The United Republic of Tanzania

Ministry of Health Community Development Gender Elderly & Children

# SUPPLEMENTARY MALARIA MIDTERM STRATEGIC PLAN (2018 – 2020)

OCTOBER 2018

**NATIONAL MALARIA CONTROL PROGRAMME**

**TANZANIA MAINLA**

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## Foreword:

The Supplementary Malaria Midterm Strategic Plan 2018 - 2020 (SMMSP 2018-2020) has been developed with the aim of fast tracking the achievement of malaria elimination in Tanzania by 2030. The plan provides a comprehensive technical guidance to stakeholders and development partners for the next 2 years, focusing on transitioning to malaria elimination in phases.

By implementing this SMMSP 2018-2020, stakeholders and Development partners agree to stratify malaria burden in the country according to a decade long observed epidemiological diversity. In the continuum of malaria elimination, stratification with matching package of interventions enables strategic adjustments to invest for impact burden reduction in high transmission settings and to advance towards malaria elimination in very low transmission areas.

SMMSP 2018-2020 development, takes on board the WHO Global Technical Strategy 2016-2030 recommendations and support for countries to update their national malaria plans. Preparation of the supplementary plan coincided with country formalization of Community Health Workers, a sustainable workforce at the community level. The major performance achievements for SMMSP 2018-2020 will be from a combination of global technical guidance, stratification of malaria burden with its matching package of interventions and added value of CHWs sustainable workforce for community engagement.

Experience from the two decades of malaria implementation and progress made, has shown us that, with adequate investments and the right mix of strategies, we can make remarkable strides against malaria. We will need strong political commitment, Multisectoral Collaborations and Strong SBCC and Advocacy reprogramming of available resources and expanded financing for specific recommended intervention in strata to see this through.

We should act and remain focused on our shared goal of eliminating malaria by 2030. I remain confident that if we all act with determination, we can reach that ambitious goal.

Ummy A. Mwalimu (MP).

**MINISTER FOR HEALTH, COMMUNITY DEVELOPMENT, GENDER, ELDERLY AND CHILDREN**

# Acknowledgement.

The Supplementary Malaria Midterm Strategic Plan 2018-2020 (SMMSP 2018-2020) was developed through an extensive consultation process that began by a first workshop in May 2018. It was concluded after adoption by the Ministry of Health, Community Development, Gender, Elderly and Children (MoHCDGEC) Senior Management members meeting in October 2018. The SMMSP was developed in close collaboration with Government Ministries, Departments, Organizations and Development partners.

Preparation of the supplementary malaria strategic plan was coordinated by technical leadership of the National Malaria Control Program (NMCP), WHO country office and Swiss TPH, the three institutions formed the facilitation team.

The MoHCDGEC acknowledges the important contributions received from members of NMCP, MoHCDGEC departments, PORALG, USAID PMI, The Global Fund and implementing partners. Their contributions have improved the entire processes for the development of this plan.

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# Acronyms

| | |
|---|---|
| ACT | Artemisinin-based Combination Therapy |
| ACD | Active Case Detection |
| ANC | Antenatal Care |
| API | Annual Parasite Index |
| CBHC | Community Based Health Care |
| CCA | Community Change Agent |
| CHW | Community Health Worker |
| CPM | Co-Payment Mechanism |
| DP | Dihydroartemisinin Piperaquine |
| DHIS | District Health Information System |
| eIDSR | Electronic Integrated Disease Surveillance & Response |
| EIR | Entomological Inoculation Rate |
| EM | Environmental Management |
| FSAT | Focused Screening and Treatment |
| GF | Global Fund |
| GTS | Global Technical Strategy for malaria 2016-2030 |
| HMIS | Health Management and Information System |
| iCCM | Integrated Community Case Management |
| IDSR | Integrated Disease Surveillance & Response |
| IMVC | Integrated Malaria Vector Control |
| IRS | Indoor Residual Spray |
| ITN | Insecticide Treated Nets |
| LGA | Local Government Authority |
| LLIN | Long-Lasting Insecticide treated Net |
| LMU | Logistic Management Unit |
| LSM | Larval Source Management |
| MCM | Malaria Case Management |
| MDA | Mass Drug Administration |
| MEEDS | Malaria Epidemic Early Detection System |
| MEEWS | Malaria Epidemic Early Warning System |
| MIS | Malaria Indicator Survey |
| MoHCDGEC | Ministry of Health Community Development Gender Elderly & Children |
| MRC | Mass Replacement Campaign |
| mRDT | malaria Rapid Diagnostic Test |
| MTR | Midterm Review |
| NBS | National Bureau of Statistics |
| NEMC | National Environment Management Council |
| NMCP | National Malaria Control Program |
| OPD | Out-patient Department |
| PORALG | President Office Regional Administration & Local Government |
| PSM | Procurement Supply & Management |
| PQ | Primaquine |
| RCH | Reproductive & Child health |
| SBCC | Social Behavior Change Communication |
| SMPS | School Malaria Parasite Survey |
| SNP | School Net Program |
| SWOT | Strength Weakness Opportunity& Threat |
| TES | Therapeutic Efficacy Study |
| TPR | Test Positivity Rate |
| TWG | Technical Working Group |
| WHO | World Health Organization |

# Executive Summary:

Malaria prevalence has declined in the country from an average of 18.1% in 2008 to 7% in 2017. The national goal is to reach 1% by 2020.The Supplementary Malaria Midterm Strategic Plan (SMMSP) 2018 -2020 was developed to facilitate achievement of greater impact and reduce malaria national average prevalence to very low levels of a set target of 1% towards elimination by 2020. In the last 10 years, approximately one third of the country consistently showed a very low (<1%) malaria prevalence. During the same period transmission remained moderate to high (10% and above) in another third of the country. The remaining third of the country has a low prevalence (1 - <10%) fluctuating between the two above extremes.

This SMMSP 2018-2020 is a product of Midterm Review (MTR) conducted in July - August 2017 at the midpoint of the National Malaria Strategic Plan (NMSP) 2015 - 2020 implementation period. MTR was conducted by the Government under WHO technical assistance and in collaboration with partners. The purpose was to assess malaria situation and program performance in order to strengthen the program implementation for better results and impact. One of the key MTR recommendation was; Update appropriate intervention packages and response mechanisms for malaria in different epidemiological strata and promote evidence based delivery of malaria intervention in the context of changing malaria epidemiology in the country.

To address the strategic, programmatic and operational challenges to the limited progression towards achievements, the Ministry in collaboration with the WHO conducted a consultative expert meeting in February 2018 of global and national malaria experts. The forum created more knowledge and recommendations on appropriate strategic approaches that will help to achieve the set targets and eventually realize greater impact and reduce malaria to very low levels.

One of the five principles underlying WHO Global Technical Strategy (GTS) 2016 - 2030 is stratification of malaria burden to optimize the implementation of malaria interventions. That is, stratified targets with its matching package of interventions and overseen by improved Surveillance, Monitoring and Evaluation (SME). The GTS 2016 -2030 recommends SME to be raised to a core intervention in National Malaria Programs to enhance tracking of disease and taking programmatic actions in response to data received from respective strata. Surveillance as an intervention functions most intensively in very low transmission in elimination settings.

The major re-orientation of the SMMSP 2018 - 2020 is stratification of malaria burden according to the observed epidemiological diversity of four major epidemiological strata, and set up for implementation of intervention packages to match with the heterogeneity. Malaria stratification provides guidance to the transition towards elimination in phases. Itis an approach that facilitates strategic adjustments to invest for impact and burden reduction in moderate to high transmission areas and disadvantaged population. Also to further decrease low transmission areas and to advance towards malaria elimination in very low transmission settings.

In addition to SMMSP 2018-2020, the strategic and performance frameworks and implementation arrangements were reoriented. The revised implementation arrangement takes on board the added value of community engagement through a sustainable workforce of Community Health Workers (CHWs). These are particularly important for; promotion on (use of LLIN, early health care seeking,), Implementation of vector control activities; (Larval Source Management-LSM and Indoor household Residual Spray-IRS, case management (Integrated Community Case Management) and Surveillance (Active Case Detection in elimination settings).

A strategic framework was revised, while the vision remain the same, the mission was edited to emphasize community engagement and to be the primary beneficiaries. Impact indicators for strategic objectives were reviewed and three out of five were changed; Case management impact is on reduction of malaria mortality, the impact for uplifted SME to core intervention is on annual updated stratification of council and region malaria burden profiles and Program Management impact is on proportion of malaria control budget funded through domestic financing.

Development of SMMSP 2018 - 2020 calls for parallel revision of the following linked areas; quantification of commodities, implementation plan, SME plan, business plan, reprogramming the budget of major malaria funders (GF and PMI) and updating guidelines to the agreed new recommended technical interventions.

SMMSP 2018 - 2020 is operational through available resources of GOT, GF and PMI. Reprogramming of available resources is needed to optimize and mobilize additional resources for specific recommended interventions in strata.

# 1 Chapter One: Background

The goal of the National Malaria Strategic Plan (NMSP 2015 -2020) is to reduce the country malaria parasite prevalence from 10% in 2012 to 5% in 2017 and less than 1% in 2020. At the mid-term point (2017) of the NMSP 2015 - 2020 implementation, the progress towards the achievement of the goal is fair at 7% prevalence but not attained the goal of 5%. With the current strategic agenda, it is unlikely the prevalence of less than 1% by 2020 will be achieved.

To address strategic, programmatic and operational challenges to the limited progress towards achievements, the Ministry with technical assistance from WHO conducted a Midterm Review (MTR) in 2017 for systematic assessment of impact and program performance. The MTR was followed by a consultative process for the forum of global and national malaria experts. The forum created more knowledge on appropriate strategic approaches to help achieve the set targets and eventually realize greater impact and reduce malaria to very low levels.

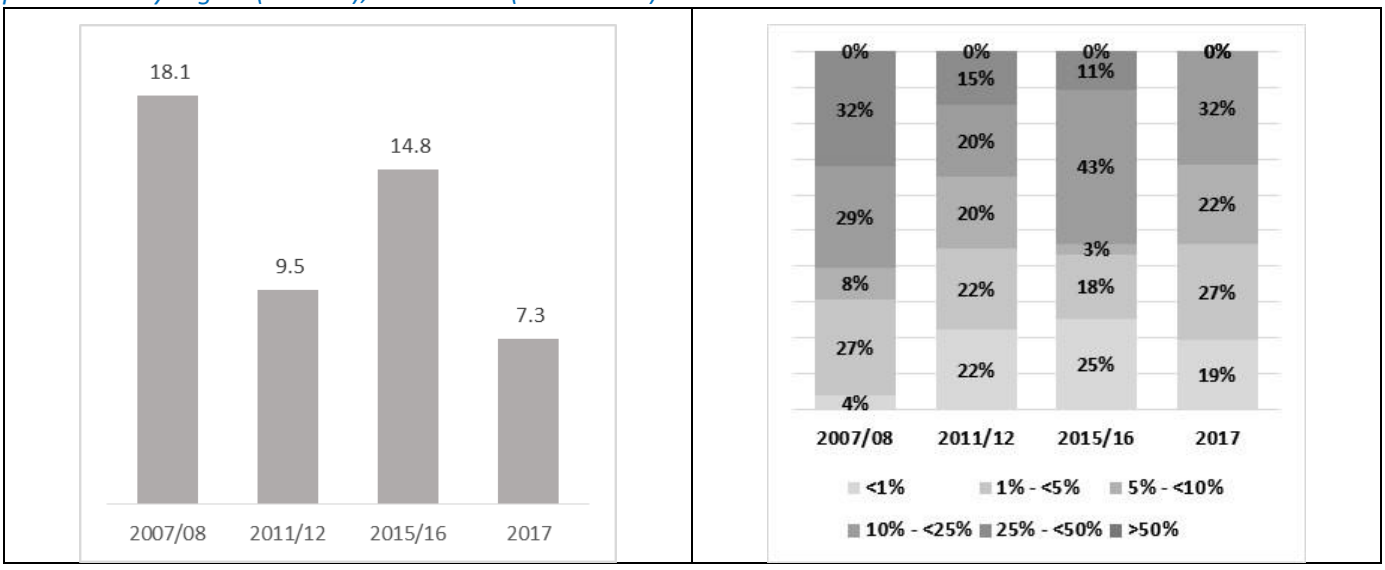
The Supplementary Malaria Midterm Strategic Plan (SMMSP) 2018 - 2020 reorients strategic approaches and set up for implementation of intervention packages to match with malaria transmission diversity in the country. It provides a credible and realistic strategic approach towards malaria elimination in Tanzania mainland.

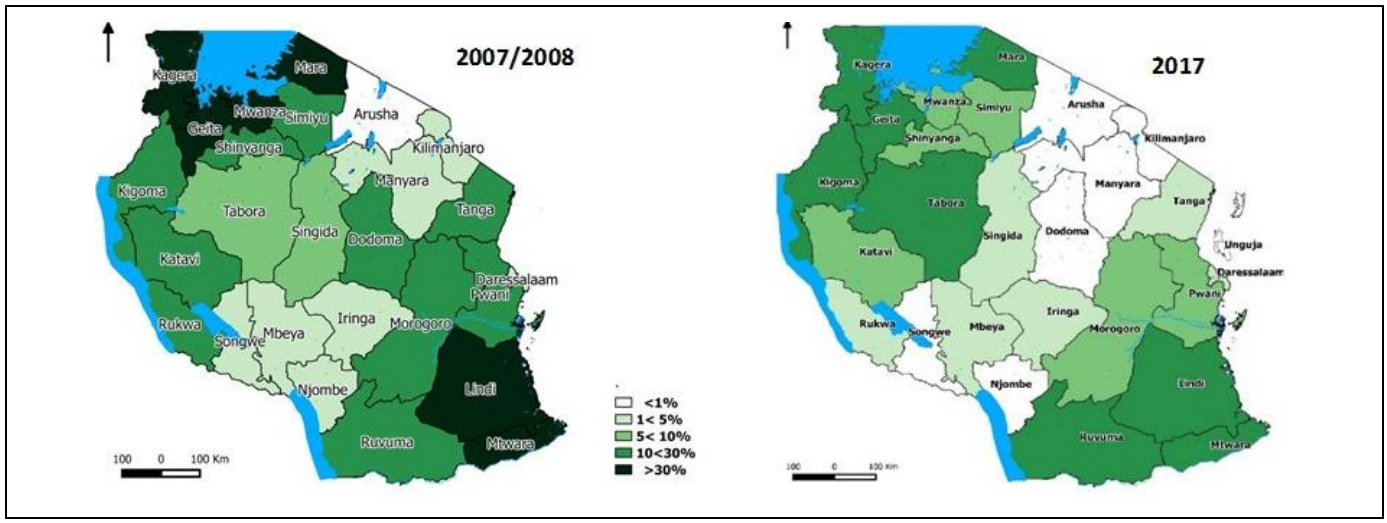
## 1.1 Justification.

### 1.1.1 The Tanzania Malaria Epidemiological Transition and its Diversity

In Tanzania, malaria prevalence has declined from an average of 18.1% in 2008 to 7% in 2017.There was an upswing of prevalence to 14.8% in 2016 but overall it is decreasing as indicated. In the last decade approximately one third (31%) of the country consistently showed a low malaria endemicity (<5% *plasmodium falciparum parasite rate - pfpr*). However, during the same period transmission remained moderate (10 % *pfpr* and above) in approximately another third of the country (32%). Within these areas *pfpr* has either remained constant or even increased. In the remaining third of the country, malaria transmission has been fluctuating between the two above extremes. Furthermore, between 2008 and 2016, the population living in extremely low malaria endemicity (<1% *pfpr*) increased from 1.5 million to 8.5 million while the population living in the highest endemic areas (>25% *pfpr* decreased from 12.5 million to 5.2 million (Figure 1).

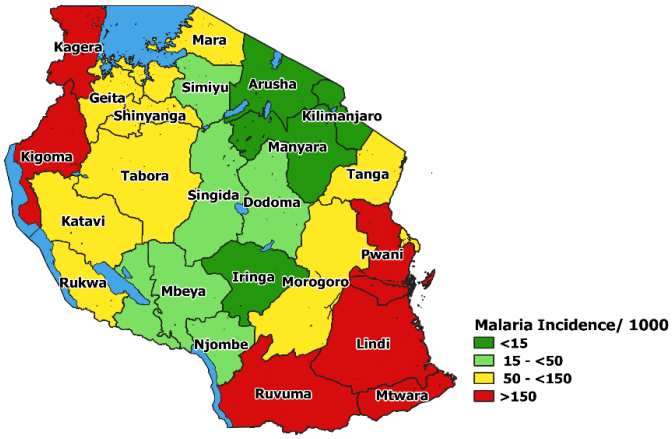
*Figure 1: Malaria parasite prevalence (left), proportion of population by epidemiological class (right), and parasite prevalence by region (bottom), 2008-2017 (source MIS)*






Recent routine data from health facilities have confirmed the transmission intensity pattern with extremely low malaria confirmed incidence, malaria cases /1,000 population in north-eastern (<15/1,000), low in central and south-western zones(15-<50 per 1,000population)and much high confirmed incidence in the north-western and in south-eastern coastal zones ( >150 per 1,000 population) (Figure 2).

*Figure 2: Malaria confirmed incidence/1000 population by Zones for 2017 (source HMIS/DHIS2)*




Malaria heterogeneity has also been consistently observed in different socio-economic strata, (urban/rural, lower/higher wealth and level of education). In 2017, people living in rural areas were 5 times more affected than those living in urban areas, while the people within the poorest wealth quintile were affected 10 times more than those in the richest wealth quintile (MIS 2015/2016).

During the past 15 years, evidence based malaria control interventions have been deployed on a massive scale: Over 71 million ITN distributed since 2014. There are two LLINs distribution mechanism in place: catch up and keep up. Mass net distribution contributed to over 70% of LLINs distributed in the past 15 years, spraying of 6 million households in targeted Regions, supply of 170 million ACT treatments and 100 million mRDT in health facilities. In addition, the capacity of several thousand health care providers and health management teams has been continuously strengthened. As a result, accessibility, usage and equity of ITNs, mRDTs and ACTs increased over the time. Nevertheless, to progress towards Malaria Strategic Plan Goals and malaria elimination needs some strategic adjustments are inevitable to facilitate high burden reduction in high transmission areas and disadvantaged populations, and advancement towards malaria elimination in low transmission areas.

**The Malaria Global Technical Strategy 2016-2030**

Within the period of planning and conducting Mid Term Review (MTR) of the NMTSP in 2017, the WHO framework to implement the Global Technical Strategy (GTS) for malaria 2016 – 2030 was released just a year before the MTR. It describes priority interventions and actions for countries and provides clear strategic approaches to accelerate efforts toward malaria elimination in Africa through interventions tailored to the local context. National malaria plans are advocated to take into account the epidemiology and diversity of malaria in a country. This diversity need to be addressed by stratification of malaria burden and tailoring interventions to respective strata. Furthermore, in line with the GTS recommendations, SME has been uplifted to a core intervention, in addition to Malaria Prevention through Integrated Malaria Vector Control and Diagnosis and Treatment strategies

The current diversity in malaria epidemiology, demographic and socio-economic factors motivate stratification of malaria burden in the country. This Supplementary Malaria Midterm Strategic Plan2018 – 2020 (SMMSP 2018-2020) brings on board WHO recommendations on malaria burden stratification which tailor interventions to local context. The SMMSP 2018-2020 is introducing four evidenced based epidemiological strata; 'very low', 'low', 'moderate' and 'high' transmission strata and one 'urban' operational stratum (see Stratification in section 1.2.3 and Chapter 2) with matching stratified individual intervention packages (see Intervention packages section 1.2.4 and Chapter Four: Intervention packages per Strata).

### 1.1.2 The Malaria Strategic Plan Mid-Term Review (2017)

This Supplementary Malaria Midterm Plan is an outcome of Midterm Review (MTR) conducted between July - August 2017 at the midpoint of the National Malaria Strategic Plan (NMSP) 2015-2020 implementation period in collaboration with WHO and other partners. The WHO provides technical support to malaria endemic countries to perform Malaria Program Review. The MTR is management tool that assesses progress and performance of country programs by refining performance and eventually, the strategic direction and focus.

At the time of the review the country malaria prevalence was 14.8% (MIS 2015-16), updated data from MIS 2017 indicated the prevalence of 7.3%. Despite the significant reduction of malaria prevalence, it was observed unlikely that the set goal of reducing malaria prevalence to less than 1% by 2020 would be achieved unless strategic approaches are realigned to address the wide diversity of malaria transmission within and between administrative regions.

Recommendations of MTR are listed in Appendix A: Mid Term Review and Consultative Malaria Expert Meeting Recommendations.

### 1.1.3 Strategic Questions and Consultative Malaria Expert Meeting (2018)

To address strategic, programmatic and operational challenges to limited progression towards achievement of malaria elimination, the Ministry conducted a consultative process through global and national malaria experts. The forum enabled the NMCP and its partners to gain more knowledge on appropriate strategic approaches that will facilitate achievement of set targets, realize greater impact and reduce malaria to very low levels[1].

The NMCP identified two major strategic questions for the near future: 1) Should the country continue charting in the same way towards malaria elimination with the current interventions? 2) Is the current situation conducive for deploying suitable and ambitious intervention packages for defined areas/populations? (Settings with different malaria risks such as individuals with low wealth/education; hard to reach/urban areas; areas resilient to transmission changes or with consistently low transmission).

At the heart of these two questions, is the strategic decision on how to move towards malaria elimination. In view of current status and the future, the most relevant programmatic matters to be addressed are: to ensure maximal reduction of morbidity and mortality, sustained provision of universal access and coverage of proven interventions in all areas; support the program to effectively transition from high or moderate to low, very low, or zero levels of malaria transmission; consider scale-down of some of recommended intervention in consistently very low malaria transmission settings and intensify malaria surveillance and response.

[1] *NMCP Consultative Malaria Expert Meeting Report 2018*

The recommendations of the Consultative Malaria Expert Meeting are listed in Appendix A: Mid Term Review and Consultative Malaria Expert Meeting Recommendations.

## 1.2 The Supplementary Malaria Midterm Strategic Plan Review Process

### 1.2.1 Outline of the consultative Supplementary Midterm Strategic Plan (SMMSP) development process

The development of SMMSP 2018-2020 was done through a consultative processes. The process had three main steps

1. NMCP Midterm review - July-August 2017 (see section 1.1.2)
2. Consultative global and national expert meeting- February 2018. (see section 1.1.3)
3. Stakeholders workshops to develop the SMMSP 2018-2020 , the workshops were conducted in May to June 2018. The aims were: (a) realignment of the SMMSP to updated targets of the performance framework for epidemiological and implementation achievements and a SWOT analysis of the implementation per intervention areas; (b) development and definition of pragmatic epidemiological stratification; (c) identification of appropriate intervention packages to move from "one size fits all" to "tailored interventions" according to needs in strata; (d) modeling impact and costs; (e) redefine the strategic outline and the implementation framework with revised goal, strategic and specific objectives, interventions; and (f)update the implementation arrangements.

The elaborated outcomes were assembled and disseminated to stakeholders and partners (July 2018).
During the development phase of the SMMSP 2018-2020 draft, malaria stratification was shared and had technical inputs from the Global Malaria Programme (GMP) at the WHO headquarters in Geneva and from the WHO Country Office.

The main reorientation of SMMSP 2018 - 2020 is the stratification of local malaria burden and aligning it to the corresponding recommended interventions package.

### 1.2.2 Strategic and Operational Strength, Weakness, Opportunities and Threats (SWOT) Analysis

The summary of achievements in the implementation of the NMSP – 2015 - 2020 was obtained from performance framework of the midterm targets of the goal, strategic and specific objectives. The analysis of the Strengths, weaknesses, opportunities and threats (SWOT) was used as a tool to identify major positive aspects (strengths and opportunities) and potential for successful implementation of the next phase of the strategic plan. It was also used to identify major negative aspects (weaknesses and threats) to be addressed during the next phase. The SWOT analysis facilitated redefining and refining of specific objectives with their outcomes and interventions with their corresponding outputs (Table 1).

*Table 1: Strength, Weakness, Opportunities and Threat (SWOT) analysis*

| **Integrated Malaria Vector Control** | |
|---|---|
| Positive aspect (Strength & Opportunities) | Negative aspect (Weakness & Threat) |
| – Availability of local manufacturers for Vector Control interventions (LLINs and Larvicides)<br>– Strong partnership in resource mobilization(Government, NGOs and Private sector) and multiple LLINs distribution channels<br>– Presence of high National level political interest to implement and/or expand VC interventions (IRS, Larviciding, Environmental Management)<br>– Strong collaboration with research institutions and academia for assessment of effectiveness of implemented and innovative interventions<br>– Established Community based VC capacity for IRS and Larviciding<br>– Safety of the bio- larvicides facilitates Larviciding to be a community led intervention | – High dependency on donors funding (LLINs, IRS).<br>– Spreading of insecticide resistance (IRS, LLINs)<br>– Lack of LLINs in the private sector/commercial net distribution channel (common in urban settings)<br>– High IRS cost for insecticide, operations and high specification on proper disposal of its solid wastes<br>– Larviciding and EM has no streamlined recommended interventions by the NMCP to facilitate formation of performance indicators for councils<br>– The available entomological database lacks some key data required for calculation of strategic impact indicator (e.g. Entomological Inoculation Rate - EIR) |

| Case Management | |
|---|---|
| Positive aspect (Strength & Opportunities) | Negative aspect (Weakness & Threat) |
| – Assured SP ensures availability for IPTp through the GoT<br>– Strong GF partnership in commodities resource mobilization, predictable procurement framework and deliveries (ALu, mRDT and injectable Artesunate)<br>– Strong collaboration with researchers towards assessment of antimalarial efficacy (TES)<br>– Partnership with regulatory bodies (TFDA& NHLQATC) on QA of diagnostics and antimalarials<br>– Availability of GF Co-payment mechanism in the private sector for accessibility of subsidized Quality Assured ACTs<br>– Introduction of HF based Malaria Service & Data Quality Improvement (MSDQI) package<br>– Institutionalization of CHWs for CBHC is a potential platform for iCCM interventions<br>– Functional monitoring framework on availability of malaria commodities (commodity based surveys and LMU staffs) | – High dependency on donors funding for malaria commodities (mRDT, ACTs, Injectable Artesunate) procurement<br>– Consistent underperformance of community access to diagnosis and treatment interventions within 24 hours<br>– Inadequate monitoring of the private sector on the quality of services for malaria diagnosis and treatment.<br>– Unaccounted ACT treatments in public sector: discrepancy between ACT dispensed against malaria patients<br>– Slow uptake of testing at community level<br>– Existence of non-recommended antimalarials in the private sector<br>– Late bookings for ANC visits lowers the IPTp performance<br>– New recommended MCM approaches and treatment are not included in the MCM guidelines (Primaquine, Malaria Case Based Surveillance) |
| **Surveillance, Monitoring & Evaluation** | |
| Positive aspect (Strength & Opportunities) | Negative aspect (Weakness & Threat) |
| – Effective and efficient use of the DHIS2 platform for routine monitoring of key malaria indicators<br>– Establishment of a DHIS 2 based dashboard to enhance use of malaria data for service improvement and accountability<br>– Strong collaboration with partners (research institutions, academia, PO-RALG, Meteorological Agency, Bureau of Statistics) to conduct planned surveys; SMPS, MIS, TES, Entomological Surveillance<br>– Integration with eIDSR a potential platform for early detection for malaria epidemics<br>– Decentralization of HMIS-DHIS2 data entry at the Health centers and Hospitals | – The current capacity to implement surveillance as a core intervention in line with GTS 2016 -2020 recommendations is very weak<br>– Underutilized malaria dashboard for effective utilization such as periodic HFs feedback<br>– Malaria indicators are not well integrated in the standard eIDSR, no established threshold for outbreak detection.<br>– No surveillance set up introduced in the elimination areas for malaria case based surveillance (MCBS)/case notification<br>– Lack of reports from autonomous (standalone) laboratories<br>– Malaria deaths are single events based on recording and are under reported in HMIS<br>– Limited availability of HMIS tools in the private health facilities cause under reporting of total cases in the country. |
| **Social Behaviour Change Communication** | |
| Positive aspect (Strength & Opportunities) | Negative aspect (Weakness & Threat) |
| – Health and Promotion Section of the Ministry of Health guidance and ensuring adherence to standards of the SBCC interventions<br>– Functional SBCC TWG to review messages and materials, coordinate SBCC implementation and harmonize SBCC partners.<br>– Formalized cadre of CHWs countrywide<br>– Malaria Safe Companies initiative ready to participate in the fight against malaria<br>– Trained Regional/Council Malaria Focal Persons, Ward Health Officers and Community Change Agent (CCAs) to implement Malaria SBCC activities.<br>– NMCP ability to verify SBCC activities | – Donor dependency because there is minimal or no raising of local resources to implement effective SBCC at central and council levels<br>– The formalized cadre of CHWs is not operational,affecting the attainment of SBCC indicators; existing vertical projects supporting CHWs have limited geographical coverage<br>– Low coverage of interpersonal communication approaches as compared to mass media, due to limited resources<br>– There is no coordination on potential malaria linked activities with other non-health sector sections and ministries (Water, Agriculture, Environment, Education, Infrastructures, Energy and Minerals).<br>– Some myth and misconceptions on malaria interventions such as LLINs use and IRS |
| **Program Management** | |
| Positive aspect (Strength & Opportunities) | Negative aspect (Weakness & Threat) |
| – Strong leadership, political commitment and partnership<br>– Universal access of tools and implementation of recommended interventions. | – Inadequate domestic funding for malaria interventions.<br>– Inadequate numbers of technical personnel in the programme and considerable numbers among them are under donor support, posing sustainable challenges. |

| | |
|---|---|
| – Availability and strong collaboration with development partners with diverse expertise supporting the malaria programme<br>– Existence of updated Malaria policy documents, strategic plan and guidelines per thematic areas.<br>– Appropriate messages to the community in the utilization of available malaria tools and interventions.<br>– Consistency in capacity building to staff at all levels | – Technically equipped R/DMIFP reallocation to other duties.<br>– Lack of resources allocation for maintenance of equipment procured at Regional and District levels.<br>– Uncertainties of continued funding to sustain the gains achieved. |

### 1.2.3 Development of Stratification

Malaria stratification is classification of geographical areas or localities according to the malaria burden. Established cutoff points of local malaria burden matched with stratified interventions in the country and produced four epidemiological classes; 'very low, 'low', 'moderate' and 'high' burden strata and one operational strata; 'urban'. Stratification maps are the outputs of classified malaria burden in different areas of the country. Administrative regions and councils are the levels used to create a macro-stratification of the malaria burden. Based on operational reasons, the urban strata was also added. Urban areas are municipal and city councils.The objective for regional classification is for a broader definition of the malaria situation while council level stratification provides a more granular malaria burden definition potential for adoption and operationalization of different interventions. Subsequent micro-stratification will be elaborated as part of the SME implementation plan to further stratify a council to sub-council level and fine tune interventions at sub-council levels.

The detailed stratification framework is described in Chapter Two: Stratification and Appendix B: Stratification Methodology.

### 1.2.4 Identification of appropriate Intervention packages

The supplementary malaria midterm strategic plan for the period 2018-2020 aims to introduce more tailored malaria interventions to address the specific needs of the stratified malaria burden in the country. This is basically reflecting two major intents: a) to reduce the disease burden in moderate and high transmission areas and b) to introduce specific interventions targeting disease elimination in very low and low transmission areas.

The detailed intervention package framework is described in Chapter Four: Intervention packages per Strata and Appendix D: Malaria Interventions included in the Supplementary Malaria Midterm Strategic Plan 2018-2020.

### 1.2.5 Modeling Impact and Costs

Modeling of malaria interventions for impact was included in the development processes of SMMSP 2018-2020.Modeling assumptions are based on data and previous knowledge. Modeling results contribute to technical and operational information for better understanding on specific aspects of intervention impact and cost. The modeling exercise refined strategic planning in particular of Interated Malaria Vector Control (IMVC) and Malaria Case Management (MCM) interventions. However, next generation LLIN and PBO effectiviness on metabolic resistance was not included. Modelling was used to provide information for some of the key questions raised in the most strategic way forward towards malaria elimination in the country.

The detailed description of the modeling outcomes are described in Chapter Five: Modeling impact and cost by strata.

### 1.2.6 Re-defining of the Strategic Outline and Performance Framework

The strategic outline of the current strategic plan was revised. The Vision remains the same while the mission has retained the facilitation of access to intervention as the core activity with specification on the type of intended access. The mission was also edited to emphasize community engagement being the primary beneficiaries. The target for the main goal was revised to have the 2017 midterm strategic period as a benchmark. Impact indicators for strategic objectives were reviewed and three components of the impact indicators realigned; the entomological inoculation rate levels remained the impact indicator for malaria vector control, the case management impact was converted to reduction in malaria mortality, Surveillance, Monitoring and Evaluation impact was redefined to monitor annually the malaria stratification profile by councils; Social behaviour change communication and advocacy focus on increasing caretakers who can take appropriate actions to protect their children from malaria and emphasis on shifting from external to domestic funding was highlighted as the main indicator for program

management. The detailed description of the revised strategic outline, performance framework and implementation arrangements are described in Chapter Three: Revised Strategic Framework; Chapter Six: Implementation Arrangements and Appendix F: Performance Framework.

# 2 Chapter Two: Stratification

Malaria stratification involves the classification of geographical areas or localities according to the burden of malaria. It is an essential element of effective targeting of interventions and efficient resource allocation. Accurate development of malaria stratification provides guidance to the transition to both disease burden reduction and elimination. The aim of stratification is identification and optimization of effective intervention packages. The WHO GTS 2016-2030 recommends that all countries can accelerate efforts towards elimination through interventions tailored to local contexts. The recommendations from WHO together with those received during the 2017 mid-term review of the Tanzania National Malaria Strategic Plan 2015-2020 and the 2018 Tanzania malaria consultative expert meeting accentuated the need for Tanzania to stratify the malaria burden and accordingly revise its malaria strategic plan. The following sections describe in detail the methodology used for malaria macro- and micro-stratification in mainland Tanzania.

## 2.1 Macro-stratification

The objective of this type of stratification is to determine broad category areas at the lowest resolution as possible of high malaria transmission areas for burden reduction against low malaria transmission for elimination. The resulting strata of transmission intensity provides guidance to develop intervention packages suitable for each area.

The Macro-stratification level chosen for Tanzania Mainland considered the Local Government administrative level for which operational decisions are being made at National level. The regions and councils were assigned respectively to 4 epidemiological strata - Very low, Low, Moderate and High and 1 operational stratum - Urban.

### 2.1.1 Indicators used for Macro-stratification

When selecting the indicators for stratification, the recommendations from WHO together with the availability, frequency and robustness of malaria data in Tanzania were considered. Table 2 below summarizes the WHO recommended parameters and the country specific indicators that were used for the stratification process.

*Table 2: Key parameters used for country malaria stratification*

| Key parameters | Source | WHO recommended | Selected Country parameters | Remarks |
|---|---|---|---|---|
| Community | | | | |
| Parasite Prevalence | School Malaria Parasitological Survey | ✓ | ✓ | Biennial |
| Health Facility | | | | |
| Malaria incidence | HMIS/DHIS2, OPD | | ✓ | Annual confirmed malaria OPD cases/1000 population |
| Annual Parasite incidence | HMIS/DHIS2, Laboratory | ✓ | ✓ | Annual confirmed cases from laboratory register |
| Test Positivity rate | HMIS/DHIS2, Laboratory | ✓ | ✓ | Annual mRDT positivity rate |
| Case counts | HMIS/DHIS2, OPD | ✓ | | To be reserved for low transmission areas |
| ANC positivity rate | HMIS/DHIS2, ANC | | ✓ | Annual routine malaria test in 1st ANC visit |

Various stratification approaches, with combinations of the indicators selected, were tested. The strength and weakness of each of the indicators were considered and this guided in selecting the best stratification approach. Table 3 below summarizes the strengths and weaknesses of each indicator.

*Table 3: Strengths and weaknesses of the indicators used for stratification*

| Indicator | Strengths | Weakness |
|---|---|---|
| School Malaria Parasitological Survey (SMPS) | Robust data collected in a standardized manner<br>conducted in a representative population | Occurs every two years<br>Expensive |
| Confirmed malaria incidence/1000 population | Readily available data in the DHIS2 with reporting rate of OPD above 90% | Affected by population size, accessibility to health facilities |
| Annual Parasite Incidence (API) | Readily available data in the DHIS2 | Dependent on the testing rate of the catchment population.<br>Affected by population size<br>The reporting tools of laboratory test results were recently introduced in Tanzania (October 2015) and hence the reporting rate is yet to reach above 90% |
| Test positivity Rate (TPR) | Readily available data in the DHIS2<br>Not affected by population size | Low testing rate can result in high positivity and therefore not reflective of the actual situation<br>The reporting tools of laboratory test results were recently introduced in Tanzania (October 2015) and hence the reporting rate is yet to reach above 90% |
| ANC Positivity Rate | Readily available data in the DHIS2<br>Data validated [2]<br>High Testing rate in ANC | |

For macro-stratification, a combination of the five selected indicators were used to develop one robust and meaningful stratification. The stratification process was divided into five steps: 1) establishing cutoffs; 2) using the data to assign strata; 3) assigning scores; 4) generating maps; and 5) further supporting analysis.

The first step involved establishing cut offs. Each indicator was first stratified before combining all indicators into a single stratification map. Suitable cut-offs for each of the indicators were determined. Thereafter the cut offs were applied to assign councils to the strata. The indicator selected for stratification were then summed using a scoring system (assigning values 1 to 4 to each strata) in order to produce a combined stratification. The final steps were then to create maps and to do some further analysis to support the developed stratification method. The detailed description of each of the steps are described in Appendix B: Stratification Methodology.

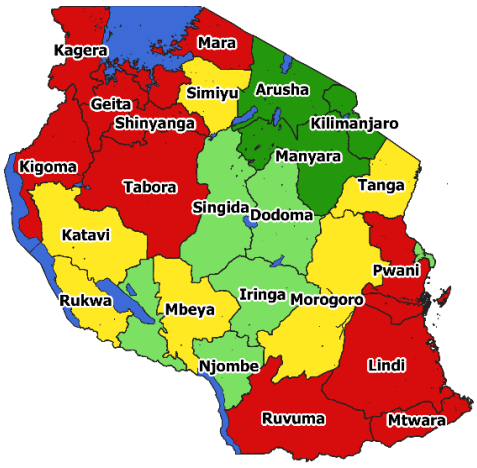
### 2.1.2 Selected Strata

The proposed macro-stratification at regional and council level for Tanzania Mainland is summarized in Chapter Two: Stratification. This outcome was selected for its robustness after a thorough and meticulous process described in details in Appendix B: Stratification Methodology. All five indicators (confirmed incidence, SMPS prevalence, API, TPR and ANC positivity rate) were used to develop the stratification with SMPS being the reference parameter to develop the cut offs described in Table 4 for the other indicators (see also correlation analysis in Appendix B: Stratification Methodology). The maximum value of the assessed period (three years) was taken to assign a councils into the respective stratum. The weights of API and mRDT TPR were reduced to factor in the low reporting rate. This approach increased the robustness of the stratification and will allow periodic monitoring of the status of the respective administrative level. The Tanzanian parasite prevalence cut-off is slightly different from the one

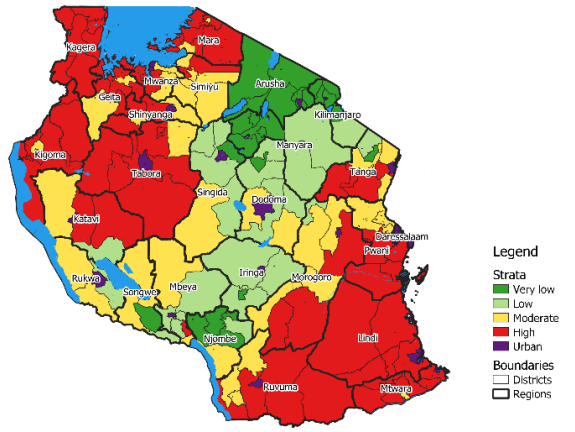
[2] *N.Brunner: Validating the use of pregnant women as a sentinel population for malaria surveillance in Tanzania, 2016*

proposed by WHO[3] (see Table 5). For further references and obtaining the councils stratification and regional stratification profiles see Figure 3 and Figure 4, and Appendix C: Regional Profiles and Council Strata.

*Figure 3: macro-stratification at regional (upper map) and council (lower map) level*




| Count of regions | | |
|---|---|---|
| Stratum | Epi strata | Epi + non epi strata |
| Very Low | 3 | 3 |
| Low | 6 | 5 |
| Moderate | 6 | 6 |
| High | 11 | 11 |
| Urban | | 1 |
| Total | 26 | 26 |




| Count of councils | | |
|---|---|---|
| Stratum | Epi strata | Epi + non epi strata |
| Very Low | 28 | 26 |
| Low | 34 | 23 |
| Moderate | 49 | 41 |
| High | 73 | 69 |
| Urban | | 25 |
| Total | 184 | 184 |

Note:

Cut offs for each of the indicators were determined by using the SMPS 2017 data as a reference point and developing the cutoffs for other indicators based on this as shown in table 5 above.

The maximum values of all three years were used to categorize the districts into their respective strata

The mRDT test positivity was used

The weights of API and TPR towards the overall score was reduced as shown in Table 16

The distribution of counts of councils per strata for each indicator using SMPS as reference is summarised in Figure 3.

*Table 4: The cutoff thresholds for selected stratification*

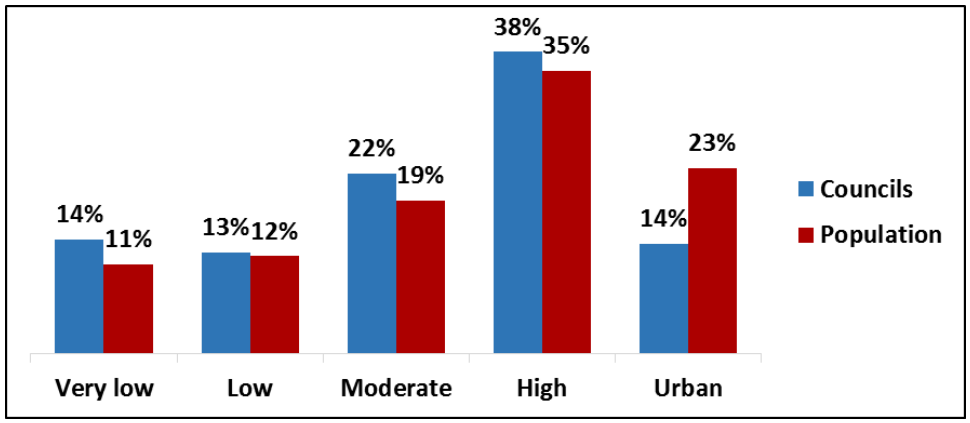
| | Prevalence (SMPS) | Incidence | ANC Positivity | API | TPR |
|---|---|---|---|---|---|
| **Very low** | <1 | <15 | <1 | <15 | <5 |
| **Low** | 1-<5 | 15-<50 | 1-<3 | 15-<75 | 5-<15 |
| **Moderate** | 5-<30 | 50-<150 | 3-<10 | 75-<150 | 15-<30 |
| **High** | >30 | >150 | >10 | >150 | >30 |

[3]WHO, A framework for Malaria Elimination (2017)

*Table 5: Parasite prevalence cut offs*

| | Parasite prevalence Cut off points (%) | | |
|---|---|---|---|
| **Stratum** | **WHO** | **NMCP** | **Remarks** |
| **Very low** | <1 | <1 | NA |
| **Low** | 1-<10 | 1-<5 | The conservative NMCP cut off of <5% is a strategic risk mitigation measure to increase the certainty of a more stable classification of low transmission |
| **Moderate** | 10-<35 | 5-<30 | The wider range according to the NMCP cut offs<5% to <30 is a strategic measure to allow the deployment of intensive burden reduction intervention in the moderate burden stratum |
| **High** | >35 | >30 | NA |

*Figure 4: Percentage of districts and population in proposed Tanzania malaria stratification*




*Note: Around half of the 25 Municipal and City Councils fall into the strata "very low" (n=2) and "low" (n=11).*

## 2.2 Micro-stratification

Micro-stratification further defines malaria burden below the council level (ward or village). The objective is to determine the high and low strata within a council and ultimately target the most appropriate interventions according to the localized burden. Development and updating of council malaria profile including micro-stratification is a strategic impact indicator for SME. Malaria surveillance as a newly uplifted core intervention functions most intensively in very low transmission of elimination settings. See SME impact indicator in chapter 3 and its related outcome indicator for very low transmission settings. The micro-stratification methodology is described in Appendix B: Stratification Methodology.

# 3 Chapter Three: Revised Strategic Framework

## 3.1 Vision, Mission and Goal

### 3.1.1 Vision

Tanzania becomes a society free from malaria.

### 3.1.2 Mission

Ensure all Tanzanians have access to quality, effective, safe, and affordable malaria preventive and curative interventions through timely and sustainable collaborative efforts with partners and with emphasis on community ownership being the principle beneficiaries

### 3.1.3 Goal

Malaria control is the continuum to malaria elimination. **The average national goal is to reduce malaria prevalence from 7.3% in 2017 to less than 1% in 2020.** Stratification is an intervention to a new malaria surveillance core intervention. The targets for strata are formulated to control, reduce malaria burden in moderate to high strata, and maintain very low prevalence in elimination areas.

The goal is to reduce the average malaria prevalence in moderate and high disease burden areas from 16% in 2017 to less than 5% in 2020 and in low disease burden areas from 3% in 2017 to less than 1% in 2020.

### 3.1.4 Strategy Components

Malaria intervention components

**Core interventions**

- Integrated Malaria Vector Control
- Malaria diagnosis, treatment and preventive therapies
- Surveillance, monitoring and evaluation

**Supportive interventions**

- Promotion of malaria prevention and curative services through information, education and communication
- Programme management, partnership development and resource mobilization

## 3.2 Malaria Strategic Objectives and their Impact Indicators

| Strategic objectives | Impact indicators | | Target | |
|---|---|---|---|---|
| | | | Baseline 2017 | End-line 2020 |
| To reduce transmission of malaria by maintaining effective and efficient vector control intervention packages recommended per malaria strata | Reduce entomological inoculation rate (EIR) to <0.25 [4] | | NA | <0.25 |
| To prevent the occurrence of mortality related to malaria infection through promotion of universal access to appropriate early diagnosis and prompt treatment and provision of preventive therapies in vulnerable groups | Reduce reported malaria mortality rate in health facilities to 5 per 100,000 [5] | | 8/100,000 | 5/100,000 |
| To provide timely and reliable information to assess progress towards the set global, national and sub-national targets, to trigger responses to the identified needs and to ensure that resources are used timely and in the most cost-effective manner to account for investments made in malaria control | Proportion of councils stratified according to the transmission intensity epidemiological class | Very low | 15% | 30% |
| | | Low | 18% | 30% |
| | | Moderate | 27% | 20% |
| | | High | 40% | 20% |
| To strengthen an enabling environment where individuals at risk from malaria are empowered to protect themselves and their families from malaria and seek proper and timely malaria-treatment | Proportion of caretakers who are able to take actions to protect their children from malaria | | 85% | 90% |
| | Proportion of caretakers with children under five years old with fever in the last two weeks for whom advice or treatment was sought | | 80% | 90% |
| Efficient programmatic and financial management of malaria control interventions at all levels, implemented through effective and accountable partnerships to assure adequate resources | Proportion of malaria control budget funded through domestic financing | | 13% | 50% |

*[4] At low levels of transmission, the estimated entomological inoculation rate may not be reliable, and alternative methods should be considered for evaluating transmission risk. Usually in hypoendemic, mesoendimc, hyperendemic and holoendemic areas the EIR is lower than 0.25; 0.25-10; 11-140 and more than 140 respectively. The national target has been set to an EIR of <0.25 by 2020 (more realistic and measurable compared to the previous target of <0.1)*

*[5] Mortality attributed to malaria as underlying cause in health facilities*

## 3.3 Specific Objectives and Outcomes

### 3.3.1 Integrated Malaria Vector Control

| IMVC Specific objectives | Outcomes indicators | Targets | |
|---|---|---|---|
| | | Baseline 2017 | End-line 2020 |
| Ensure adequate access to LLINs of the population at risk according to transmission settings | Percent of the household population with access to an LLIN within their household (assuming one LLIN covers two persons) | 62.5% | 80% |
| Consolidate and expand IRS in epidemiologically and operationally suitable areas | Percent of households in the country sprayed with recommended insecticide(s) within the past 12 months | 3.7% | 25% |
| Implement appropriate, sustainable and quality larval source management interventions in suitable epidemiological and operational areas | Number of councils implementing larval source management according to the national integrated malaria vector control guidelines | NA | 184 |
| Provide a strategic framework for coordination and continuous assessment for the implementation of evidence-based IMVC interventions | Number of innovative evidence-based integrated initiatives for malaria vector control adopted and introduced in the Country | 2 | 4 |

### 3.3.2 Case Management

| MCM Specific objectives | Outcomes indicators | Targets | |
|---|---|---|---|
| | | Baseline 2017 | End-line 2020 |
| Provide universal access to appropriate, quality and timely malaria diagnosis to all people with signs and symptoms of malaria | % of U5 children with fever who had a malaria test the same or next day after onset of a disease | 43% | 75% |
| Provide universal access to appropriate, quality and timely treatment to all people who have malaria | % children under age 5 with fever who were treated with recommended antimalarial the same or next day following the onset of fever | 34.5% | 80% |
| Provide appropriate and effective services to reduce the risk of malaria infection and its complications among populations biologically and socioeconomically vulnerable to malaria | % of women with live birth in the previous two years who received three doses or more of SP (IPTp3+) | 56.1 | 80% |

| MCM Specific objectives | Outcomes indicators | Targets | |
|---|---|---|---|
| | | Baseline 2017 | End-line 2020 |
| Ensure that commodities used in malaria patient care and prevention are consistently safe, quality assured and available at the points of care | Proportion of public healthcare facilities with no stock outs of ACT at the end of the month | 95% | 88% |
| | Proportion of public healthcare facilities with no stock outs of mRDTs at the end of the month | 95% | 99% |
| Deploy appropriate malaria case management interventions and preventive therapies in case of special situations, emergency, outbreaks and resurgence to reduce the risk of severe morbidity and mortality | Number and proportion of emergency situation in which correct malaria case management interventions have been implemented | NA | 5 (100%) |

### 3.3.3 Surveillance Monitoring and Evaluation

| SME Specific objectives | Outcomes indicators | Targets | |
|---|---|---|---|
| | | Baseline 2017 | End-line 2020 |
| Improve quality and timeliness of malaria indicators within the routine health information system | Proportion of health facilities among all facilities reporting OPD indicators monthly data through the HMIS | 98% | 100% |
| Strengthen malaria framework for collecting, processing and storing essential indicators from periodic service delivery and programmatic surveys | Proportion of updated datasets with key indicators for monitoring preventive malaria services, logistics, coverage, quality of service provision, vector and parasite dynamics included in composite database and available for programmatic decision making[6] | 0% | 100% |
| Maintain a comprehensive malaria knowledge management system to collate, interpret, disseminate, and promote the use of quality malaria data for evidence-based decision making at all level | Proportion of quarterly and annually malaria epidemiological bulletin developed and disseminated to malaria partners and stakeholders | 4 (100%) | 8 (100%) |
| Strengthen malaria epidemic prevention and control in very low and low transmission settings | Proportion of malaria epidemics detected and responded within two weeks from the onset | NA | 80% |

[6]*The minimum set of data (and frequency of updates) should include: a) Vector control implementation indicators - LLIN, IRS and LSM (annual); b) insecticide and therapeutic efficacy -TES and IRM (annually); c) vector and parasite dynamics – MVS (quarterly), SMPS (biennially); d) MSDQI (quarterly)*

| SME Specific objectives | Outcomes indicators | Targets | |
|---|---|---|---|
| | | Baseline 2017 | End-line 2020 |
| Establish appropriate surveillance system in 'very low' transmission settings | Number and Proportion of districts within the “very low” transmission stratum that established appropriate surveillance system | 0 | 26 (100%) |

### 3.3.4 Social and Behaviour Change Communication

| SBCC Specific objectives | Outcomes indicators | Targets | |
|---|---|---|---|
| | | Baseline 2017 | End-line 2020 |
| Reinforce and update knowledge and practice amongst all community members about appropriate malaria prevention, testing and treatment, promote desired positive behaviours and influence social norms about healthy behaviours | Proportion of population (disaggregated by sex) with knowledge of measures to avoid malaria | 92/89% | 95/95% |
| | Proportion of population (disaggregated by sex) with knowledge on where malaria test and treatment is obtained | 79/92% | 95/95% |
| Maintain high knowledge and improve good practices amongst vulnerable groups - or their care takers - with elevated risk of malaria infection about their specific risk and the prevention and treatment options available to them | Proportion of women 15-49 years who know pregnant women are at higher risk of getting malaria | 93% | 95% |
| Encourage communities to initiate and implement community-based malaria control initiatives | % of women (and men) who state that malaria is the most serious health risk in the community | 57% | 80% |
| Create strong SBCC public private partnership to maximize efforts and ensure consistency in the fight against malaria | Number and proportion of private sector companies that contribute (programmatically or financially) to prevent and control malaria for their workforce and broader community | NA | 80/100 (80%) |

### 3.3.5 Program Management

| PM Specific Objectives | Outcome indicators | Targets | |
|---|---|---|---|
| | | Baseline 2017 | End-line 2020 |
| Improve the effectiveness and accountability of malaria control implementation by strengthening partnerships and cooperation with malaria control stakeholders at all levels | Programme performance as rated over time through semi-annual independent evaluation | 'A' | 'A'/'1 |
| Increase the level of resource mobilization to fund the strategic plan by 90%, according to the programmatic needs | Proportion of the strategic plan interventions budget funded | 80% | 90% |
| | Proportion of MoHCDGEC and PORALG budgets dedicated to malaria interventions | NA | 10% |
| Promote a harmonized regional and inter-sectoral approach to malaria control so at least two action plans will be developed respectively | Regional/cross-border and multi-sectoral malaria initiatives action plans developed | 0 | 3 |

## 3.4 Interventions

### *Vector Control*

| 1.1. Ensure adequate access to LLINs of the population at risk according to transmission settings | |
|---|---|
| 1.1.1 | Implement a mass replacement campaign to bring LLIN coverage to at least 80% of all households in low, moderate and high strata |
| 1.1.2 | Keep up LLIN coverage to at least 80% of all households in low, moderate and high strata trough school net and other targeted distribution mechanisms |
| 1.1.3 | Implement RCH LLIN distribution to cover biological vulnerable groups and to keep up coverage to at least 80% of all households countrywide |
| 1.1.4 | Implement targeted LLIN distribution to socio-economic vulnerable population to keep up coverage at 80% of all households countrywide |
| 1.1.5 | Create an enabling environment to revive the commercial market for ITNs and LLINs |

| 1.2. Consolidate and Expand IRS in epidemiologically and operationally suitable areas | |
|---|---|
| 1.2.1 | Build capacity of Local government Authority and private sector to plan, implement, and evaluate IRS |
| 1.2.2 | Application of quality IRS in endemic areas/councils with perennial high transmission and resilient to change |
| 1.2.3 | Application of quality IRS in councils with high significant level of pyrethroids resistance |
| 1.2.4 | Application of foci quality IRS in very low transmission as a response to MCBS entomological foci investigation |

| 1.3. Appropriate, sustainable and quality larval source management interventions in suitable epidemiological and operational areas | |
|---|---|
| 1.3.1 | Application of appropriate, sustainable and quality blanket bio-larvicides in all city and municipal councils according to the National guidelines |
| 1.3.2 | Application of appropriate, sustainable and quality targeted bio-larvicides in town and district councils according to guidelines where mosquitoes breeding sites are few, fixed, and findable |
| 1.3.3 | Application of appropriate focal bio-larvicides in identified transmission foci in very low and low transmission areas as contribution to stop transmission |
| 1.3.4 | Ensure that the National Environmental Management Council (NEMC) includes larval source management as a prerequisite for conducting and approval of environmental Impact assessment/audit in all infrastructure/development projects |
| 1.3.5 | Promote community-led environmental management initiatives in receptive conditions especially in highly densely populated areas |

| 1.4. Provide a strategic framework for coordination and continuous assessment for the implementation of evidence-based IMVC interventions | |
|---|---|
| 1.4.1 | Encourage partners to research and develop new and appropriate vector control tools to create an evidence-base for scale up |
| 1.4.2 | Implementation of insecticide resistance management plan including insecticide rotation for IRS and innovative LLIN products |
| 1.4.3 | Work with national regulatory authorities to improve the monitoring and quality assurance of IMVC equipment and commodities |

| |
|---|
| 1.5. Deploy appropriate Integrated malaria vector control interventions suitable for 'very low' epidemiological settings for elimination |
| 1.5.1 Introduce response mechanism (entomological foci investigation) to SME established case based surveillance in identified low transmission areas |

### *Case Management*

| | |
|---|---|
| 2.1 | Provide universal access to appropriate, quality and timely malaria diagnosis to all people with signs and symptoms of malaria |
| 2.1.1 | Provide high-standard, accessible, affordable, equitable, and quality-assured testing for patients seeking treatment in the public sector |
| 2.1.2 | Facilitate the provision of high-standard, accessible, affordable, and quality-assured testing to patients seeking treatment in the private sector |
| 2.1.3 | Provide quality-assured malaria testing services from skilled providers |
| 2.1.4 | Facilitate the provision of high-standard, accessible, affordable, and quality-assured testing to patients seeking treatment beyond the operational health facilities[7] |
| 2.1.5 | Conduct research and introduce evidence-based, innovative diagnostic tools/system for malaria detection and differential diagnosis of other pathogens causing febrile illnesses |

| | |
|---|---|
| 2.2 | Provide universal access to appropriate, quality and timely treatment to all people who have malaria |
| 2.2.1 | Provide highly efficacious, accessible, affordable, equitable and quality-assured antimalarial to patients seeking treatment in the public sector |
| 2.2.2 | Facilitate the provision of accessible, affordable, and quality-assured antimalarial to patients seeking treatment in the private sector |
| 2.2.3 | Provide high-quality fever management services by skilled providers |
| 2.2.4 | Facilitate the provision of high-standard, accessible, affordable, and quality-assured management to patients seeking treatment beyond the operational health facilities[8] in identified suitable areas [9] |
| 2.2.5 | Introducing highly effective gametocidal medicines in low transmission areas |

| | |
|---|---|
| 2.3 | Provide appropriate and effective services to reduce the risk of malaria infection and its complications among populations biologically and socioeconomically vulnerable to malaria |
| 2.3.1 | Increase the uptake of IPTp2+ to 80% in low, moderate and high transmission areas to reduce vulnerability in pregnancy |
| 2.3.2 | Increase the uptake of IPTp3+ to 60% in low, moderate and high transmission areas to reduce vulnerability in pregnancy |
| 2.3.3 | Reduce risk among specific vulnerable groups: people with sickle cell, HIV, non-immune travellers |
| 2.3.4 | Introduce the provision of selected suitable antimalarial for IPT to the school children within high transmission areas |
| 2.3.5 | Introduce the provision of selected suitable antimalarial for IPTi during vaccination schedule within selected high transmission areas to reduce malaria burden in infants |
| 2.3.6 | In the event of the introduction of a malaria vaccine, the country is able to rapidly scale-up its use in suitable epidemiological and operational areas |

[7] Operational health facility is a registered HF and included in the Tanzania HMIS National Data Warehouse
[8] Operational health facility is a registered HF and included in the Tanzania HMIS National Data Warehouse
[9] *Underserved and hard to reach areas*

| | |
|---|---|
| 2.4 | Ensure that commodities used in malaria patient care and prevention are consistently safe, quality assured and available at the points of care |
| 2.4.1 | Facilitate malaria commodities procurement process as indicated by the comprehensive annual quantification and PSM plan through the provision of timely ordering and clear delivery schedule to the selected procurement agency |
| 2.4.2 | Integrate to ensure eLMIS functionality to align consumption and reported cases |
| 2.4.3 | Improve logistic information system to facilitate the commodities supply chain from MSD to healthcare facilities and to respond to stock-outs |
| 2.4.4 | Eliminate counterfeit, suboptimal, substandard products through monitoring and regulation reinforcement |
| 2.4.5 | Facilitate the relevant regulatory authorities to conduct post market surveillance and pharmacovigilance for antimalarial medicines |

| | |
|---|---|
| 2.5 | Deploy appropriate malaria case management and preventive therapies interventions in suitable epidemiological and operational areas, and in the event of special situations, (e.g. emergency, outbreaks and resurgence) to reduce the risk of severe morbidity and mortality |
| 2.5.1 | Provide appropriate initiatives as response to emergency situation including malaria outbreak |
| 2.5.2 | Introduce response mechanism(reactive case detection)to SME established case based surveillance in identified low transmission areas |
| 2.5.3 | Introduce the provision of selected antimalarial risk mitigation for chemoprevention, focal screening and treatment, and mass drug administration [10] in suitable epidemiological and operational areas |

### *Surveillance Monitoring and Evaluation*

| | |
|---|---|
| 3.1 | Improve quality and timeliness of malaria indicators within the routine health information system |
| 3.1.1 | Continue collaboration with HMIS section at the MoHCDGEC to improve reporting, analysis and use of malaria indicators within DHIS2 platform for planning and monitoring malaria control activities at all levels |
| 3.1.2 | Strengthen quality assurance/control system to provide reliable routine malaria services and data in the health facilities |

| | |
|---|---|
| 3.2 | Strengthen malaria framework for collecting, processing and storing essential indicators from periodic service delivery and programmatic surveys |
| 3.2.1 | Ensure that national and sub-national representative population surveys are performed according to SME plan |
| 3.2.2 | Strengthen countrywide longitudinal vigilance of malaria parasitaemia in sentinel population: Routine pregnant women malaria testing at RCH clinics and school-age children through regular School Malaria Parasite surveys |
| 3.2.3 | Strengthen longitudinal monitoring of mosquito population dynamics and insecticide susceptibility surveillances in the sentinel sites |
| 3.2.4 | Carry out standard antimalarial efficacy tests studies (TES) in sentinel sites as per WO standard protocol |
| 3.2.5 | Coordinate the collection, use, and interpretation of the programmatic monitoring of vector control initiatives (including LLINs, IRS, and LSM) |

[10] E.g. Seasonal malaria chemoprevention (SMC), mass drug administration (MDA), screening and treatment (MSAT/FSAT)

| | |
|---|---|
| 3.3 | Maintain a comprehensive malaria knowledge management system to collate, interpret, disseminate, and promote the use of quality malaria data for evidence-based decision making at all level |
| 3.3.1 | Conduct a comprehensive periodic stratification of malaria burden in all councils with corresponding stratified interventions |
| 3.3.2 | Strengthen the national malaria data management capacity and data repository arrangements to enable evidence-based decision making at all levels |
| 3.3.3 | Undertake periodic malaria program reviews and evaluation of the implementation of malaria strategic plan |
| 3.3.4 | Develop a conducive environment for continuous collaboration with research and academia to translate research into practice and support evidence based and sustainable policy decisions |

| | |
|---|---|
| 3.4 | Strengthen malaria epidemic prevention and control in low and very low transmission settings |
| 3.4.1 | Strengthen Malaria Epidemic Early Warning System (MEEWS) and a Malaria Epidemic Early Detection System (MEEDS) |
| 3.4.2 | Strengthen capacity for malaria epidemics containment at Council and health facility level in epidemic prone areas |
| 3.4.3 | Implement malaria outbreaks response operations when and where necessary |

| | |
|---|---|
| 3.5 | Establish appropriate surveillance system in 'very low' transmission settings |
| 3.5.1 | Establish sub district level micro-stratification to identify areas suitable for targeting elimination |
| 3.5.2 | Establish a system for case-based surveillance to implement elimination interventions in selected areas of very low transmission areas |
| 3.5.3 | Establish a system for investigating and classifying malaria transmission foci in selected areas with very low transmission areas |

### *Social Behavioral Communication Change*

| | |
|---|---|
| 4.1 | Reinforce and update knowledge and practice amongst all community members about appropriate malaria prevention, testing and treatment, promote and influence social norms about desired healthy behaviours |
| 4.1.1 | Improve capacity of healthcare workers to effectively provide accurate and relevant information to patients on desired behaviours for malaria prevention and treatment |
| 4.1.2 | Improve capacity of ward- and village-level health staff, extension workers and community health workers to effectively provide accurate and relevant malaria information in their interaction with community members |
| 4.1.3 | Develop and implement sensitization campaigns with key stakeholders at different levels using different communication channels to spark actions |

| | |
|---|---|
| 4.2 | Maintain high knowledge and improve good practices amongst vulnerable groups - or their care takers - with elevated risk of malaria infection about their specific risk and the prevention and treatment options available to them |
| 4.2.1 | Improve capacity of healthcare workers to provide accurate and relevant information on specific malaria risks and appropriate action to biologically vulnerable groups during health visits |
| 4.2.2 | Develop and implement outreach programme for socioeconomically vulnerable groups, hard-to-reach and mobile populations in high-transmission areas |

| 4.3 Encourage communities to initiate and implement community-based malaria control initiatives | |
|---|---|
| 4.3.1 | Develop and implement specific community based malaria intervention packages including health promotion, local vector control initiatives[11] and test & treatment services[12] in suitable operational areas |

| 4.4 Create strong SBCC public private partnership to maximize efforts and ensure consistency in the fight against malaria | |
|---|---|
| 4.4.1 | Strengthen existing malaria initiatives fora and implement strategic frameworks for SBCC partners to ensure coordinated and harmonized implementation of the SBCC strategy at all levels |
| 4.4.2 | Create a platform for private sector companies to provide malaria control services to their workforce and the communities in which they work |

### *Programme Management*

| 5.1 Improve the effectiveness and accountability of malaria control implementation by strengthening partnerships and cooperation with malaria control stakeholders at all levels | |
|---|---|
| 5.1.1 | Improve coordination and governance structures at all levels to strengthen coordination, communication, governance and close follow up of all malaria related interventions |
| 5.1.2 | Develop and disseminate malaria control strategy and updated technical guidelines |
| 5.1.3 | Strengthen human resources capacity for effective strategic plan implementation at National and LGA levels |
| 5.1.4 | Enhance well structured, coordinated and harmonized supervision and verification system involving implementing entities at various levels |

| 5.2 Increase the level of resource mobilization to fund the strategic plan by 90%, according to the programmatic needs | |
|---|---|
| 5.2.1 | Update comprehensive resource mobilisation plan to attract adequate funding to support malaria implementation from domestic sources and development partners contributions |
| 5.2.2 | Develop and update comprehensive business and operational plans for malaria control |
| 5.2.3 | Improve NMCP capacity to successfully implement planned malaria interventions |
| 5.2.4 | Engage politicians, policy and decision-makers and non-health sector debate on malaria control |
| 5.2.5 | Raise the profile of malaria amongst policy and decision makers at all levels so that national, regional and district plans include appropriate interventions and sufficient budget to implement the malaria strategy |
| 5.2.6 | Advocate RHMTs /CHMTs to budget for malaria interventions according to respective level and target (malaria elimination or burden reduction) |

| 5.3 Promote a harmonized inter country and inter-sectoral approach to malaria control so at least two action plans will be developed respectively | |
|---|---|
| 5.3.1 | Develop a strategic framework for inter country cross border collaboration on malaria control |
| 5.3.2 | Develop action plans with relevant ministries outlining inter-sectoral malaria control intervention and targets |

[11] Vector control at community level should target larval source management either using bio-larviciding and environmental management
[12] Malaria test and treatment services at community level are advocated for hard to reach and underserved areas

# 4 Chapter Four: Intervention packages per Strata

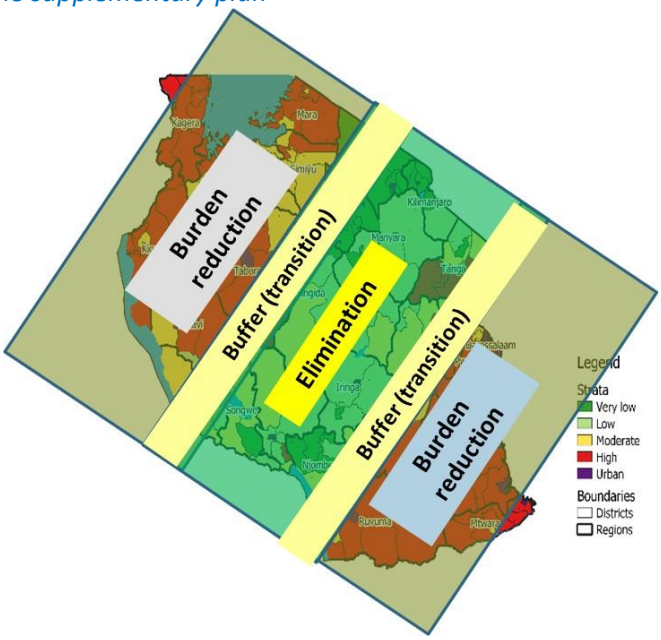
The supplementary malaria midterm strategic plan for the period 2018-2020 introduces tailored interventions to address a) the reduction of disease burden in moderate and high transmission areas and b) specific interventions targeting disease elimination in very low and low transmission areas (Figure 5).

The supplementary plan intends to maintain some essential strategic differences in deploying interventions in the low and very low burden strata, especially the vector control ones. The recent achievements in low stratum are considered fragile and much driven by past control interventions. The risk of disease rebound in the low strata has been considered, and therefore there is a need to deploy higher range of vector control initiatives, compared to the very low stratum, as a risk mitigation measure and an attempt to further reduce the disease burden. Low strata will still be considered to target malaria elimination.

The very low stratum is full-fledged for malaria elimination and needs some additional interventions in the attempt to reach the goal. Strategic reorientation towards elimination includes the introduction of some innovative measures such as case based surveillance and transmission foci control, further improved febrile diseases management; outbreak prevention and control. Some preventive and vector control initiatives will be scaled down but a contingency mitigation plan will be established through an intensified malaria surveillance and response. Very low burden areas are basically justifying the positioning of surveillance as a core intervention.

The major strategic purpose for high burden stratum areas is the disease burden reduction and to achieve it the supplementary strategic plan indicates the deployment of additional preventive intervention packages. The moderate burden stratum has been strategically considered as a transition from high to low burden through the consolidation of a set of standard intervention packages.

*Figure 5: Strata and strategic aims of the supplementary plan*




Matching strata with targeted package result into four epidemiological strata; 'very low', 'low', 'moderate' and 'high'. The fifth 'urban' settings stratum is operational. A number of interventions cut across all strata to maintain the universal coverage purpose. The proposed interventions according to strata and the available referenced evidences are illustrated in Appendix D: Malaria Interventions included in the Supplementary Malaria Midterm Strategic Plan 2018-2020. The supplementary plan is also introducing stratified targets, where applicable, not only for strategic and specific objectives but also for interventions (see Appendix F: Performance Framework).

## 4.1 Very low transmission

**Description of the stratum:** The councils in this stratum have been consistently demonstrating less than 1% prevalence and a very low case load of less than 15 cases per 1000population per annum. The total number of councils in this stratum is 28 accounting for 11% of country population.

| intervention | | Mechanism/ approach | Justification | Risk mitigation |
|---|---|---|---|---|
| Malaria vector control | LLIN | RCH distribution | In the current epidemiological transition, very low malaria transmission settings are unlikely to benefit from large LLIN distribution schemes.<br>The dedicated Tanzanian malaria modeling demonstrates a very low increase of malaria prevalence after withdrawing LLIN distribution in this stratum. | Intensified surveillance, including CBS and weekly malaria reporting and analysis<br>A strategic contingency stock of LLIN should be made available and mobilized in very short time in case of evident increase of malaria cases (more than 25 per 1000).<br>Micro-stratification is needed to assess if additional LLIN distribution systems are needed within this stratum in defined areas. |
| | IRS | Pro active IRS | Following malaria foci investigations, pro-active (focal) IRS should be the best immediate approach to interrupt residual transmission alongside well targeted LSM (see below). | Appropriate logistic management and capacity building are necessary for the effective deployment of this intervention that might be quite infrequent. The size of the operation (area to be sprayed) should be carefully estimated and te insecticide to be used based on resistance profile and resistance mitigation plan. |
| | LSM | Targeted bio-larviciding | This approach should be supplementary to the above vector control initiatives (LLIN RCH distribution and pro-active IRS). | Reconnaissance of active breeding sites is mandatory before its deployment. The best time to apply bio-larviciding must be considered following the evidence of entomological findings. |
| Malaria case management | Malaria testing | Universal testing target in health facilities<br>(and through CHWs testing if available) | Testing rate in the health facilities within very low malaria transmission settings are considerably lower compared to other strata. This might be due to the false confidence among health care workers that detection of malaria parasite is a rare event. Increasing the testing rate in OPD is needed to optimize surveillance to monitor malaria incidence towards elimination. This approach will detect a number of infected people, most of them asymptomatic, that are potential to maintain the residual transmission in the area | The effectiveness of the intervention should be monitoring monthly through the routine surveillance and response tools. |
| | Malaria treatment | Introducing Primaquine (PQ) for confirmed malaria treatment alongside with ACT | This approach is highly recommended for reducing the risk of transmission in this stratum. | Due to the relatively low case load, commodities quantification and the associated logistics including supply chain need to be carefully conducted. |
| | MIP | Withdrawing IPTp | There are few experiences about withdrawing IPTp in very low transmission areas (.e.g. Zanzibar) and WHO recommends IPTp | All pregnant women during their first ANC attendance are tested for malaria. The effectiveness of the intervention should be monitored monthly through the routine |

| intervention | | Mechanism/ approach | Justification | Risk mitigation |
|---|---|---|---|---|
| | | | withdrawing when local transmission is demonstrated to be approaching zero. | surveillance and response tools and corrective measures should be introduced as soon as abnormal trends are detected.<br>Individual cases should be also evaluated to assess history of travel to and from more endemic areas. |
| | Preventive therapies | MDA | Modeling (see relevant section in the document) shows that MDA is very potential to reduce transmission drastically in this stratum with sustained impact. | Alternative ACT (e.g. DPQ) should be used for this approach. |
| Surveillance | Surveillance and response | HF based case detection, report and analysis | In this stratum, apart from routine standard HMIS reporting, HFs will also be reporting individually each malaria case by using a dedicated malaria registry at HF level. | The case reporting should be embedded in the existing DHIS2 for immediate analysis. The eIDSR needs to incorporate malaria case based surveillance. |
| | | Mortality audit | Suspect malaria deaths occurring within the vulnerable groups should be investigated case by case. | Appropriate tools and modalities for mortality audit should be developed and deployed. Corrective measures should be introduced as soon as abnormal trends are detected. |
| | Case based surveillance | CBS and re-ACD | See above (case detection, report and analysis). CBS will include the follow up of the index case up to household level. | This approach requires quite a substantial strengthening of the health delivery system in the respective councils. Additional material and human resources are definitely needed to carry out the intervention effectively. The intervention might benefit from appropriate community based initiatives |
| | | Foci investigation | This approach will follow the notification of abnormal number of cases in a defined area and will include epidemiological and entomological investigations. | A dedicated team (eventually integrated with other existing teams within the council) should be trained in epidemiological and entomological investigations and follow up. |
| | Epidemic detection and response | Establishment of MEEDS and MEEWS | MEEDS should be embedded into DHIS2 by using weekly IDSR platform and integrated with Tanzania Meteorological Agency (TMA) map-room web site for MEEWS | Sensitive and specific thresholds are needed to set up an effective warning and detection system |
| | | Outbreak investigations | It is necessary to differentiate malaria outbreaks from other febrile disease | The team established for foci investigation should be responsible for this task (see above in foci investigation). |
| | | Response | The immediate response should be deployed within two weeks of the onset of the outbreak and should aim to reduce the case load in a very short time. MDA, FSAT and appropriate management of fever cases should be emphasized. Appropriate severe malaria management is crucial to avoid fatalities. | Population in very low transmission areas have limited acquired immunity and, therefore, very susceptible to malaria infections with the risk of progressing towards severe form of the disease.<br>Outbreak response should be included into a preparedness plan. Contingency stocks of antimalarial should be mobilized in a short time. |

| intervention | | Mechanism/ approach | Justification | Risk mitigation |
|---|---|---|---|---|
| SBCC | | | Maintain high level of LLIN use especially to biological vulnerable (under five and pregnant women) because they are still at higher risk.<br>Promote commercial availability of LLINs so that community members who are not eligible to RCH distribution can purchase LLINs.<br>Keep up the population knowledge on uncomplicated and severe malaria signs and symptoms and the risk of acquiring malaria when travelling to endemic transmission areas.<br>Continue encouraging early treatment seeking for febrile illness and explain contexts where treatment without a test is necessary.<br>Increasing active community participation in elimination activities, including a surveillance system. | Targeted SBCC approaches with special emphasis on Interpersonal communication through CHWs and healthcare providers |
| Health System Strengthening | | Setting innovative malaria case based surveillance, foci investigation , MEEDS, epidemic response | The innovative initiatives for malaria elimination need substantial health system strengthening for both human and financial resources.<br>The response component for case based surveillance and foci investigation (reACD and targeted vector control) need a comprehensive community involvement with the participation of CHWs. | |

## 4.2 Low transmission

**Description of the stratum:** The councils in this stratum have been consistently demonstrating between 1% to less than 5% prevalence and a quite low case load of less than 50 cases per 1000 population per annum. The total number of councils in this stratum is 34 accounting for 12% of country population.

| intervention | | Mechanism / approach | Justification | Risk mitigation |
|---|---|---|---|---|
| Malaria vector control | LLIN | RCH distribution | Biological vulnerable population are highly susceptible to malaria infection in this strata especially during the transmission season that might be very short in some areas. | Intensified surveillance, including weekly malaria reporting and analysis and malaria case based surveillance in very localized foci. |
| | | SNP and/or MRC | In the current epidemiological transition, low malaria transmission settings are quite vulnerable to malaria resurgence. The dedicated Tanzanian modeling is showing that without appropriate net coverage, malaria in this stratum is going to raise within the period of the MSP implementation.<br>This stratum will definitely benefit from high LLIN coverage. To reach the targeted coverage it might be necessary to implement a catch up strategy through Mass Replacement Campaign (MRC) and to maintain high coverage a keep up | Switching from MRC (catch up) to SNP (keep up) modality is key to maintain high LLIN coverage and should be based on evidence of the desired accessibility/coverage. SNP should be initiated within one year from the MRC. A catch up distribution should as well be implemented in case the LLIN coverage during the keep up modality falls below 50%. Dedicated surveys and modeling are much more needed.<br>Micro-stratification is needed to deploy the best intervention for attaining and maintaining high net coverage |

| intervention | | Mechanism / approach | Justification | Risk mitigation |
|---|---|---|---|---|
| | | | strategy trough school distribution (SNP) should be recommended | |
| | IRS | Pro active IRS | Following malaria foci investigations, pro-active (focal) IRS should be the best immediate approach to interrupt residual transmission alongside well targeted LSM (see below). | Foci investigations in this stratum is quite complex and possibly intensive. Micro-stratification and feasibility should be carefully considered.<br>Appropriate logistic management and capacity building are necessary to effective deployment of this intervention that might be quite frequent especially in areas that recently gained from malaria interventions.<br>The size of the operation (area to be sprayed) should be carefully estimated. |
| | LSM | Targeted bio-larviciding | In this stratum this approach should be preferred to the previous one (pro-active IRS). | Reconnaissance of active breeding sites is mandatory before its deployment. The best time to apply bio-larviciding must be considered following the evidence of entomological findings. |
| Malaria case management | Malaria testing | Universal testing target in health facilities | Testing rate in the health facilities within low malaria transmission settings are considerably lower compared to moderate/high transmission strata. This might be due to the false confidence among health care workers that detection of malaria parasite is a rare event. This approach will make able to detect a number of infected people, some of them asymptomatic, that are potential to maintain the residual transmission in the area | The effectiveness of the intervention should be monitoring monthly through the routine surveillance and response tools |
| | Malaria treatment | Introducing Primaquine( PQ) for confirmed malaria treatment alongside with ACT | This approach should be considered but its effectiveness should be well evaluated | Due to the relatively low case load, commodities quantification and the associated logistics including supply chain, be carefully conducted. |
| Surveillance | Surveillance and response | Health facility based case detection, report and analysis | In this stratum weekly reporting is recommended due to the forecasted malaria transmission instability | The case reporting should be embedded in the existing DHIS2 through the IDSR platform |
| | | Micro-stratification | In low transmission stratum there is appreciable diversity in malaria transmission intensity mainly due to geographical/ecological reasons. Macro-stratification classify the entire council with and an average score and the standard intervention packages are calibrated to this score. However, some areas within the councils might largely deviate from the average score. It becomes | Council planning process needs to be customized to the micro-stratification outcomes and continuous monitoring of the selected malaria intensity parameters should be revised annually. |

| intervention | | Mechanism / approach | Justification | Risk mitigation |
|---|---|---|---|---|
| | | | increasingly important to identify the population groups most susceptible to the infection and target interventions accordingly. Therefore, micro stratification will be necessary to guide planning at council level. In some instances, it may be possible to adjust intervention packages accordingly<br><br>Low transmission stratum is quite vulnerable to changes in transmission and subject to possible malaria rebounds, especially in localized areas. | |
| | Case based surveillance | Foci investigation | Even though the entire council may be classified as low transmission, foci investigation may be necessary in the micro stratified "very low" administrative wards.<br><br>This approach should follow the reporting malaria cases within the micro strata and should include epidemiological and entomological investigations. | A dedicated team (eventually integrated with other existing teams within the council) should be trained in epidemiological and entomological investigations |
| | Epidemic detection and response | Establishment of MEEDS and MEEWS | MEEDS and MEEWS are potential for triggering adequate investigation and response.<br><br>MEEDS should be embedded into DHIS2 by using weekly IDSR platform and integrated with map-room for MEEWS. | Sensitive and specific thresholds are needed to set up an effective warning and detection system to effectively trigger investigations and responses when needed. |
| | | Outbreak investigations | It is necessary to differentiate malaria outbreaks from other febrile disease outbreaks | The team established for foci investigation should be responsible for this task (see above in foci investigation). |
| | | Response | The immediate response should be deployed within two weeks of the onset of the outbreak and should aim to reduce the case load in a very short time. MDA, FSAT and appropriate management of fever cases should be emphasized. Appropriate severe malaria management is crucial to avoid fatalities. | Population in very low transmission areas have limited immunity and, therefore, very susceptible to malaria infections with the risk of progressing towards severe form of the disease.<br><br>Outbreak response should be included into a preparedness plan. Contingency stocks of antimalarial should be mobilized in a short timer. |

| intervention | | Mechanism / approach | Justification | Risk mitigation |
|---|---|---|---|---|
| SBCC | | | In low transmission settings; Population should be aware of their possible change to low immunity status due to the recent transition from moderate to low transmission.<br>Ensure positive uptake of preventive interventions and early treatment seeking to receive correct and prompt malaria services<br>Establish appropriate levels of perceived severity as malaria cases decline and perceived risk declines.<br>Ensure service providers are equipped with counseling skills to address concerns about fevers that increasingly test negative for malaria to avoid patient dissatisfaction and erosion of trust between patients and providers | Multiple SBCC approaches should be used with targeted messages with emphasis on interpersonal communication. |
| Health System Strengthening | | Setting innovative malaria case based surveillance, foci investigation, MEEDS, epidemic response | In defined areas of the low transmission strata, the innovative initiatives for malaria elimination need substantial health system strengthening for both human and financial resources. At the same time, these areas need to deliver the standard malaria control intervention packages to reduce further the case load. The relatively high risk of outbreaks, due to increased malaria transmission instability, needs particular emphasis for the establishment of appropriate outbreak detection and response.<br>In the same identified administrative wards, the response component for case based surveillance and foci investigation (reACD and targeted vector control) need a comprehensive community involvement with the participation of CHWs. | LGA needs to provide enough level of funding to maintain tea in and progress further. |

## 4.3 Moderate Transmission

**Description of the stratum:** The councils in this stratum have been consistently demonstrating more than 5% and less than 30% prevalence and a case between 50 and 150 per 1000 population per annum. The total number of councils in this stratum is 49 accounting for 19% of country population.

| intervention | | Mechanism/ approach | Justification | Risk mitigation |
|---|---|---|---|---|
| Malaria vector control | LLIN | RCH distribution | Apart from biological vulnerable groups protection, this approach is highly recommended to contribute to the keep up the access and coverage of LLIN in these strata. | Intensified surveillance, including CBS and weekly malaria reporting and analysis |
| | | SNP and/or MRC | This stratum is the primary focus for high LLIN coverage. It is a continue process.<br>Micro assessment and stratification is needed to determine and classify level of LLINs coverage. | Switching from MRC (catch up) to SNP (keep up) modality is key to maintain high LLIN coverage and should be based on evidence of the desired accessibility/coverage. |

| intervention | | Mechanism/ approach | Justification | Risk mitigation |
|---|---|---|---|---|
| | | | Low LLINs coverage within well performing SNP geographical areas may need a mini MRC (catch up) to regain high LLINs coverage. SNP is recommended as the major LLIN strategy to keep up the LLIN coverage and should be initiated within a year from the last MRC. | Micro-stratification is needed to deploy the best intervention between SNP and MRC for attaining and maintaining high net coverage |
| | LSM | Targeted bio-larviciding | In this stratum this approach should always be secondary to the full attainment of IRS and large accessibility to LLIN.<br>A few areas within these strata will meet the criteria for LSM (few, fixed and findable breeding sites). The most probable candidates should be high densely populated ones. | Reconnaissance of active breeding sites is mandatory before its deployment.<br>The best time to apply bio-larviciding must be considered following the evidence of entomological findings. |
| Malaria case management | Malaria testing and treatment | | The Tanzanian malaria modeling demonstrates that case management should target a coverage of 85% and more of malaria cases appropriately managed in these strata in order to be potential not only to increase case management effectiveness but also to decrease transmission | The strategy needs consistent efforts to increase access to malaria testing and treatment by using innovative and large scale approaches such as mRDT in ADDO and iCCM. |
| | Preventive therapies | IPTp | Due to the high resistance to SP, alternative antimalarial should be considered for targeted introduction in these strata in order to increase efficacy in reducing parasite and anaemia burden. | Increased TES and SP resistance marker surveillance is needed. |
| | | SMC / IPTc | The only possible effective deployment of SMC is within defined areas with very high seasonal malaria occurrence (60%of reported cases within 4consecutive months). | The medicine of choice should be ACT alternative to the first line (DP). Micro-stratification is essential to detect possible candidate areas (administrative wards). |
| Surveillance | Surveillance and response | Health facility based case detection, report and analysis | Passive detection and aggregated monthly reporting are the standards for these strata.<br>Efforts should be made to ensure frequent use of the analysis reports generated through the malaria dashboard. | Monthly monitoring is needed to establish an effective planning cycle. |
| | | Micro-stratification | The whole council is allocated to a stratum based on an average score and the standard intervention packages are assigned accordingly. However, some areas within the councils might largely deviate from the average score and need localized adjustment of the intervention packages. Councils within the moderate burden stratum are likely to include localized low/unstable transmission areas that need to be identified for the implementation of intensified surveillance. | Council planning process needs to be customized to the micro-stratification outcomes and continuous monitoring of the selected malaria intensity parameters should be revised annually. |
| SBCC | | | In moderate transmission strata SBCC focuses on promoting uptake of all recommended malaria interventions | A multiple of SBCC approaches should be used to increase reach and exposure of malaria messages |

| intervention | | Mechanism/ approach | Justification | Risk mitigation |
|---|---|---|---|---|
| | | | Elevate perceived risk where malaria is considered normal<br>Re-enforce a culture of LLINs use (LLIs every night)<br>Re-enforce care seeking , LLIN use, IPTp uptake, IRS acceptance and normative behavior | Community mobilization and interpersonal communication should be highly considered to encourage positive behaviors change |
| Health System Strengthening | | Increase coverage and effectiveness of malaria case managemen t and preventive therapies | The target for this strata is to reduce disease burden and concerted curative and preventive efforts should be considered. The health system needs to be strengthen to deliver quality diagnosis and treatment and to provide the recommended preventive packages.<br>Additional interventions beyond the operational health facilities are needed to increase access to testing and treatment services (e.g. community, drug dispensing outlets). | |

## 4.4 High Transmission

**Description of the stratum:** The councils in this stratum have been consistently demonstrating more than 30% prevalence and a high case load of more 150 cases per 1000 population per annum. In high transmission areas there is a total of 73 councils accounting for 35% of country population.

| intervention | | Mechanism/ approach | Justification | Risk mitigation |
|---|---|---|---|---|
| Malaria vector control | LLIN | RCH distribution | Apart from biological vulnerable groups protection, this approach is highly recommended to contribute to the keep up the access and coverage of LLIN in these strata. | Intensified surveillance, including CBS and weekly malaria reporting and analysis |
| | | SNP and/or MRC | This stratum is the primary focus for high LLIN coverage. It is a continue process.<br>Micro assessment and stratification is needed to determine and classify level of LLINs coverage. Low LLINs coverage within well performing SNP geographical areas may need a mini MRC (catch up) to regain high LLINs coverage. SNP is recommended as the major LLIN strategy to keep up the LLIN coverage and should be initiated within a year from the last MRC. | Switching from MRC (catch up) to SNP (keep up) modality is key to maintain high LLIN coverage and should be based on evidence of the desired accessibility/coverage.<br>Micro-stratification is needed to deploy the best intervention between SNP and MRC for attaining and maintaining high net coverage |
| | IRS | Blanket IRS | For financial and programmatic reasons this approach has been deployed only in the high transmission councils of the lake zone. Councils in High transmission areas in other zones of the country are epidemiologically eligible for this approach especially in case of demonstrated high insecticide resistance. Operational and resource constraints may limit the scale up of IRS. | Intensified epidemiological and entomological surveillance is essential to monitor the additional benefits of blanket IRS and to decide when to start and, most importantly, when to stop the intervention and to mitigate the risk of rebounds |

| intervention | | Mechanism/ approach | Justification | Risk mitigation |
|---|---|---|---|---|
| | | Targeted IRS | This approach should be triggered by detection of confirmed insecticide resistance in high transmission areas | Extended and intensified insecticide susceptibility tests should be strategically deployed in this strata |
| | LSM | Targeted bio-larviciding | In this stratum this approach should always be secondary to the full attainment of IRS and large accessibility to LLIN.<br>A few areas within this stratum will meet the criteria for LSM (few, fixed and findable breeding sites). The most probable candidates should be high densely populated ones. | Reconnaissance of active breeding sites is mandatory before its deployment.<br>The best time to apply bio-larviciding must be considered following the evidence of entomological findings. |
| Malaria case management | Malaria testing and treatment | | The Tanzanian malaria modeling demonstrates that case management should target a coverage of 85% and more of malaria cases appropriately managed in these strata in order to be potential not only to increase case management effectiveness but also to decrease transmission | The strategy needs consistent efforts to increase access to malaria testing and treatment by using innovative and large scale approaches such as mRDT in ADDO and iCCM. |
| | Preventive therapies | IPTp | Due to the high resistance to SP, alternative antimalarial should be considered for targeted introduction in these strata in order to increase efficacy in reducing parasite and anaemia burden. | Increased TES and SP resistance marker surveillance is needed. |
| | | IPTsc | This approach targeting school age children considers the largely demonstrated age shifting of population groups most affected by malaria infection.<br>The Tanzanian malaria modeling is showing that high transmission stratum might benefit from the introduction of IPTsc.<br>This approach is ideal to complement SNP LLIN distribution and other SBCC interventions in the targeted schools. | Due to the nature of this innovative intervention, very effective monitoring should be established in the targeted areas.<br>The medicine of choice should be ACT alternative to the first line (DP).<br>Micro-stratification is essential to detect possible candidate areas (administrative wards). |
| | | IPTi | IPTi is potential to decrease severe morbidity and mortality in vulnerable infants especially in high transmission areas. Though, this approach is not expected to influence transmission. | The medicine of choice should be ACT alternative to the first line (DP). Micro-stratification is essential to detect possible candidate areas (administrative wards). |
| | | MDA | Some areas within this strata experienced in the recent humanitarian crisis due to influx of semi immune refugees (e.g. Kigoma).<br>Other possible complex emergencies in these strata could effectively benefit from MDA (flooding, earth quake, etc). | The medicine of choice should be ACT alternative to the first line (DP). Micro-stratification is essential to detect possible candidate areas (administrative wards). |
| | | SMC | The only possible effective deployment of SMC is within defined areas with very high seasonal malaria occurrence (60%of reported cases within 4 consecutive months). | The medicine of choice should be ACT alternative to the first line (DP). Micro-stratification is essential to detect possible candidate areas (administrative wards). |
| Surv... | Surveillance | Health facility based | Passive detection and aggregated monthly reporting are the standards for these strata. | Monthly monitoring is needed to establish an effective planning cycle. |

| intervention | | Mechanism/ approach | Justification | Risk mitigation |
|---|---|---|---|---|
| | and respons e | case detection, report and analysis | Efforts should be made to ensure frequent use of the analysis reports generated through the malaria dashboard. | |
| | | Micro-stratification | The whole council is allocated to a stratum based on an average score and the standard intervention packages are assigned accordingly. Some areas within the high burden councils (e.g. the more urbanized ones) might largely deviate from the average score and need localized adjustment of the intervention packages. | Council planning process needs to be customized to the micro-stratification outcomes and continuous monitoring of the selected malaria intensity parameters should be revised annually. |
| SBCC | | | In high transmission areas, SBCC focuses on promoting uptake of all recommended malaria interventions<br>Elevate perceived risk where malaria is considered normal<br>Re-enforce a culture of LLINs use (LLIs every night)<br>Re-enforce care seeking , LLIN use, IPTp uptake, IRS acceptance and normative behavior<br>Re-enforce acceptance of chemoprevention (IPTp, IPTsc), explaining why treatment without signs of fever is provided | A multiple of SBCC approaches should be used to increase reach and exposure of malaria messages<br>Community mobilization and interpersonal communication should be highly considered to encourage positive behaviors change |
| Health System Strengthening | | Increase coverage and effectiveness of malaria case managemen t and preventive therapies | The target for this strata is to reduce disease burden and concerted curative and preventive efforts should be considered. The health system needs to be strengthen to deliver quality diagnosis and treatment and to provide the recommended preventive packages. Additional interventions beyond the operational health facilities are needed to increase access to testing and treatment services (e.g. community, drug dispensing outlets). | |

## 4.5 Urban areas (City and Municipal Councils, large scale development projects areas)

**Description of the stratum:** This is not an epidemiological stratum but rather an operational one. The interventions for this non epidemiological stratum would thus be aligned to the interventions for the stratum within which the geographical areas fall. The 13 councils in very low and low burden would receive interventions corresponding to this stratum and likewise for the 8 and 4 councils in the moderate and high transmission. In total there are 25 city and municipal councils, accounting for 22% of the country population.

| intervention | | Mechanism/ approach | Justification | Risk mitigation |
|---|---|---|---|---|
| Malaria vector | LLIN | RCH distributio n | In the current epidemiological transition, urban areas in very low malaria transmission settings are unlikely to benefits from large LLIN distribution schemes. | Micro-stratification is needed to assess if additional LLIN distribution systems are needed within the urban areas demonstrating very low, low and moderate transmission. |

| intervention | | Mechanism/ approach | Justification | Risk mitigation |
|---|---|---|---|---|
| | | SNP/MRC | The dedicated Tanzanian malaria modeling does show some risk of resurgence in malaria cases after withdrawing LLIN distribution in this stratum, especially in urban areas within high transmission settings (Kigoma MC, Lindi MC, Mtwara MC) | These distribution schemes are highly recommended in defined settings within urban areas with moderate and high transmission. |
| | | Commercial | Access to commercial sector is quite high in urbanized areas, especially Dar es Salaam. | Usually commercial sector doesn't provide LLIN. Shifting from conventional untreated net towards treated ones should be emphasized. |
| | LSM | Blanket bio-larviciding | This approach should be supplementary to the previous one (LLIN). | Reconnaissance of active breeding sites is mandatory before its deployment.<br>The best time to apply bio-larviciding must be considered following the evidence of entomological findings. |
| Malaria case management | Malaria testing | Universal testing target in health facilities | Testing rate in urban areas is generally better compared with rural ones. However the test rate in health facilities is not optimal and the testing targets should really cover a higher proportion of people seeking advice and care in health facilities. | The effectiveness of the intervention should be monitoring monthly through the routine surveillance and response tools |
| | Malaria treatment | Universal access to quality assured antimalarials | Access to treatment services in urban areas is generally higher compared to rural areas but the adherence to standard guidelines is relatively low. Furthermore, antimalarials and diagnostics stock level in public health facilities is generally compromised by the high work load. | Strengthen logistic management and adherence to guidelines are essential to provide quality services in public health sector |
| | Private sector | Laboratory QA/QC | Private health sector is playing a large role in delivery of malaria case management services both for diagnostics and treatments.<br>The quality of diagnosis, especially microscopy, is uncertain and the treatments options are frequently deviating from the guidelines recommendations. | Extend and intensified MSDQI to improve quality of private sector health service delivery<br>Council based accreditation and certification should be promoted |
| Surveillance | Health Facility Based Surveillance and response | Case detection, report and analysis | Malaria surveillance is affected by the poor reporting practices in the private health sector and in the large public health facilities.<br>While overall reporting is high across public and private sectors, under reporting (all cases not being registered) and completeness (all elements not being completed) remain a challenge. | Intensified MSDQI should be promoted to improve quality of reporting overall in urban and among private service providers |
| | | Micro-stratification | The urban stratum is generally not homogeneous. The city and municipal councils need to be further classified according to the epi-stratum. The standard intervention packages for urban areas need to be calibrated to the related epi-stratum. Furthermore, some areas within the councils might largely deviate from the average urban transmission patterns and the average urban service delivery mechanisms and might need some localized adjustment of the intervention packages. | City or municipal councils planning process needs to be customized to the micro-stratification outcomes and continuous monitoring of the selected malaria intensity parameters should be revised annually. |

| intervention | | Mechanism/ approach | Justification | Risk mitigation |
|---|---|---|---|---|
| SBCC | | | SBCC in urban areas should promote and Encourage on LLINs ownership from alternative distribution means such us commercial mechanism.<br>Population should be encouraged to personal protection with LLINs and discourage the use of non-treated LLINs that are more available in urban areas.<br>Specific SBCC for other supplementary vector control mechanisms such LSM<br>Promote early treatment seeking, advocate, encourage and priorities the involvement of private sector to deliver quality and affordable diagnostic and treatment services in line with the national guidelines | Urban areas are privileged by wide reach of different media/message delivering channels, relatively higher educational and wealth status.<br>Malaria messages should consider using appropriate channels including wide use of mass media, collaboration with the private sector companies |
| Health System Strengthening | | Improve quality of malaria case management services and data reporting in the private sector | Up to three quarter of the managed malaria cases in urban areas are managed by the private sector. The quality of malaria cases managed at this level is generally unsatisfactory both for the poor diagnostic practices and for the lack of adherence to the national guidelines.<br>The regulatory framework is in place and need to be enforced by the health management teams in the respective councils. | Assessment of quality of services, including malaria testing and treatment, data reporting. |

# 5 Chapter Five: Modeling impact and cost by strata

## 5.1 Why Modeling?

Epidemiological, clinical and operational studies or routine health information systems alone may not be sufficient or flexible enough to provide guidance for strategic planning. This is especially true when there is a need for predictions from various hypothetical scenarios and estimates of geographically- specific, long-term effects (Chubb and Jacobsen, 2010). In the development of the SMMSP 2018-2020 modeling has been introduced to inform the NMCP on the predictive impact of a set of interventions (strategic planning). By comparing different strategic scenarios, the modelling outcomes stimulated discussion about stratification to understand what needs to be done where. Modeling has also informed NMCP to predict impact of innovative approaches and interventions that have not yet been deployed in country. By comparing different implementation regimens, modelling results generate information to understand optimal deployment of interventionsto maximize impact of newly introduced approaches.

More specifically, modeling assisted the NMCP a) to predict the impact of the current and the revised (SMMSP 2018-2020) strategic plans by comparing the deployment of interventions aiming at universal coverage (one size fit all) and stratified intervention packages targeting specific epidemiological and operational areas; and b) to answer specific questions (see box below) raised during the review development process:

*Box: Specific strategic questions*

- If LLINs mass campaigns were to be discontinued in urban and very low endemic areas would the prevalence rebound to higher levels?
- Which intervention combinations are needed to consistently reduce the prevalence in high transmission areas?
- Is there an additional benefit of adding IRS to LLINs at different insecticide resistance level?
- Is there any additional benefit to implement IPTsc in the high burden strata council when LLIN are already deployed in combination or not with IRS?
- Can MDA interrupt transmission in the very low stratum and how sustainable is the impact?

## 5.2 Simulated current and revised NMSP

***Current NMSP 2015-2020***

The current NMSP 2015-2020 described intervention packages at regional level. The whole country received LLINs distributed through different channels, and in selected councils of the Lake Zone combined with IRS. This intervention allocation divided the country into three main intervention strata[13] (MRC, SNP and SNP+IRS). Additionally, LSM was planned to be implemented in urban councils. The current NMSP was simulated with considering vector control (VC) only or in combination with improved CM in all districts (Figure 6).

**Simulated intervention deployment and number of district and population targeted**

- LLIN mass campaign in 2019 in 78 councils (46% of the population living in those councils)
- LLIN continuous distribution through schools (school net program SNP) annually between 2017 to 2020 in 102 councils (53.66% of the population)
- IRS rounds annually between 2017 to 2020 in 26 councils[14] (18.01% of the population)
- LSM with larviciding annually between 2017 to 2020 for three months every two weeks during the dry season in 25 city and municipal councils(21.68% of the population)

***Revised NMSP 2018-2020***

Specific intervention packages were allocated to each stratum. In the simulation model, interventions were simplified (Figure 6) and three alternative scenarios were considered two explorative scenarios with improved case

[13] Concept note submitted to GF in 2017 and included in 2018-2020 implementation plan

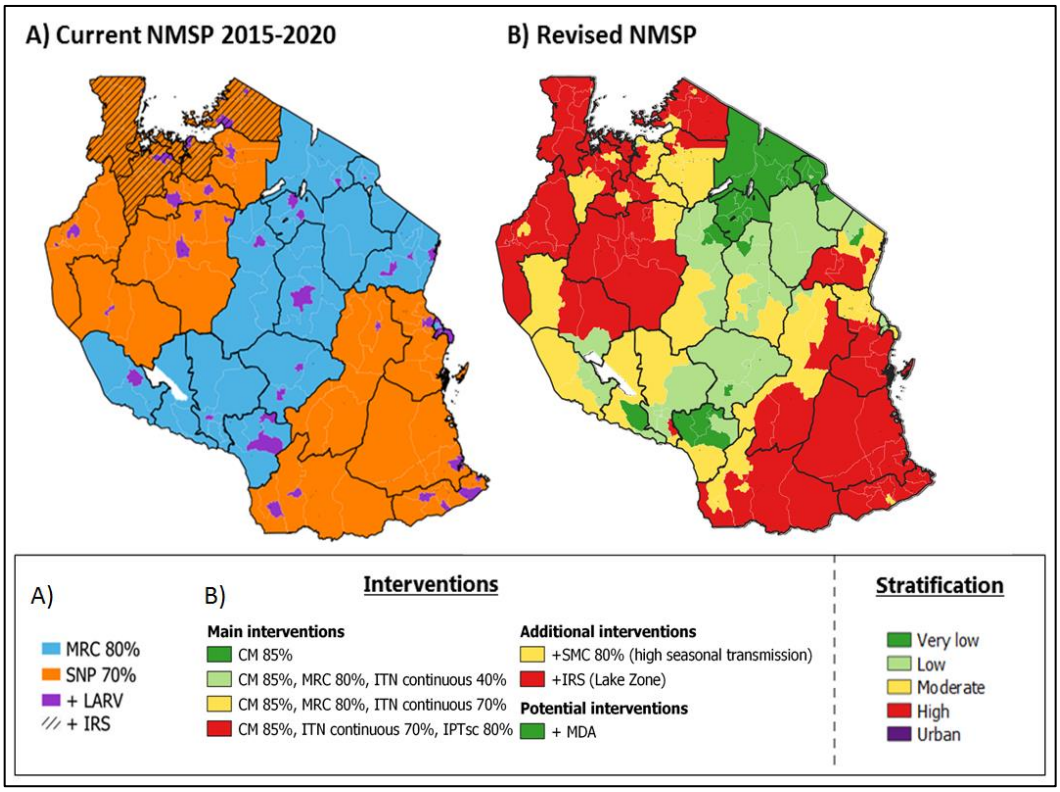
[14] Among the 26 district councils of the Lake Zone only 8-10 were actual sprayed between 2015-2018

management and reallocated ITN deployments and potential additional IPTsc in high and MDA in very low stratum, and one scenarios close to the planned intervention deployment as described in this document[15] (Table 6).

**Simulated intervention deployment and number of district and population targeted**

- Improved CM with an increase in effective treatment rate to 85% in all districts starting from 2017.
- LLIN mass campaign in 2019 in 68 districts (36% of the population living in those districts)
- LLIN continuous (40%, i.e. RCH and private sector) annually between 2017 to 2020 in 153 districts (87% of the population)
- LLIN continuous (70%, i.e. school net distributions) annually between 2017 to 2020 in 153 districts (87% of the population)
- IRS annually between 2017 and 2020 in 27 high-stratum districts (14.67% of the population), in Kagera, Geita, Mara, Mwanza, and Kigoma.
- IPTsc/ SMC in 73 districts (of those in 6 moderate stratum for SMC)

*Figure 6: Intervention stratification*




*Simulated interventions for the current NMSP (A) and revised NMSP (B). The "+" indicates in addition to the other interventions.*

*Table 6: Estimated number of districts and population per simulated intervention under the current NMSP*

| Intervention | current NMSP | | | | revised NMSP | | | |
|---|---|---|---|---|---|---|---|---|
| | Districts | | Population | | Districts | | Population | |
| | n | % | n | % | n | % | n | % |
| **CM** | 180 | 100 | 49'005'600 | 100 | 184 | 100 | 49'439'197 | 100 |
| **LLIN MRC** | 78 | 43.33 | 22'708'052 | 46.34 | 31 | 16.85 | 8'024'199 | 16.23 |
| **LLIN continuous (40%)** | ** | | | | 34 | 18.48 | 13'299'133 | 26.9 |
| **LLIN SNP / continuous (70%)** | 102 | 56.67 | 26'297'548 | 53.66 | 122 | 66.30 | 30'025'093 | 60.7 |

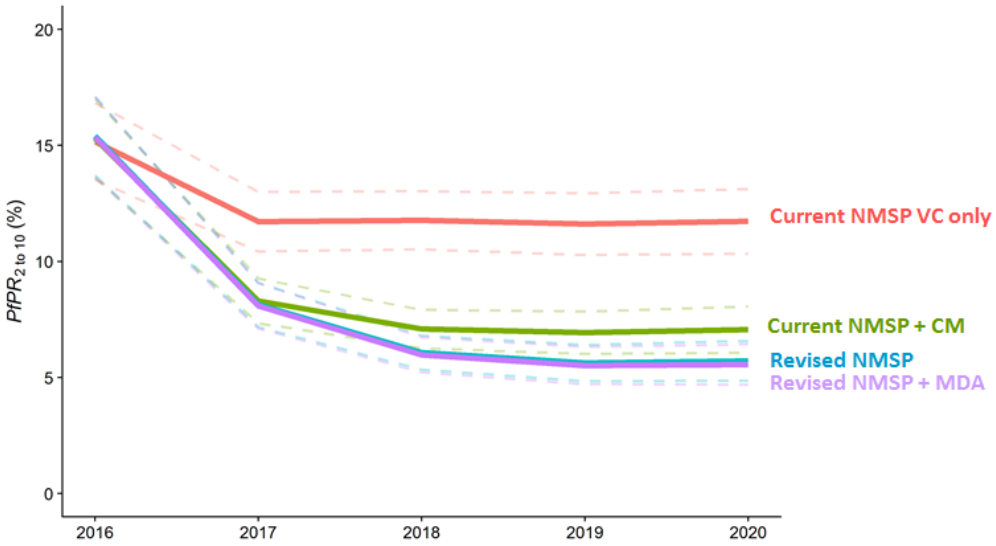
[15] *Simplified version as not all interventions had been simulated*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **IRS** | 26 | 14.44 | 8'828'180 | 18.01 | 27 | 14.67 | 9’650’936 | 19.52 |
| **LSM** | 25 | 13.89 | 10'623'545 | 21.68 | *** | | | |
| **IPTsc/ SMC** | ** | | | | 73 | 39.67 | 30’752’000 | 62.2 |

(*) Targeting school-aged children 5 to 16 years old, approximately 26% of the population.
(**) not explicitly considered in the simulation of current NMSP

The simulated current NMSP with vector control (VC) only, hardly maintained the predicted prevalence from 2016 until 2020, while additional CM led to greater reductions in predicted prevalence. The simulated revised NMSP resulted in lower predicted prevalence compared to the simulated current NMSP (Figure 7).

*Figure 7: Impact on prevalence per strategy at national level for the years 2016 to 2020*

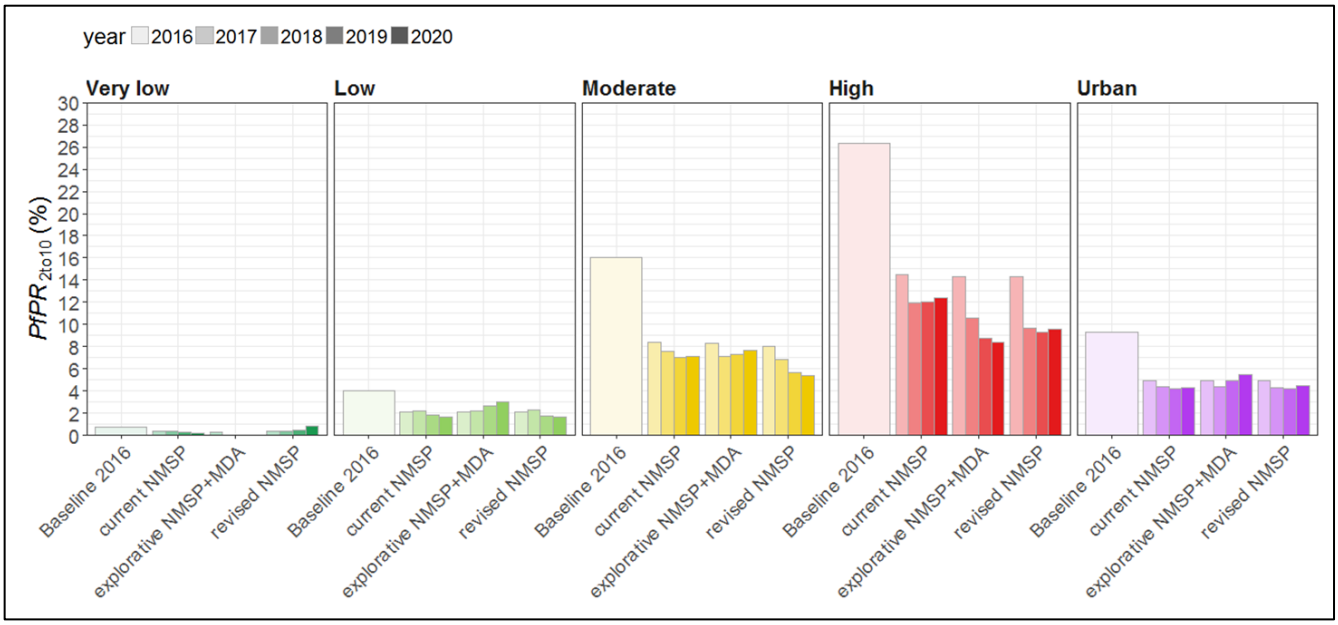



*The full lines represent the mean and the dashed lines the confidence intervals based on variation among the councils.*

## 5.3 Simulated Prevalence per strata

The simulated revised NMSP was predicted to reduce the prevalence by 53.2%. The reduction was highest in the moderate and high stratum (66.3% and 63.8% respectively), followed by the low and urban stratum (58.4% and 51.82) and lowest in the low stratum (-5.3%, average increase from 0.76% to 0.8%). Additional impact of MDA would reduce the prevalence to zero in the very low stratum (explorative NMSP+MDA). The predicted impact and sustainability of MDA per district is addressed in **Error! Reference source not found.** (**Error! Reference source not found.**). Over time, the highest reduction in the predicted prevalence was between 2016 and 2017 with smaller reductions in the years afterwards until 2020 (Figure 8).

*Figure 8: Aggregated predicted impact on prevalence trend by strata for simulated revised NMSP*




## 5.4 Costs

A simplified approach was used to approximate the costs per strategy. Unit costs per person for each intervention were obtained from literature and from personal communication with the NMCP (Table 7). Only costs per treatment for severe and uncomplicated cases were considered for case management. For LLINs distributed by mass campaign or via schools, different costs were considered, assuming in both cases two people per net.

*Table 7: Assumed cost estimates for approximating total costs per intervention*

| Indicator | Value | Unit | Source |
|---|---|---|---|
| **Case management - treatment of cases** | $15.20 | Per severe episode | (White et al., 2011) |
| | $5.20 | Per uncomplicated episode | |
| **MDA** | $5.95 | Cost per drug (= cost per person) | (Scott et al., 2017), (Walker et al., 2016) |
| **LLIN** | $3.11 | Per net for continuous distribution (2 people per net) | Personal communication with NMCP |
| | $4.00 | Per net for mass campaign (2 people per net) | |
| **IRS** | $30 | Per structure (~5 people per household) | Personal communication with NMCP; Spraying reports and 2012 population census |
| **IPTsc** | $2.5 | Cost per drug delivered(= cost per person) | Personal communication with NMCP |

Note: Simplified cost estimates for approximating intervention costs. Updated cost values and costing at micro level are needed for reliable cost estimates.

The costs per intervention were approximated by multiplying the population covered with the unit costs of the intervention with the number of deployment rounds. The costs for school nets did not directly take into account the current level of LLINs. The approximated costs are shown in

Table 8 and Figure 9.

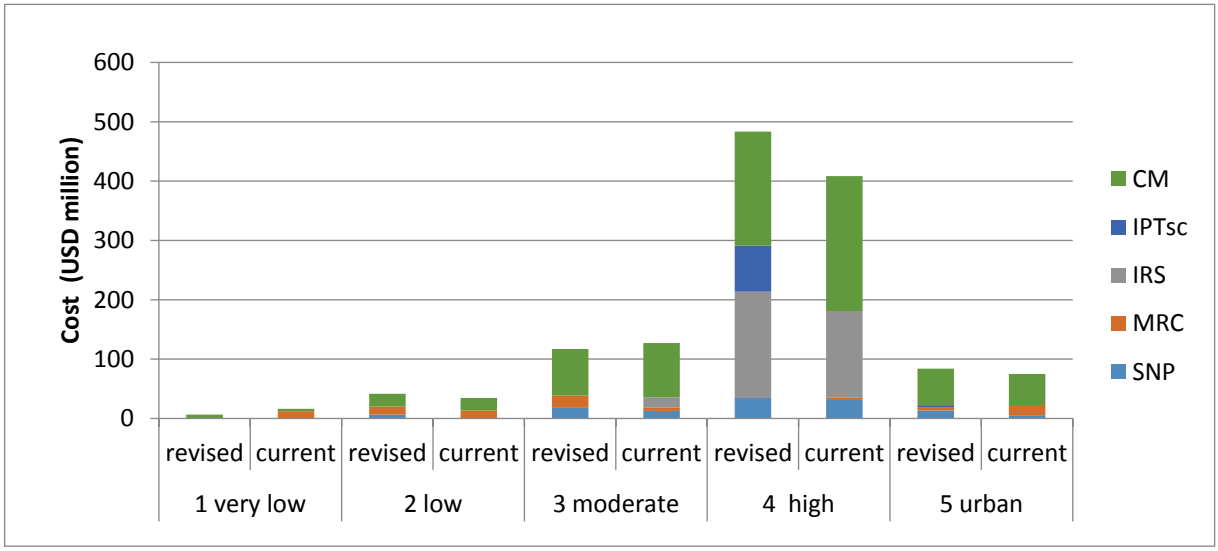
The table shows the estimated cumulative costs for four years (2017-2020) at national level per simulated NMSP strategy. The estimated costs for the simulated current NMSP (VC+CM) and for the simulated revised NMSP (VC+CM) are very similar considering a scale of rounded costs per one million USD.

*Table 8: Approximated costs in USD for 4 years (2017-2020) per one million*

| Intervention | current NMSP | | revised NMSP | |
|---|---|---|---|---|
| | VC only | VC + CM | VC + CM | +MDA |
| CM (treatment of cases) | 251 | 396 | 360 | 349 |
| LLIN MRC | 50 | 50 | 40 | 39 |
| LLIN continuous | 51 | 51 | 72 | 71 |
| IRS | 163 | 163 | 179 | 179 |
| IPTsc/SMC | - | - | 81 | 78 |
| MDA | - | - | 0 | 415 |
| **Total** | 516 | 661 | 732 | 1'130 |
| **Excluding treatment costs** | 265 | 265 | 372 | 781 |

** Not simulated interventions were not included in the cost approximation (e.g. IPTi, IPTp, LSM)*

*Figure 9: Approximated costs for single interventions per strata compared by simulated strategies*




*Note: Not simulated interventions were not included in the cost approximation (e.g. IPTi, IPTp, LSM).*

The estimated costs are only a simplified approximation of costs per intervention at aggregated level. Micro-costing as well as the inclusion of health system costs would be needed to produce more realistic cost estimates.

## 5.5 Strategic Modeling Summary

### 5.5.1 Results per objective

Table 9 summarize the modeling results of the questions anticipated in the box of the "Why Modeling?" in section5.1.

*Table 9: Contribution of modelling to answer questions raised – summary table*

| Nr | Objective | Modelling results | Figure |
|---|---|---|---|
| **1** | Comparison of the revised NMSP with the current NMSP. | In the simulated revised NMSP, fewer LLINs received LLINS via mass campaign and more districts via school net distribution or other routine distribution schemes. The target regions for IRS were expanded and simulated targeted at district level rather than at regional level. In the high stratum IPTsc was added and SMC was included in few districts in the moderate stratum. Those changes were predicted to result in higher prevalence reductions in the high and moderate stratum and to lower prevalence reduction in the low and urban strata, compared to the simulated current NMSP. | Figure 6, Figure 7 |
| **2** | Additional questions raised | | |
| 2.1 | Discontinuation of large scale LLIN distributions in urban and very low endemic areas and predicted rebound. | The modelling results predicted increasing prevalence in urban and low stratum three years after the mass campaign if no further LLINs are distributed. In the very low stratum, the increase three years after last MRC was marginal. Analysis per EIR showed, that the pre-intervention EIR is important to consider in the decision about the discontinuation of LLINs. | Figure 24 |
| 2.2 | Intervention combination needed to reduce the prevalence in high transmission areas to a reasonable low level. | In the analysis, the reduction in prevalence was used as outcome indicator instead of the actual prevalence. The interventions needed to achieve high prevalence reduction varies across districts and in few districts CM and LLINs might already be enough to reach a predicted prevalence reduction greater than 80%, while in most districts additional IPTsc or IRS or both might needed to reach a predicted prevalence reduction greater than 80%. | Figure 25 |
| 2.3 | Additional impact of IRS to CM and LLIN compared between resistance and no resistance scenario. | The predicted impact on prevalence for IRS in addition to CM and LLINs was higher in the case of resistance compared to no pyrethroids resistance, and also higher at lower LLIN coverage compared to target coverage levels. | Figure 26 |
| 2.4 | Additional benefit of implementing IPTsc in the high strata councils, when LLIN are already deployed in combination of IRS or no IRS. | Overall, IPTsc was predicted to have limited additional benefit on prevalence but higher impact on malaria cases averted. At district level, the predicted additional impact of IPTsc in the high stratum was very heterogeneous and might have a higher additional impact, especially in areas, in which CM and LLIN coverage are below target levels. | Figure 27, Figure 28 |

| | | | |
|---|---|---|---|
| 2.5 | Impact of MDA campaigns [in the very low stratum] and predicted resurgence | MDA was predicted to rapidly reduce the prevalence in all strata, however if implemented with CM only, only in councils with low transmission intensity was the impact predicted to last for two years after stopping MDA. Additional interventions were predicted to reduce/slow down the resurgence in prevalence. | Figure 29 |

### 5.5.1 Results per stratum

| Stratum | Modeling Results | Strategic response and mitigation |
|---|---|---|
| **Very low** | Without LLIN replacements but with high effective treatment rate the prevalence was predicted to be maintained until 2020. However, depending on the pre-intervention EIR, a slight increase in prevalence was predicted after the effect of the last MRC (2016) decayed, while prevalence in 2020 remained lower as the baseline prevalence in 2016. MDA was predicted to rapidly interrupt transmission, while the impact was predicted to last for two years after stopping MDA in councils with low transmission intensity and under the assumption. | Establishment of improved surveillance and response, including case based surveillance with reactive case detection; Foci investigation and response with reactive vector control interventions; Epidemic detection and response |
| **Low** | CM and LLINs maintaining at least 40% coverage in the population (e.g. through continuous distributions) were predicted to maintain the baseline prevalence in 2016 until 2020. In the scenario of no additional LLINs (allowing the LLIN coverage to drop below 40%), the prevalence was predicted to increase in 2020 after the LLIN coverage was halved in 2019[16]. | Establishment of LLIN coverage surveillance for optimizing LLIN distribution mechanisms.<br>Improved malaria surveillance and response including epidemic detection and response |
| **Moderate** | In this stratum, ITN mass campaign followed by continuous LLIN distributions (e.g. SNP), were predicted to result in an large decrease in prevalence until 2020, if no other control measure is in place. | Establishment of LLIN coverage surveillance for optimizing LLIN distribution mechanisms. |
| **High** | The simulated interventions in this stratum included annual ITN distributions, maintaining a LLIN coverage of at least 70%, additional IRS campaigns in districts in the Lake Zone and Kigoma, and IPTsc in all districts. That combination was predicted to result in high reductions in prevalence until 2020, which reached the same predicted prevalence as in the moderate strata, but both remained higher as the prevalence in the other strata. IPTsc might add additional impact varying among the councils and deployment would need to be assessed at council level. In an explorative scenario, the combination of mass campaign and annual ITN distribution lead to further reductions but only marginal. | Establishment of LLIN coverage surveillance for optimizing LLIN distribution mechanisms.<br>IRS to be deployed according to optimized resource allocation. |
| **Urban** | In the urban stratum, the baseline prevalence in 2016 was highly heterogeneous and discontinuation of LLIN distributions in all urban areas was predicted to result in a rebound in prevalence. Therefore, LLIN distributions in urban areas should follow epidemiological strata. In practice LSM e.g. larviciding might have additional impact but was not included in the simulations. | LLIN distribution mechanisms to be deployed according to the underlying epidemiological stratum.<br>Optimal CM coverage to be reached with private sector quality improvement schemes. |

### 5.5.2 Modeling discussion and Conclusions

The modelling work aimed to provide impact predictions of the revised NMSP interventions to be used in the strategic planning workshop. In this chapter the predicted impact on prevalence and approximated costs aggregated at national level and per strata were described.

[16] *Last MRC in 2016 with assumed half-life of three years*

Overall, the revised SMMSP 2018-2020 and the current NMSP 2015-2020 were similar in their predicted prevalence, incidence and approximated costs. The revised stratification with targeted interventions at council level allowed for the flexibility to maintain prevalence in councils with already low prevalence (very low and low stratum) and to achieve higher reductions in the high stratum as compared to the current NMSP with interventions mostly targeted at region level.

Whether case management alone might be enough in the long-term to prevent re-establishment of malaria highly depends on the pre-intervention EIR, importation rate of malaria infections, and the existing measures to identify imported infections[17],[18]. In the model, a constant importation rate of 5 per 1000 population per year was assumed, which lies within the range of 1-12 imported infections per 1000 per year estimated in Zanzibar[19]. To produce more robust results on the question about resurgence after transmission has been interrupted in councils in the very low stratum, an extended model with varying importation rates would be needed. In the model intervention deployment was assumed to be ideal and homogeneous within districts. In practice targeted deployment might be more cost-effective.

## Analysis limitations

The prevalence was used as main outcome indicator and in a more detailed analysis the incidence and mortality would need to be included. Results were presented at national or at stratification level, while heterogeneity among councils between and within strata was not addressed fully in this analysis, which could be objective of additional analysis. The approximated costs were only meant to provide first directions of the cost trends compared between the current and revised NMSP and more detailed cost values and calculations will be needed to produce more reliable cost estimates and assess cost-effectiveness.

OpenMalaria was parameterized based on prevalence according to microscopy. The simulated prevalence corresponds to microscopy and TDHS-MIS 2015-16 microscopy prevalence estimates were used for fitting the models per councils. Transformation of the predicted prevalence to mRDT level would change the scale, but not the presented trends.

## Model limitations

Models are a simplified representation of a real complex. In order to be representative of a specific setting, models are calibrated with data that have been collected to represent that setting. However, the outputs of the models are highly influenced by the input data and their quality. Moreover, the presented impact of interventions is only assessing its technical feasibility, operational and financial feasibility are not accounted for. Variability in intervention coverage and malaria endemicity (potential presence of foci) can be important drivers of malaria transmission. Therefore, by assuming homogeneity in each council, the model might overestimate the impact of the interventions. Additionally, improvement in housing, climate change and urbanisation influence the malaria transmission on the long term, but were not considered relevant for the short timeframe of interest .

## Intervention assumptions to be updated

- IPTsc deployment coverage should account for different school enrollment rates per council or age.

[17] WHO, 2017. A framework for malaria elimination. World Health Organization

[18] Crowell, V., Hardy, D., Briët, O., Chitnis, N., Maire, N., Smith, T., 2012. Can we depend on case management to prevent re-establishment of P. falciparum malaria, after local interruption of transmission? Epidemics 4, 1–8. https://doi.org/10.1016/j.epidem.2011.10.003

[19] Tatem, A.J., Qiu, Y., Smith, D.L., Sabot, O., Ali, A.S., Moonen, B., 2009. The use of mobile phone data for the estimation of the travel patterns and imported Plasmodium falciparum rates among Zanzibar residents. Malar. J. 8, 287. https://doi.org/10.1186/1475-2875-8-287

- SumiShield 50WG as an active ingredient of IRS potentially increases the impact of IRS but was not included in the model at the time the analysis was done.
- PBO nets potentially increase the impact of nets but were not included in the model at the time the analysis was done.
- RCD could have a significant impact in very low and low strata but were not included in the model at the time the analysis was done.
- Larviciding is a major component of the SSMP and might have significant additional impact but due to uncertainty in simulated impact was excluded from the analysis and separate in-depth analysis on larviciding is needed.

## Conclusions

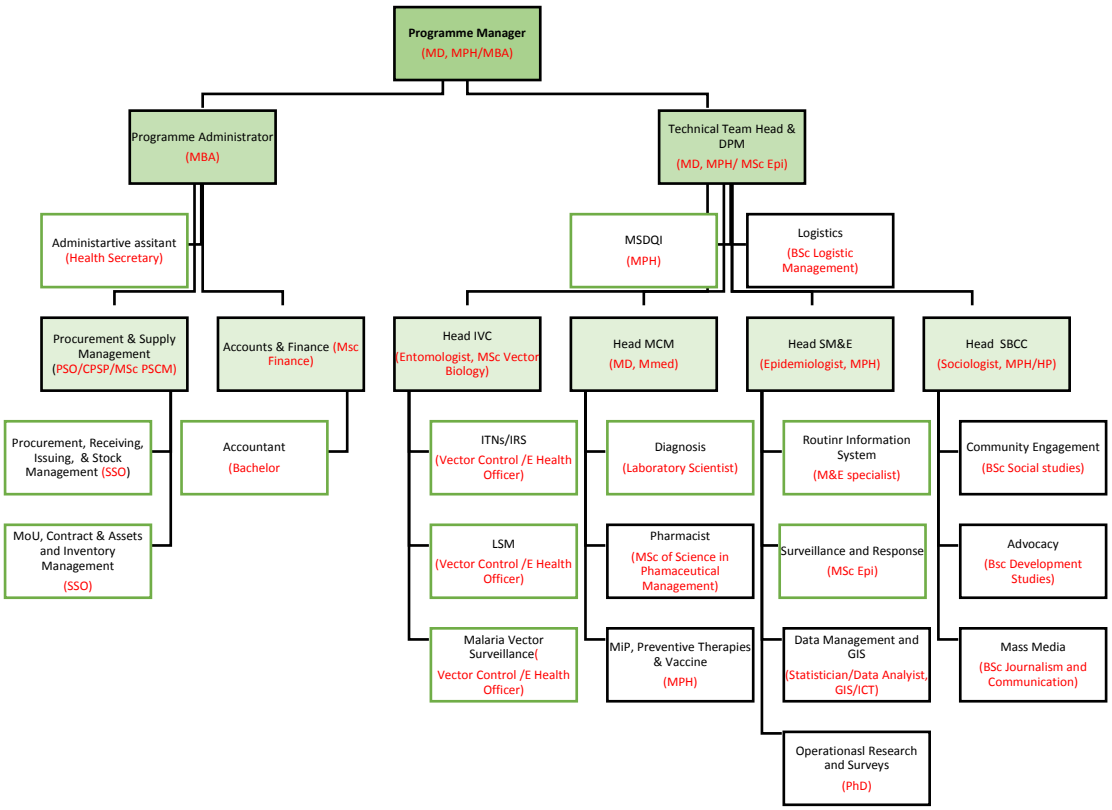
- The revised strategy was predicted to reach lower prevalence at national level compared to the standard NMSP 2015-2020.
- The revised stratgey was predicted to result in higher reduction of prevalence in high stratum, while in low and very low stratum the prevalence was maintained, but did not decrease as in the current NMSP, in which those strata were planned to continue large scale LLINs.
- Regardless of the allocation of vector control interventions in the current and revised NMSP, highest reductions were predicted in combination with improved case management.
- Higher additional impact of IPTsc in high stratum on malaria cases than on prevalence and possible implementation needs to consider present case management and ITN coverage levels.
- MDA was predicted to rapidly interrupt transmission in all strata, however the predicted impact could only be sustained with high treatment coverage and at very low transmission, while additional intervention could reduce/slow down the resurgence. In depth analysis would be needed to describe impact and trends at council level.

# 6 Chapter Six: Implementation Arrangements

## 6.1 Administration and Management of NMCP

The Programme is headed by the Programme Manager, with two arms. One is the Technical Team which is headed by the Deputy PM : IMVC, MCM, SME and SBCC. The other arm is Programme Administration under which we have Accounts and Finance and Procurement and Supply Chain management.

*Figure 10: NMCP organogram*




## 6.2 Implementation mechanism

The health service delivery system is composed of the following key players: Public health sector; private health sector; Non-Governmental Organizations (NGOs), Faith-based organizations and other voluntary organizations and recent formalized Sector at community level using Community Health Care Workers.

**The structure of health care delivery system in Tanzania is organized in the following six (6) levels**:

**At National level:** The MoHCDGEC plays a role of policy oversight, supportive supervision on technical matters in implementing National Health Policy. PORALG deals with administrative matters on health at LGAs.

**Regional level**: Supporting the health service delivery through the Regional Health Management Teams (RHMT)

**District level:** The Council Health Management Team (CHMT) is the overseer of all health care services in the District.

**Ward level:** The health care facility at this level is a health centre, which provides both curative and preventive services. This acts as a referral point for dispensaries within the same catchment area.

***Village/Mtaa level****:* The health care facility at this level is a dispensary which provides both curative and preventive services. This is the lowest level of the operational health facility delivery system.

**Community/household level:** This is the lowest level of the health care delivery system. Community Health Workers (CHWs) are the providers of the health services mostly health education and promotion services, preventive and basic clinical skills with curative services.

There is added value of recent formalized CHWs in relation to Malaria Strategic Plan implementation framework. CHWs are sustainable workforce in community level to complement the following malaria related interventions.

- promotion; use of LLIN, early health care seeking for treatment and IPTp
- preventive; vector control participate in LSM, IRS)
- basic clinical skills; testing and treatment for integrated Community Case Management - iCCM)
- surveillance: tracking of local malaria cases at the household linked with health facility diagnosis in elimination settings

# Appendix A: Mid Term Review and Consultative Malaria Expert Meeting Recommendations

## Summary of recommendation from MTR

**Epidemiological strategic direction**

- Update appropriate intervention packages and response mechanisms for malaria in different epidemiological strata by promoting evidence based delivery of malaria intervention in the context of changing malaria epidemiology in the country.

**Entomological strategic direction**

- Add measurement parameters (human biting rate) to obtain entomological impact data (EIR) through the established MEVS which capture other parameters; Sporozoite Rate and Mosquitoes species parameters

**Strategic direction for effective health system to deliver malaria interventions:**

- Put into operation and enhance the roles of the Community Health Workers (CHWs) to promote all malaria interventions; such as facilitate community access to diagnosis and treatment, larviciding, SBCC IPC approach, active case detection in very low malaria transmission
- Develop LSM scientific implementation framework for assessment of its performance to match with ongoing Government investment
- Strengthen capacity of SME unit to manage and utilize the established NMCP composite database with its dashboard to further understand diversity in malaria situation and accelerate the efforts to raise *'Surveillance'* to a *'Core Intervention'* as recommended by Global Technical Strategy (GTS) 2016 - 2030
- Use the lessons from operational research to address the intrinsic and extrinsic factors of the observed resilience of malaria in some regions
- MoHCDGEC to advocate for an increased proportion of the recurrent budget, which, is allocated for health in line with Abuja declarations of 15%.

## Summary of recommendation from consultative expert meeting

### Vector Control

| Issue | Answer |
|---|---|
| General s | • LLIN should remain primary intervention, with further scale up to fill gaps and ensure sustained high coverage (continuous and mass distributions)<br>• New products (next-generation-nets, insecticides) evaluated should be used to address resistance challenges for effective vector control<br>• IRS to continue in areas with resistance and high incidence<br>• Intensify data collection through case surveillance, and entomological monitoring of all vectors; special focus on *An. funestus*<br>• Using surveillance and DHIS2 data to target and fine-tune packages of interventions to "hot spots" and epidemic prone areas in the low transmission belt<br>• LSM as a supplementary intervention adapted to the local context<br>• House improvement & screening be explored with a multi-sectoral approach<br>• BCC to increase utilisation and to promote interventions<br>• Facilitate increased commercial sector to increase access to ITNs |
| LLIN | • Primary intervention strategy -> sustained optimal coverage<br>– Continuous distribution through multiple channels<br>– Mass campaign (if needed) |

| | |
|---|---|
| | – Channels to facilitate filling gaps in household and community coverage<br>– Maximizing efficiency through stratification, including reducing free distribution in areas of sustained low prevalence<br>• Quality control of insecticide content pre – and post delivery<br>• BCC to increase acquisition and use of LLINs<br>• Facilitate commercial sector participation, extending coverage of ITNs<br>• Challenges<br>– Misuse of nets<br>– Counterfeit nets<br>– Insecticide resistance to pyrethroids<br>• Introduce next-generation-nets .e.g. PBO nets through regular distribution channels in areas of reported resistance to pyrethroids<br>• Issues for consideration<br>– Prices can be expected to drop in future, when the market increases<br>– Monitoring of effectiveness, durability, use |
| LSM | • Deployment in all areas with suitable methods for the local context, including low transmission areas<br>• Integrated into a entomological monitoring and evaluation system to monitor impact and performance<br>• Different implantation strategies will need to be developed<br>– low vs. high transmission,<br>– seasonal vs. non-seasonal areas<br>• Deployment based on local context<br>– E.g. type and quantity of breeding sites.<br>• Challenges<br>– Assess technical feasibility, e.g. using drones to map breeding sites<br>– Identify optimal timing, interval and frequency |
| **IRS** | • Strategy to mitigate resistance or low coverage in high endemic areas.<br>–Insecticide rotation, using available insecticides such as Actelic and others (SumiShield in pipeline)<br>–Choice of specific insecticide should be based on local factors such as resistance profile, cost-effectiveness<br>–and other potential costs As part of epidemic response in low transmission areas<br>• Quality control<br>• Challenges<br>– Sustainability of IRS? resurgence or epidemic<br>– Limited list of insecticide available for rotation<br>• The use of DDT will be guided by insecticide susceptibility tests. In addition DDT has special requirements and considerations.<br>–Evidence for and against the use of DDT in Tanzania should be guided by the following:<br>– Insecticide Management Plan<br>– Registration of DDT<br>– Cost effectiveness compared to other options<br>– Availability of funds to purchase DDT<br>–Additional supervisory procedures and operational factors required to reduce potential harm<br>– Availability of DDT when needed<br>– Multi-sectoral consultation (Agriculture, Fisheries, Finance and Trade) |
| ME and Innovation | • Including key indicators such as:<br>– Resistance types and intensity<br>– Vector composition and behaviour<br>– Sporozoite rates<br>• Data will inform actions to counter resistance<br>Innovation<br>• **Improved housing:**<br>–Recent data shows screened houses are as effective as LLINs in preventing malaria. Many households are already screening houses without government support. With some support, potential exists to leverage private investments for expanded malaria prevention.<br>–Eave tubes are currently being evaluated in Ifakara and may offer an additional housing improvement with malaria prevention effects |

## Case Management

| Issue | Answer |
|---|---|
| **Universal access to diagnostics** | • Introduce alternative community based malaria testing and treatment (**iCCM**) especially for "hard to reach". Repackage the **mRDT in ADDO** experience<br>• Improve testing in HF. Need to understand the Test/ACT mismatch pattern; Testing targets to be revised (all OPD visits?) according to epi-strata |
| **Universal access to therapeutic** | • Strengthening motivation to enhance private sector (FLB, wholesalers and retailers) use of QAACT<br>• Promote understanding of irrational prescribing/use of ACT in public facilities and address the findings |
| **Preventive therapies** | • Targeting specific population in specific epi strata with preventive therapies (e.g. school children)<br>• Explore feasibility to introduce MDA in appropriate epi strata<br>• Explore feasibility of introducing SMC<br>• Explore options for re-introducing IPTi in suitable limited epi strata (high resilient areas)<br>• Discuss scale down IPTp administration by epi strata (very low transmission) |
| **Management of non malaria fever** | • Develop explore and introduce more specific algorithms<br>• Testing other pathogens |
| **Severe malaria management** | • Pre-referral management (including infrastructure availability of rectal formulation in the community etc.) is crucial to prevent mortality as well as<br>• Improvement of in-patient services for management of severe cases |
| **Resistance mitigation** | • Explore introduction of multi-ACT policy |
| **Targeting low transmission areas** | • Introduction/piloting of low dose Primaquine in very low transmission areas<br>• Monitoring species distribution<br>• Introduce and expand active case detection and foci identification<br>• Stop IPTp in very low transmission |

## Surveillance and elimination

| Issue | Answer |
|---|---|
| **Make correct stratification (Low, moderate and high transmission strata)** | • Pull more data from different sources to confirm the burden of malaria<br>• Validation using other sources of data, e.g. additional surveys may be required to reduce uncertainty.<br>• Stratification should be a continuous process; NMCP should review the data regularly (e.g. annually in high transmission areas and more frequently in low transmission areas).<br>• Areas in between strata should be identified. |
| **We should have one universal Surveillance system in all strata (in low transmission additional information will be needed, e.g. more assessment of admission data)** | • Housed in DHIS2<br>• Vector population dynamics, targetable behaviours, insecticide susceptibility, vector products and delivery process<br>• Frequency of reporting and accuracy of patient based data<br>• Making changes in the MIS e.g. capturing age of patients?<br>• Use DHIS2 for active case surveillance<br>• Community survey data need to be integrated in DHIS2, (e.g. use the data make a decision to stop survey where transmission has been interrupted; then introduce ACD (at <1% prevalence)<br>• The data should be geo-coded? To support visualization in space and time.<br>• Data quality? (IQA, QC, EQA) |

| | |
|---|---|
| **Optimized interventions for each strata** | • Stratification should be done at particular time before any intervention is done<br>• Investigate parasite species and vector heterogeneity (spatial and temporal)<br>• In low transmission<br>– Investigate cases<br>– Investigate parasite importation using molecular tools<br>– Investigate positivity rates by molecular and serological tools |
| **We need multi-sectoral collaboration embedded in the elimination plan** | • Involve private sectors e.g. investment in agriculture<br>• Climate an weather forecast agencies<br>• Local government involvement in planning e.g. infrastructure with malaria control focus<br>• Environmental management under local governments<br>• Telecom and mobile companies in reporting<br>• Role of others key sectors is critical, e.g. Military, port authority, tourist, agriculture (irrigation?) – They should be involved<br>– Need a focal person to represent NMCP |
| **Strata specific targets, goals and strategies need to be set up** | • They should be rational and realistically feasible<br>• They should be different for districts/regions based on the strata with specific narratives (e.g. Prevalence)<br>• Active case detection (ACD), (what type)?<br>• Reporting and investigation of index case<br>• Identifying and classify hotspots<br>• Case reporting and notification<br>• Needs to establish a situation room (monthly, weekly?)<br>– Experts committees can be established?<br>– Malaria Elimination Committee?<br>– Utilize existing staff in partner instructions<br>– Strengthen national institution<br>• Death notification and audit<br>• Strengthening human resource capacity for surveillance t the National and district levels<br>– Central and local government<br>– Data analysis and interpretation |

# Appendix B: Stratification Methodology

### Steps for Stratification and stratification options explored

The **stratification process** was divided into five steps: 1) Establishing Cutoffs; 2) Using the data to assign strata; 3) Assigning scores; 4) Generating maps; and 5) Further supporting analysis. (Figure 11: Flow chart of the steps taken for stratification).The **data sets** used and the period are listed in Table 10. Five **stratification options** were explored to select the most appropriate way to establish a pragmatic pattern of malaria burden in the country (Table 11).

*Figure 11: Flow chart of the steps taken for stratification*

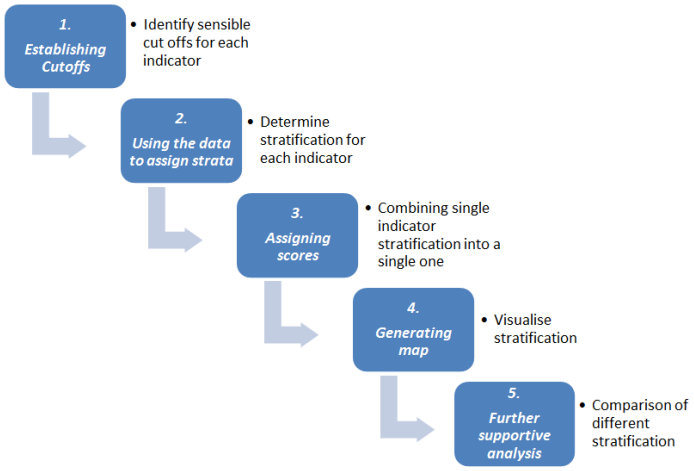



*Table 10: Data sets used for stratification*

| Source | Indicator | Dataset periods |
|---|---|---|
| School malaria parasite survey | Parasite prevalence | 2015 and 2017 |
| HMIS/DHIS2 OPD | Annual malaria confirmed incidence per 1,000 population | 2015, 2016, 2017 |
| HMIS/DHIS2 ANC | Annual malaria positivity rate | 2015, 2016, 2017 |
| HMIS/DHIS2 Lab | Annual parasite incidence rate | 2016, 2017 |
| HMIS/DHIS2 Lab | Annual malaria test positivity rate | 2016, 2017 |

*Table 11: Options explored for data analysis*

| Stratification Option and scenarios | Description |
|---|---|
| 1 | Preselected Ranges for each individual dataset based on indicator trends |
| 2 | Ranges based on quartiles |
| 3 | SMPS community parasite rate for 2017 as reference point to determine the cut offs for each of the other indicators |
| 4, 5, 6 | As option 3 but with different scoring system |

### Step 1: Establishing Cutoffs

For each of the five indicators used for the stratification, the cut off for the data ranges were first determined.

Three options were explored to identify suitable cut off points for the indicator values to be classified into four strata.

**Option 1:** the cutoffs were developed from observing the data trends (**Table 12**). The analysis using these cutoffs was termed “stratification 1”.

*Table 12: The cutoff thresholds for stratification 1*

| | SMPS | Incidence | ANC Positivity | API | TPR |
|---|---|---|---|---|---|
| **VERY LOW** | <1 | <10 | <1 | <25 | <10 |
| **LOW** | 1-<5 | 10-<50 | 1-<5 | 25-<50 | 10-<15 |
| **MODERATE** | 5-<30 | 50-<100 | 5-<15 | 50-<100 | 15-<30 |
| **HIGH** | >30 | >100 | >15 | >100 | >30 |

**Option 2:** the cutoffs were developed using the quartiles of the data (Table 13). The analysis using these cutoffs was termed "stratification 2".

*Table 13: The cutoff thresholds for stratification 2*

| | SMPS | Incidence | ANC Positivity | API | TPR |
|---|---|---|---|---|---|
| **VERY LOW** | <1 | <30 | <1 | <10 | <10 |
| **LOW** | 1-<10 | 30-<100 | 1-<5 | 10-<50 | 10-<25 |
| **MODERATE** | 10-<35 | 100-<180 | 5-<15 | 50-<120 | 25-<40 |
| **HIGH** | >35 | >180 | >15 | >120 | >40 |

**Option 3:** The SMPS community parasite rate for 2017 was used as reference point to determine the cut offs for each of the other indicators. The analysis using these cutoffs was termed "stratification 3".

For example, for all districts with a parasite rate of <1% (strata: very low), the corresponding values of the data for all the other indicators were examined. The quartiles of the values were calculated. The 3$^{rd}$ quartile was used to set the first cutoff point (strata: very low) for each of the indicators. The 3$^{rd}$ quartile corresponds to 75% of all observed values among that strata, hence it captures the majority of the values and excludes outliers. Similarly, the values for the indicators of all districts with a parasite rate of 1-<5% (strata: low) were analyzed for their quartile ranges. This was repeated for districts with parasite rate of 5-30% (strata: moderate) and parasite rate >30% (strata: high). This method resulted in four epidemiological cutoff points (very low, low, moderate and high) for each of the indicators (Table 14)

*Table 14: The cutoff thresholds for stratification 3*

| | SMPS | Incidence | ANC Positivity | API | TPR |
|---|---|---|---|---|---|
| **VERY LOW** | <1 | <15 | <1 | <15 | <5 |
| **LOW** | 1-<5 | 15-<50 | 1-<3 | 15-<75 | 5-<15 |
| **MODERATE** | 5-<30 | 50-<150 | 3-<10 | 75-<150 | 15-<30 |
| **HIGH** | >30 | >150 | >10 | >150 | >30 |

**Step 2: Using the data to assign strata**

Once the cutoffs were established, the data for two or more years were used to assign the appropriate strata. Two options were explored:

**Option 1**: Using the maximum value of all the years to assign the strata. For instance, the data for confirmed incidence/1000 population were for the period 2015, 2016, and 2017. Hence the data with the maximum value in these years were used to assign the appropriate strata based on the cutoffs established.

Using the maximum value factors in any possibility for the malaria indicator to rebound and ensures the stability of the indicator.

**Option 2:** Using the average value of all the years to assign the strata. For instance, the data for confirmed incidence/1000 population were for the period of 2015, 2016, and 2017. Hence the average of the data points of these years were used to assign the appropriate strata based on the cutoffs established.

**Step 3: Assigning scores**

After establishing the strata for all indicators, each strata was assigned a score. A few options were considered before the most suitable approach was selected.

**Option 1:**

For each of the 5 indicators, equal points were assigned so that each indicator contributed equally towards the overall score as shown in table below. For instance, the total score for a district in the very low strata in each of the indicators was 5. A range was assigned for the total scores to allow a degree of flexibility in that at least 3 out of the 5 indicators had to be very low for the district to be considered in the overall very low strata.

*Table 15: Assigned scores for each strata*

| | SMPS | ANC | Incidence | API | TPR | Total | Range |
|---|---|---|---|---|---|---|---|
| **very low** | 1 | 1 | 1 | 1 | 1 | 5 | <=7 |
| **low** | 2 | 2 | 2 | 2 | 2 | 10 | 8<=12 |
| **moderate** | 3 | 3 | 3 | 3 | 3 | 15 | 13<=17 |
| **high** | 4 | 4 | 4 | 4 | 4 | 20 | >=18 |

**Option 2**:

The score of API and TPR towards the overall score was reduced due to reporting tools for these indicators being introduced recently in 2015 and reporting rate being low as shown in Table below.

*Table 16: Assigned scores for each strata*

| | SMPS | ANC Positivity | Incidence | API | TPR | Total | Range |
|---|---|---|---|---|---|---|---|
| very low | 1 | 1 | 1 | 0.5 | 0.5 | 4 | <=6 |
| low | 2 | 2 | 2 | 1 | 1 | 8 | 6<=10 |
| moderate | 3 | 3 | 3 | 1.5 | 1.5 | 12 | 10<=14 |
| high | 4 | 4 | 4 | 2 | 2 | 16 | >=14 |

**Option 3:**

The API as an indicator was removed and the mRDT positivity rate was assigned a score of 1 as shown below.

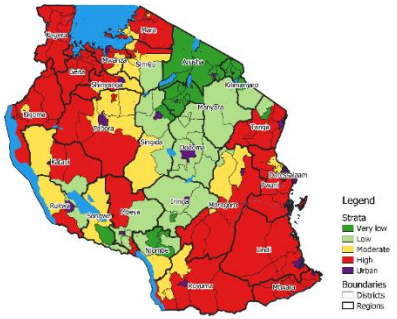
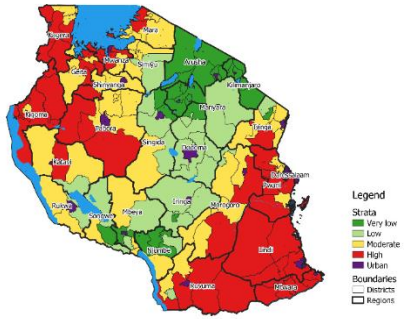
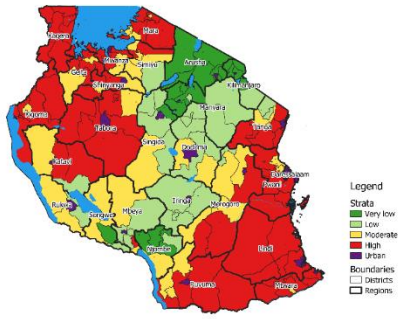
*Table 17: Assigned scores for each strata*

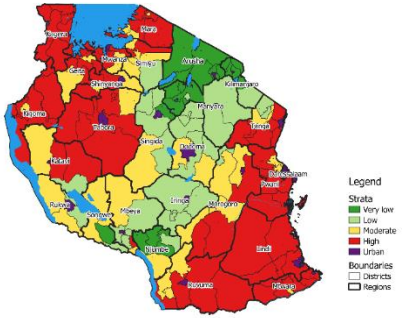
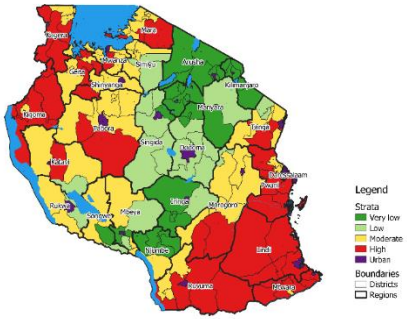
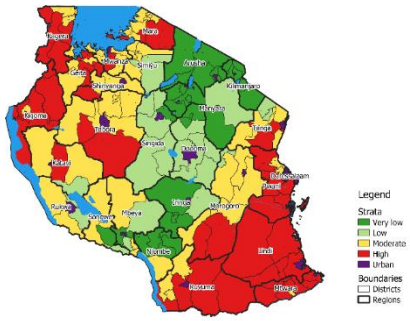
| | SMPS | ANC Positivity | Incidence | TPR | Total | Range |
|---|---|---|---|---|---|---|
| **very low** | 1 | 1 | 1 | 1 | 4 | <=6 |
| **low** | 2 | 2 | 2 | 2 | 8 | 7<=10 |
| **moderate** | 3 | 3 | 3 | 3 | 12 | 11<=14 |
| **high** | 4 | 4 | 4 | 4 | 16 | >=15 |

**Step 4: Generating maps**

Maps were generated using QGIS after the final strata for each of the districts were established. Various possible scenarios (summarized in Figure 12) were explored to determine the most robust stratification for Tanzania.

*Figure 12: Stratification Scenarios*

<table>
<tr><th>Scenario</th><th colspan="3">Scenario</th></tr>
<tr><td>1</td><td>  </td><td>Cut offs for each of the five indicators were determined by observing the data trends and assigning cut off values accordingly as shown in Table 12.<br>The maximum values of all two/three years were used to categorize the councils into their respective strata.<br>A summary of the distribution of counts of councils per strata for stratification 1 is summarised in the table on the right The epidemiological strata considered 4 strata, very low, low, moderate and high. For operational reasons, the urban strata was also added. Urban areas were the districts that were municipal and city councils.</td><td><table><tr><th></th><th colspan="2">Count of Councils</th></tr><tr><th></th><th>Epidemiological strata</th><th>Epidemiological strata + urban</th></tr><tr><td>1 Very Low</td><td>26</td><td>23</td></tr><tr><td>2 Low</td><td>36</td><td>29</td></tr><tr><td>3 Moderate</td><td>40</td><td>29</td></tr><tr><td>4 High</td><td>82</td><td>78</td></tr><tr><td>5 Urban</td><td></td><td>25</td></tr><tr><td>Total</td><td>184</td><td>184</td></tr></table></td></tr>
<tr><td>2</td><td>  </td><td>Cut offs for each of the indicators were determined by using the quartile ranges as shown in Table 13.<br>The maximum values of all two/three years were used to categorize the councils into their respective strata.<br>A summary of the distribution of counts of councils per strata for stratification 2 is summarised in the table on the right.</td><td><table><tr><th></th><th colspan="2">Count of Councils</th></tr><tr><th></th><th>Epidemiological strata</th><th>Epidemiological strata + urban</th></tr><tr><td>1 Very Low</td><td>33</td><td>29</td></tr><tr><td>2 Low</td><td>35</td><td>26</td></tr><tr><td>3 Moderate</td><td>63</td><td>52</td></tr><tr><td>4 High</td><td>53</td><td>52</td></tr><tr><td>5 Urban</td><td></td><td>25</td></tr><tr><td>Total</td><td>184</td><td>184</td></tr></table></td></tr>
<tr><td>3a</td><td>  </td><td>Cut offs for each of the indicators were determined by using the SMPS 2017 data as a reference point and developing the cutoffs for other indicators based on this as shown in Table 14.<br>The maximum values of all three years were used to categorize the councils into their respective strata.<br>A summary of the distribution of counts of councils per strata for stratification 3a is summarised in the table on the right.</td><td><table><tr><th></th><th colspan="2">Count of Councils</th></tr><tr><th></th><th>Epidemiological strata</th><th>Epidemiological strata + urban strata</th></tr><tr><td>1 Very Low</td><td>24</td><td>22</td></tr><tr><td>2 Low</td><td>38</td><td>28</td></tr><tr><td>3 Moderate</td><td>46</td><td>37</td></tr><tr><td>4 High</td><td>76</td><td>72</td></tr><tr><td>5 Urban</td><td></td><td>25</td></tr><tr><td>Total</td><td>184</td><td>184</td></tr></table></td></tr>
</table>

<table>
<tr><th>Scenario</th><th colspan="3">Scenario</th></tr>
<tr><td>3b</td><td> 
</td><td>Cut offs for each of the indicators were determined by using the SMPS 2017 data as a reference point and developing the cutoffs for other indicators based on this as shown in Table 14.<br>The maximum values of all three years were used to categorize the councils into their respective strata.<br>The test positivity rate used was for mRDT positivity because of functioning national wide framework for mRDT testing accuracy and quality control. This was used to avoid the tendency of false positives with microscopy when not performed with quality standards.<br>A summary of the distribution of counts of councils per strata for stratification 3b is summarised in the table on the right.</td><td><table>
<tr><th></th><th colspan="2">Count of Councils</th></tr>
<tr><th></th><th>Epidemiological strata</th><th>Epidemiological strata + urban strata</th></tr>
<tr><td>1 Very Low</td><td>26</td><td>23</td></tr>
<tr><td>2 Low</td><td>36</td><td>27</td></tr>
<tr><td>3 Moderate</td><td>46</td><td>37</td></tr>
<tr><td>4 High</td><td>76</td><td>72</td></tr>
<tr><td>5 Urban</td><td></td><td>25</td></tr>
<tr><td>Total</td><td>184</td><td>184</td></tr>
</table></td></tr>
<tr><td>4a</td><td> 
</td><td>Cut offs for each of the indicators were determined by using the SMPS 2017 data as a reference point and developing the cutoffs for other indicators based on this as shown in Table 14.<br>The average values of all three years were used to categorize the councils into their respective strata.<br>A summary of the distribution of counts of councils per strata for stratification 4a is summarised in the table on the right.</td><td><table>
<tr><th></th><th colspan="2">Count of Councils</th></tr>
<tr><th></th><th>Epidemiological strata</th><th>Epidemiological strata + urban strata</th></tr>
<tr><td>1 Very Low</td><td>35</td><td>30</td></tr>
<tr><td>2 Low</td><td>35</td><td>25</td></tr>
<tr><td>3 Moderate</td><td>61</td><td>54</td></tr>
<tr><td>4 High</td><td>53</td><td>50</td></tr>
<tr><td>5 Urban</td><td></td><td>25</td></tr>
<tr><td>Total</td><td>184</td><td>184</td></tr>
</table></td></tr>
<tr><td>4b</td><td> 
</td><td>Cut offs for each of the indicators were determined by using the SMPS 2017 data as a reference point and developing the cutoffs for other indicators based on this as shown in Table 14.<br>The Average values of all three years were used to categorize the councils into their respective strata<br>The mRDT test positivity was used.<br>A summary of the distribution of counts of councils per strata for stratification 4b is summarised in the Table on the right.</td><td><table>
<tr><th></th><th colspan="2">Count of Councils</th></tr>
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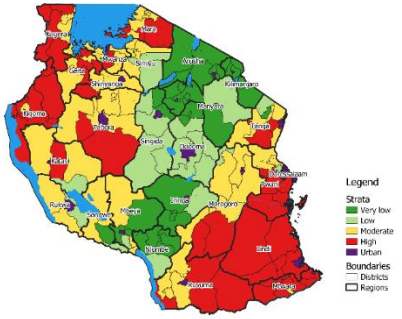
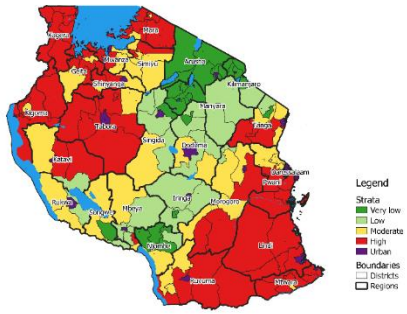
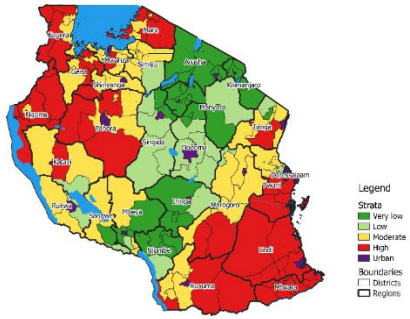
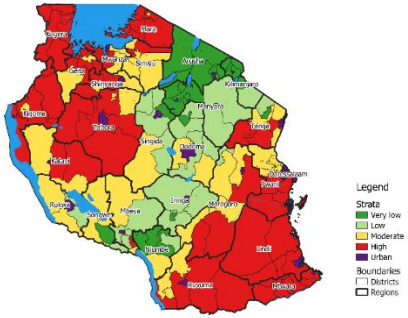
<tr><td>Total</td><td>184</td><td>184</td></tr>
</table></td></tr>
</table>

| Scenario | Scenario | | |
|---|---|---|---|
| 5a |  | Cut offs for each of the indicators were determined by using the SMPS 2017 data as a reference point and developing the cutoffs for other indicators based on this as shown in Table 14.<br>The average values of all three years were used to categorize the councils into their respective strata.<br>The mRDT test positivity was used.<br>The weights of API and TPR towards the overall score.<br>A summary of the distribution of counts of councils per strata for stratification 5a is summarised the Table on the right. | **Count of Councils**<br>**Epidemiological strata** / **Epidemiological strata + urban strata**<br>1 Very Low: 40 / 35<br>2 Low: 32 / 22<br>3 Moderate: 63 / 53<br>4 High: 49 / 49<br>5 Urban: / 25<br>**Total: 184 / 184** |
| 5b |  | Cut offs for each of the indicators were determined by using the SMPS 2017 data as a reference point and developing the cutoffs for other indicators based on this as shown in Table 14.<br>The maximum values of all three years were used to categorize the councils into their respective strata.<br>The mRDT test positivity was used.<br>The weights of API and TPR towards the overall score was reduced.<br>A summary of the distribution of counts of councils per strata for stratification 5b is summarised in the Table on the right. | **Count of Councils**<br>**Epidemiological strata** / **Epidemiological strata + urban strata**<br>1 Very Low: 28 / 26<br>2 Low: 34 / 23<br>3 Moderate: 49 / 41<br>4 High: 73 / 69<br>5 Urban: / 25<br>**Total: 184 / 184** |
| 6a |  | Cut offs for each of the indicators were determined by using the SMPS 2017 data as a reference point and developing the cutoffs for other indicators based on this as shown in Table 14.<br>The Average values of all three years were used to categorize the councils into their respective strata<br>The mRDT test positivity was used.<br>The API indicator was removed in the analysis<br>A summary of the distribution of counts of councils per strata for stratification 6a is summarised in the Table on the right. | **Count of Councils**<br>**Epidemiological strata** / **Epidemiological strata + urban strata**<br>1 Very Low: 41 / 35<br>2 Low: 30 / 21<br>3 Moderate: 60 / 50<br>4 High: 53 / 53<br>5 Urban: / 25<br>**Total: 184 / 184** |

| Scenario | Scenario | | |
|---|---|---|---|
| 6b |  | Cut offs for each of the indicators were determined by using the SMPS 2017 data as a reference point and developing the cutoffs for other indicators based on this as shown in Table 14.<br>The Maximum values of all three years were used to categorize the councils into their respective strata<br>The mRDT test positivity was used.<br>The API indicator was removed in the analysis<br>A summary of the distribution of counts of councils per strata for stratification 6a is summarised in the Table on the right. | |

| | Count of Councils | |
|---|---|---|
| | **Epidemiological strata** | **Epidemiological strata + urban strata** |
| 1 Very Low | 30 | 26 |
| 2 Low | 31 | 22 |
| 3 Moderate | 52 | 42 |
| 4 High | 71 | 69 |
| 5 Urban | | 25 |
| **Total** | **184** | **184** |

**Step 5: Further supporting analysis**

Further analysis was done to ascertain the stratification methodology. Analysis included drawing of individual indicator maps, correlation analysis and cluster analysis.

### *Individual indicator maps*

The maps for each of the individual parameters were also developed to provide further support to the trends seen in the stratification.

As seen in Figure 13 to Figure 17, there is heterogeneity in malaria burden across the country and this is in line with the strata distribution.

*Figure 13: School Malaria Parasitological Survey 2015, 2017*

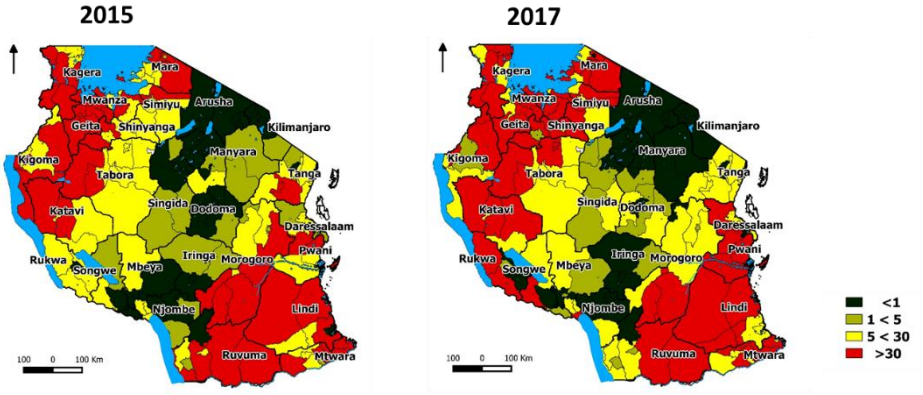



*Figure 14: Confirmed Malaria Incidence/1000 population, 2015-2017*

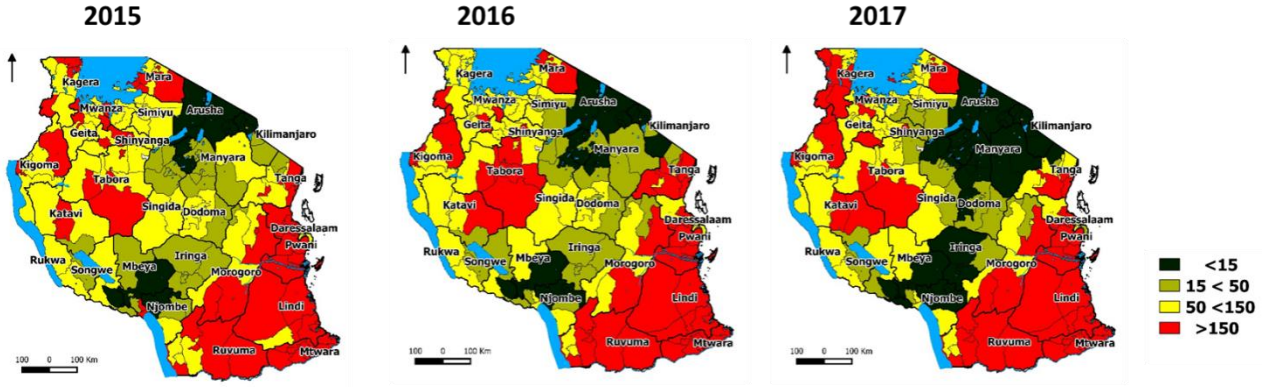



*Figure 15: ANC Positivity Rate 2015- 2017*

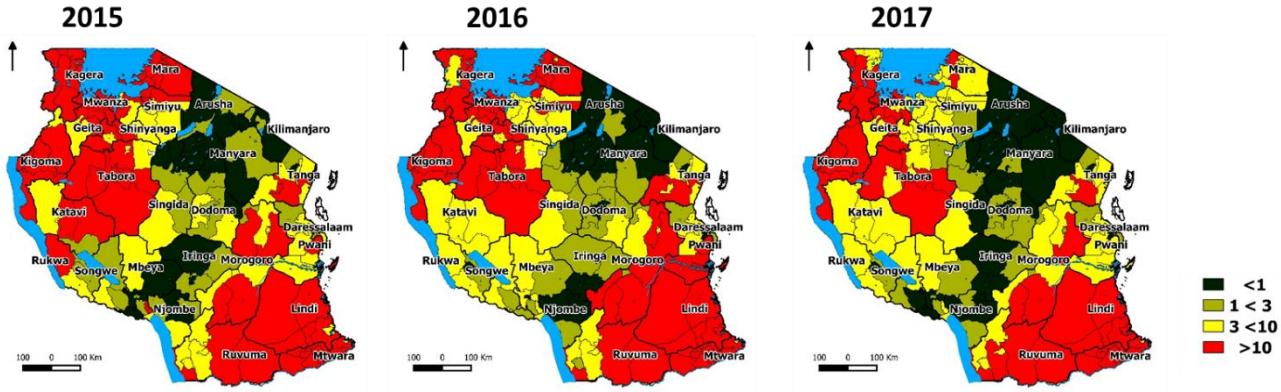


*Figure 16: mRDT Positivity Rate 2016-2017*

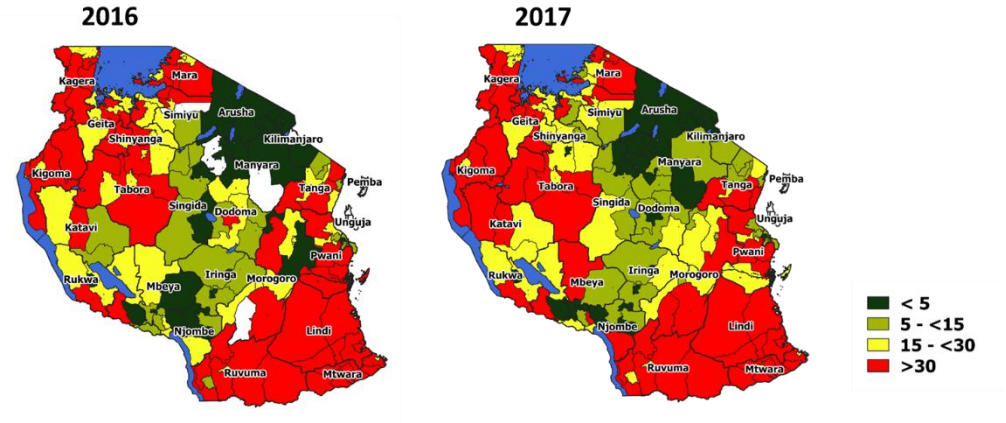
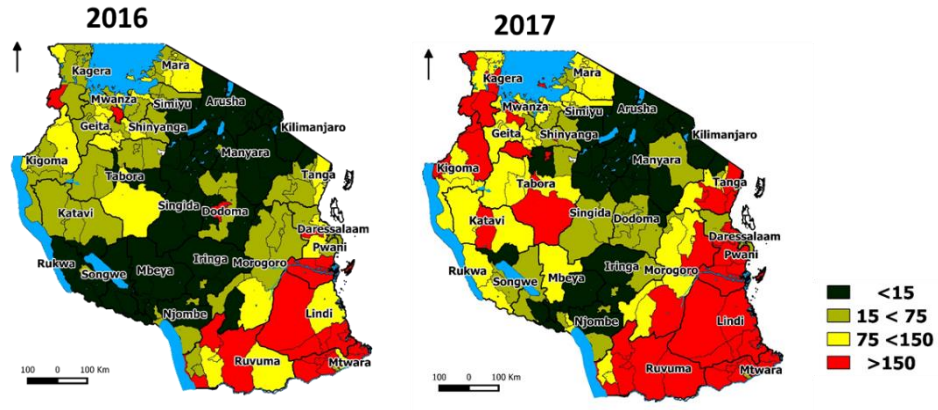



*Figure 17: Annual Parasite Incidence 2016-2017*




**Correlation analysis**

Correlation analysis was performed in the R program to analyze the correlation of the data for all indicators against the SMPS data. The resulting charts also allow to observe the distribution of the number of councils in each of the strata. Figure 18 demonstrates the designated strata for the correlation matrix

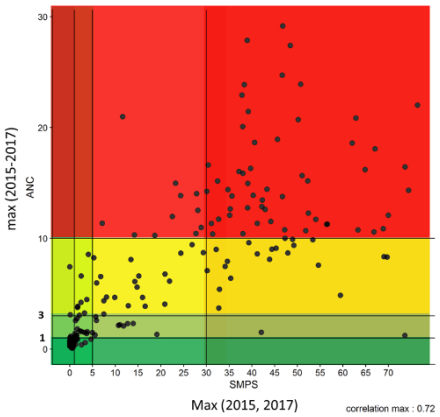
Figure 19 shows the correlation analysis and distribution of districts based on the maximum value of the data points; while demonstrates the correlation analysis and distribution of districts based on the average value of the data points

*Figure 18: Correlation Matrix*

| | | | |
|---|---|---|---|
| High – very low | High - low | High - moderate | High - High |
| moderate-very low | moderate-low | moderate-moderate | moderate -high |
| Low – very low | Low - Low | Low - moderate | Low - High |
| Very low-Very low | Very low-low | Very low-moderate | Very low-high |

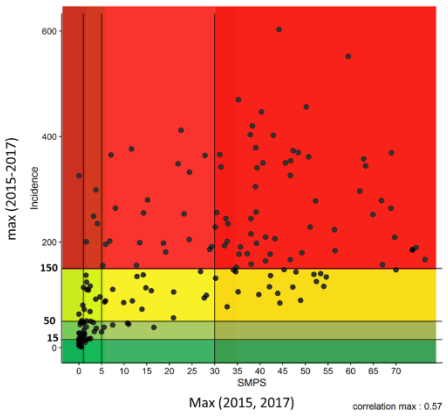
*Figure 19: Correlation analysis and distribution of districts based on the maximum value of the data points*

ANC Vs SMPS



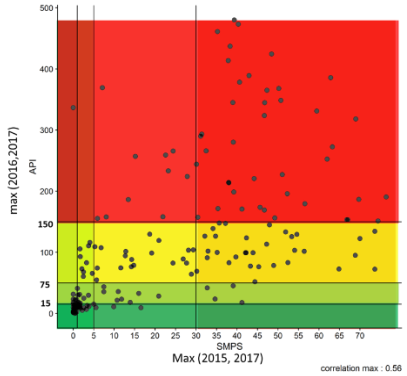

| | | ANC Positivity | | | |
|---|---|---|---|---|---|
| | | Very Low | Low | Moderate | High |
| SMPS | Very Low | 21 | 10 | 2 | 0 |
| | Low | 3 | 18 | 8 | 1 |
| | Moderate | 0 | 6 | 21 | 14 |
| | High | 0 | 1 | 14 | 65 |

Confirmed incidence Vs SMPS



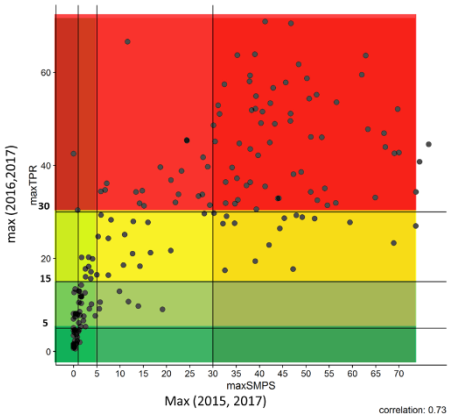

| | | Incidence | | | |
|---|---|---|---|---|---|
| | | Very Low | Low | Moderate | High |
| SMPS | Very Low | 18 | 3 | 11 | 1 |
| | Low | 2 | 13 | 11 | 4 |
| | Moderate | 0 | 6 | 15 | 20 |
| | High | 0 | 0 | 21 | 59 |

API Vs SMPS




| | | API | | | |
|---|---|---|---|---|---|
| | | Very Low | Low | Moderate | High |
| SMPS | Very Low | 25 | 6 | 0 | 2 |
| | Low | 14 | 11 | 5 | 0 |
| | Moderate | 3 | 13 | 15 | 10 |
| | High | 1 | 8 | 29 | 42 |

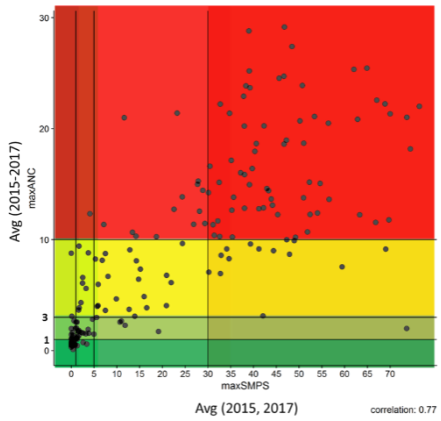
TPR Vs SMPS




| | | TPR | | | |
|---|---|---|---|---|---|
| | | Very Low | Low | Moderate | High |
| SMPS | Very Low | 20 | 1 | 10 | 2 |
| | Low | 2 | 20 | 8 | 0 |
| | Moderate | 0 | 6 | 14 | 21 |
| | High | 0 | 0 | 15 | 65 |

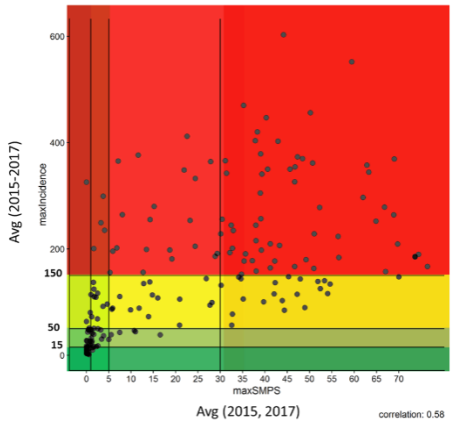
*Figure 20: Correlation analysis of parameters based on Average values*

ANC Vs SMPS



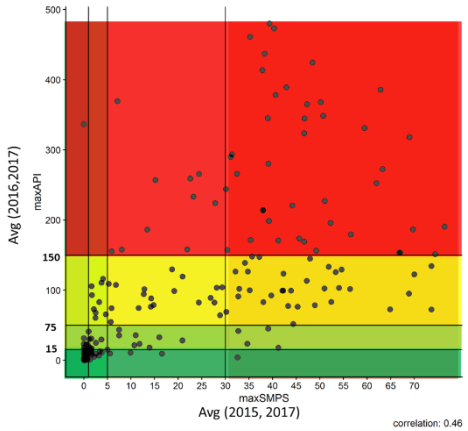

| | | ANC Positivity | | | |
|---|---|---|---|---|---|
| | | Very Low | Low | Moderate | High |
| SMPS | Very Low | 35 | 8 | 1 | 0 |
| | Low | 4 | 10 | 11 | 1 |
| | Moderate | 0 | 7 | 30 | 15 |
| | High | 0 | 2 | 13 | 47 |

Confirmed Incidence Vs SMPS



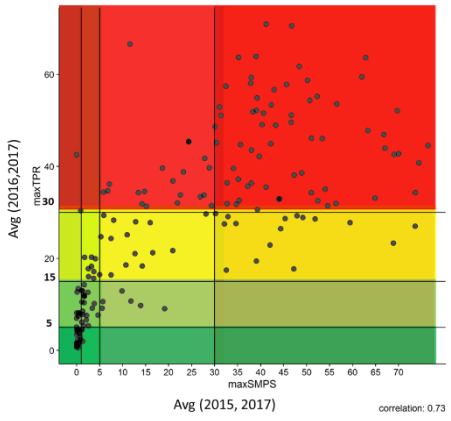

| | | Incidence | | | |
|---|---|---|---|---|---|
| | | Very Low | Low | Moderate | High |
| SMPS | Very Low | 23 | 17 | 3 | 1 |
| | Low | 4 | 6 | 11 | 5 |
| | Moderate | 0 | 7 | 27 | 18 |
| | High | 0 | 0 | 27 | 35 |

API Vs SMPS




| | | API | | | |
|---|---|---|---|---|---|
| | | Very Low | Low | Moderate | High |
| SMPS | Very Low | 35 | 6 | 1 | 2 |
| | Low | 10 | 5 | 10 | 1 |
| | Moderate | 6 | 9 | 25 | 12 |
| | High | 1 | 4 | 35 | 22 |

TPR Vs SMPS




| | | TPR | | | |
|---|---|---|---|---|---|
| | | Very Low | Low | Moderate | High |
| SMPS | Very Low | 27 | 15 | 1 | 1 |
| | Low | 2 | 16 | 6 | 2 |
| | Moderate | 0 | 6 | 24 | 22 |
| | High | 0 | 0 | 16 | 46 |

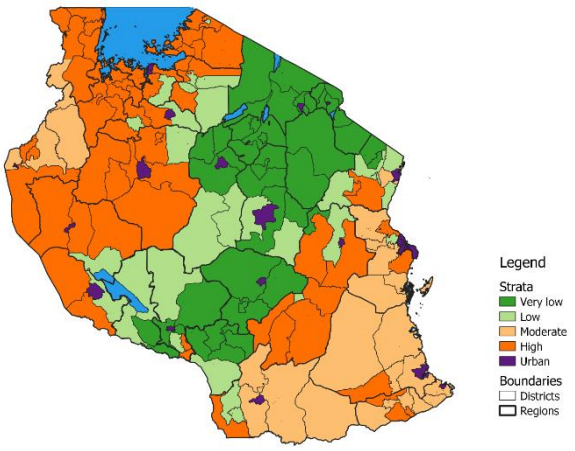
## Cluster analysis

A statistical method, called cluster analysis[20] was used to compare the stratification without pre-determined cut offs with the stratification using cut offs (See

*20Divisive Analysis (DIANA) of hierarchical clustering*

Figure 21). The cluster analysis was performed with two different sets of indicator variables: 1) indicator values per year, and 2) maximum value per indicator.

*Figure 21: Stratification based on cluster analysis*




The Table 18 below shows a comparison of the selected strata (strata 5b) and the strata resulting from the cluster analysis. Not considering cut offs, would result in allocating more districts to the strata "very low" and "low", while the cut offs, ensure that the stratification is epidemiological meaningful and suitable for targeting interventions.

*Table 18 Comparison of selected strata (strata 5b) and the strata resulting from cluster analysis*

| Cluster analysis strata | Strata 5b | | | | | |
|---|---|---|---|---|---|---|
| | 1 Very Low | 2 Low | 3 Moderate | 4 High | 5 Urban | Total |
| **1 Very low** | 26 | 19 | 0 | 0 | 0 | 45 |
| **2 Low** | 0 | 4 | 24 | 1 | 1 | 30 |
| **3 Moderate** | 0 | 0 | 2 | 24 | 0 | 26 |
| **4 High** | 0 | 0 | 15 | 44 | 0 | 59 |
| **5 Urban** | 0 | 0 | 0 | 0 | 24 | 24 |
| **Total** | 26 | 23 | 41 | 69 | 25 | 184 |

## Micro-stratification methodology:

For Tanzania, the micro-stratification was conducted at the ward level.

### *Indicators used for micro-stratification*

- Confirmed incidence/1000 (OPD)
- Annual parasite incidence -API (Laboratory)

The most suitable indicators available at the ward level were selected for micro-stratification. The SMPS is conducted at district level hence ward level data points are not available. Since ANC positivity rate and test positivity rate are highly affected by the number of tests performed at the health facility, it was not conducive to use them at a high resolution of ward level.

Currently, various data sources were used to obtain ward level information including information for their respective health facilities since the DHIS2 does not contain ward level information. However, the assigning of health facilities to their respective wards in the DHIS2 is currently in process and will aid in easily obtaining ward level data.
For the purpose of this analysis, the following were some of the data sources used:

- NBS Census 2012
- Malaria Atlas Project
- Open data (http://opendata.go.tz/en/)
- Open street map
- Health Facility Registry (http://hfrportal.ehealth.go.tz/)

A methodology similar to macro-stratification selection has been used.

## *Methodology*

A 5 step methodology similar to the one adopted for macro-stratification was applied as shown in Figure 11.

**Step 1: Assigning cut- offs**

The same cut-offs that were used for macro-stratification were applied.

*Table 19: Cut-off thresholds*

| | Incidence | API |
|---|---|---|
| VERY LOW | <15 | <15 |
| LOW | 15-<50 | 15-<75 |
| MODERATE | 50-<150 | 75-<150 |
| HIGH | >150 | >150 |

**Step 2: Using the data to assign strata**

Once the cutoffs were established, the data for two or more years were used to assign the appropriate strata. The maximum value of the years were used to assign wards into their respective districts.

**Step 3: Assigning scores**

Scores were assigned to the strata as shown in Table 20.

*Table 20: Assigned scores per strata*

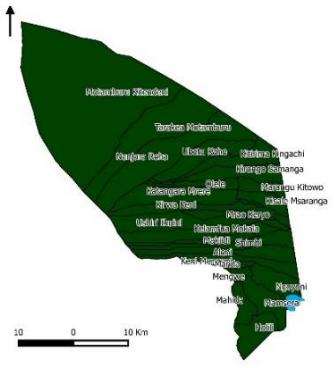
| Scoring | Incidence | API | Total | Range |
|---|---|---|---|---|
| VERY LOW | 1 | 0.5 | 1.5 | <=1.5 |
| LOW | 2 | 1 | 3 | 1.5<=3 |
| MODERATE | 3 | 1.5 | 4.5 | 3<=4.5 |
| HIGH | 4 | 2 | 6 | 4.5<=6 |

**Step 4: Generating maps**

Ward level maps were produced using QGIS. The shape files for the wards were obtained from the NBS 2012 census. Figure 22 shows the micro stratification of selected districts in Tanzania.

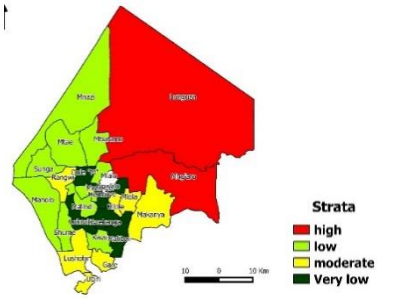
*Figure 22: Micro-stratification at ward level*

**a. Rombo DC (very low burden)**



| Strata | Population | Number of wards | Number of Facilities |
|---|---|---|---|
| Very low | 251320 | 21 | 44 |

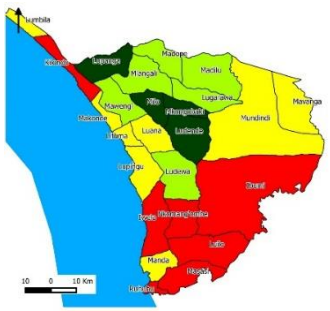
**b. Lushoto DC (low burden)**




| Strata | Population | Number of wards | Number of Facilities |
|---|---|---|---|
| Very low | 69440 | 6 | 6 |
| low | 152619 | 10 | 20 |
| moderate | 99599 | 7 | 18 |
| high | 16700 | 2 | 5 |
| Total | 338358 | 25 | 51 |

**c. Ludewa DC (moderate burden)**

**d. Nanyumbu DC (high burden)**



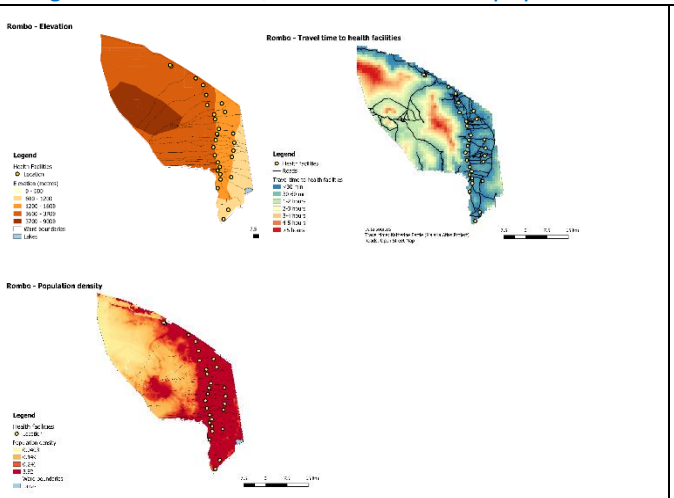
| Strata | Population | Number of wards | Number of Facilities |
|---|---|---|---|
| Very low | 22778 | 4 | 10 |
| low | 56439 | 6 | 24 |
| moderate | 37510 | 8 | 16 |
| high | 19176 | 7 | 14 |
| Total | 135904 | 25 | 64 |

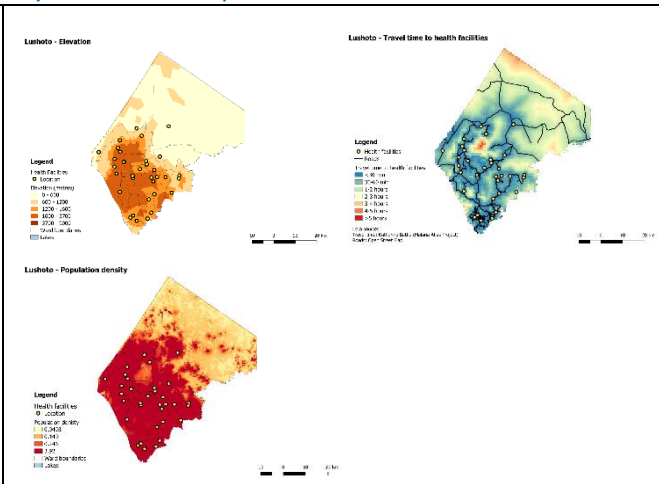
| Strata | Population | Number of wards | Number of Facilities |
|---|---|---|---|
| moderate | 18061 | 1 | 1 |
| high | 143656 | 13 | 18 |
| Total | 161717 | 14 | 19 |

**Step 5: Further supportive analysis**

The location, access to health facilities, elevation and population density maps were also generated for the respective districts so as to provide useful information for assigning intervention packages (See Figure 23).

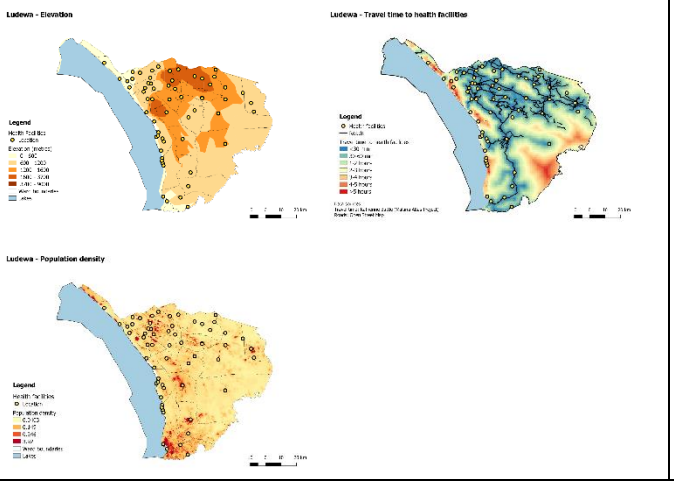
*Figure 23: Elevation, access to HFs and population density ward level maps*

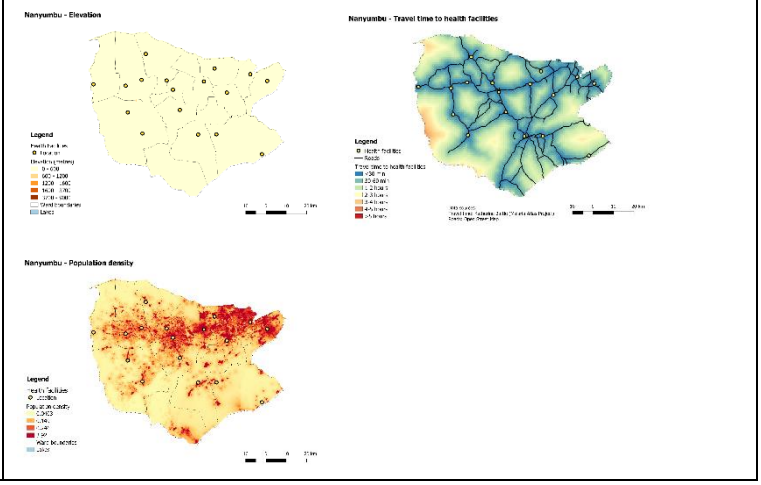



**c. Ludewa DC**

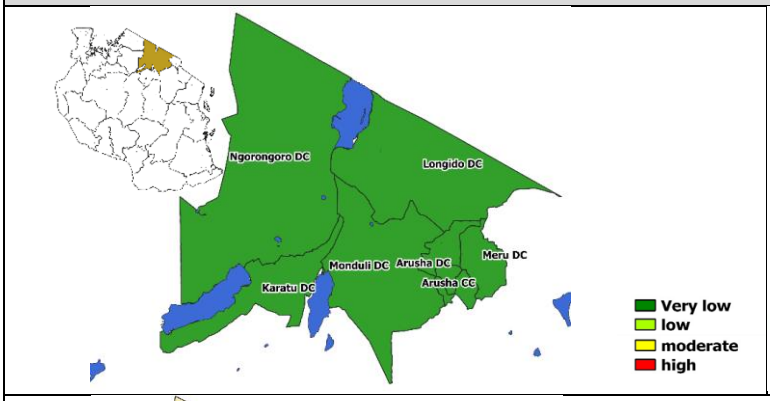
**d. Nanyumbu DC**

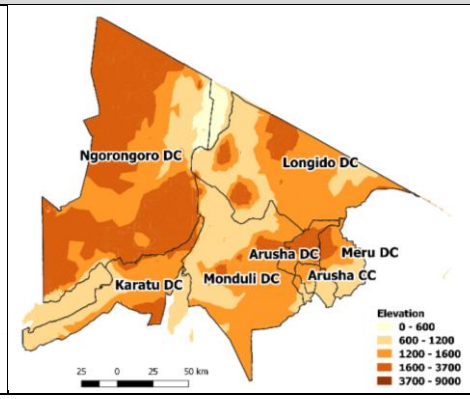


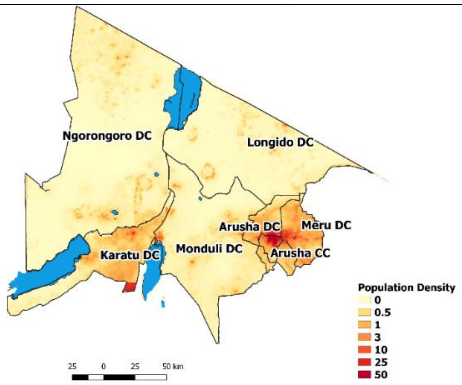



# Appendix C: Regional Profiles and Council Strata

## ARUSHA

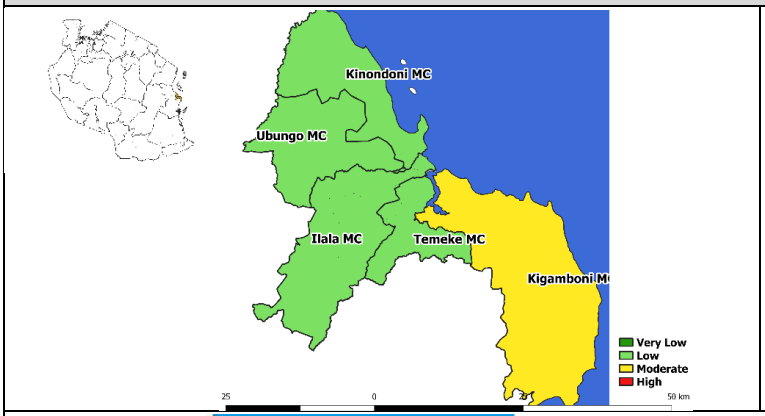


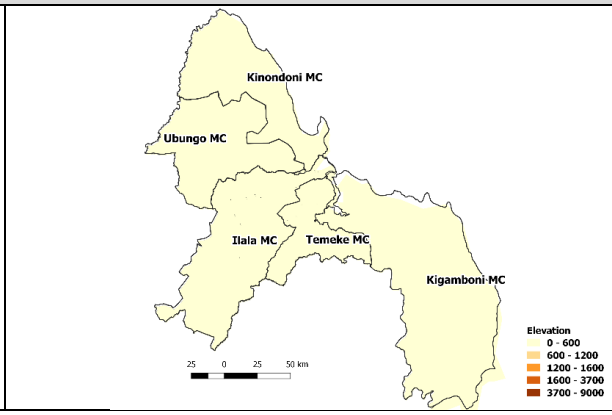



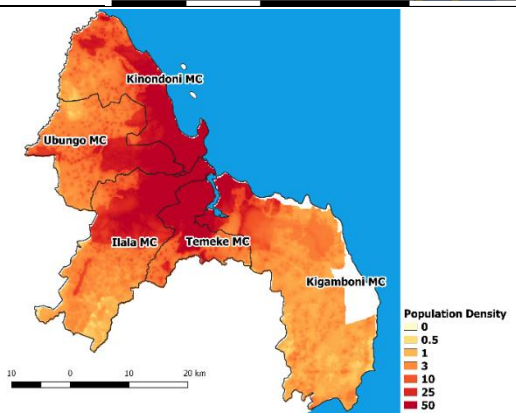




| Strata | District | Population | |
|---|---|---|---|
| Very low | Arusha CC | 480,431 | 25% |
| | Arusha DC | 365,669 | 19% |
| | Karatu DC | 261,684 | 13% |
| | Longido DC | 150,556 | 8% |
| | Meru DC | 288,867 | 15% |
| | Monduli DC | 196,166 | 10% |
| | Ngorongoro DC | 202,036 | 10% |
| Total | | 1,945,411 | |

## DAR ES SALAAM

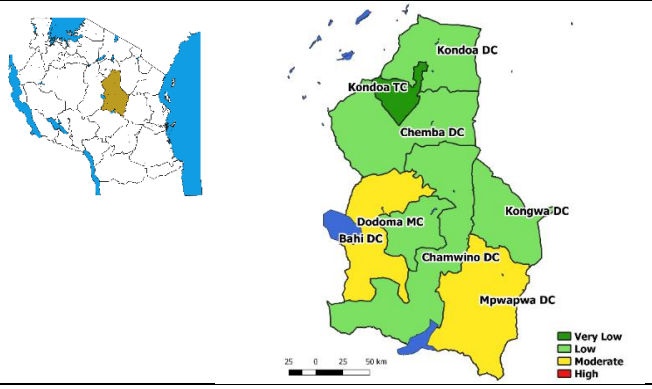


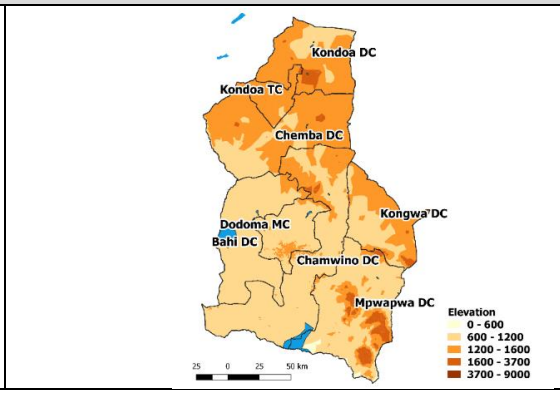



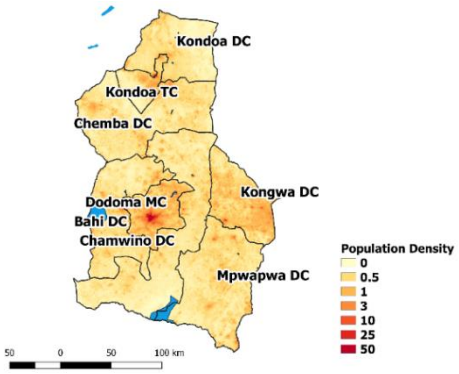




| Strata | District | Population | |
|---|---|---|---|
| Low | Ilala MC | 1,672,343 | 29% |
| | Kinondoni MC | 1,180,895 | 21% |
| | Temeke MC | 1,515,435 | 26% |
| | Ubungo MC | 1,073,800 | 19% |
| | | **5,442,473** | **95%** |
| Moderate | Kigamboni MC | 299,220 | 5% |
| Total | | 5,741,693 | |

## DODOMA

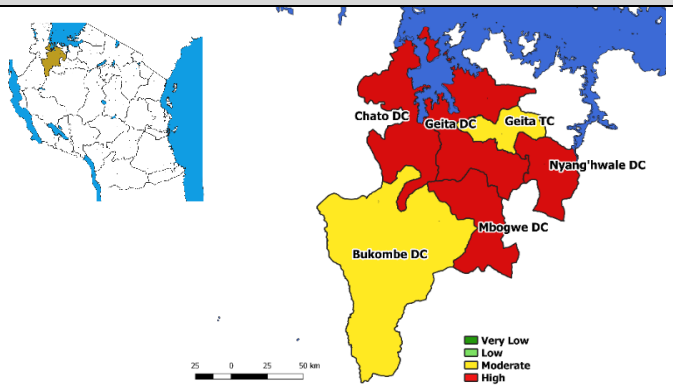


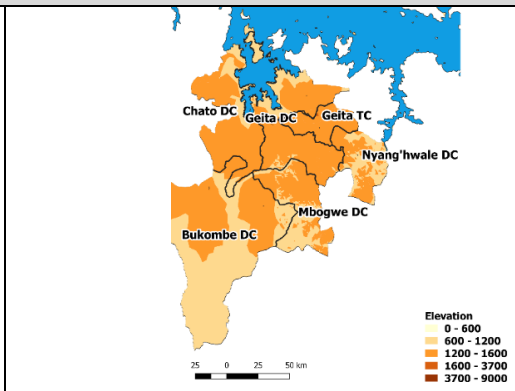



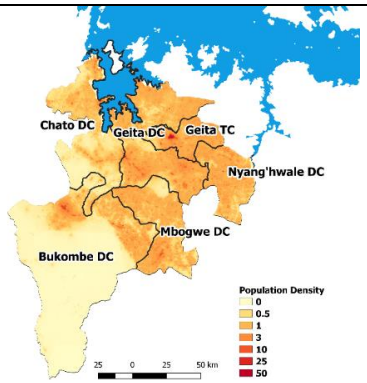




| Strata | District | Population | |
|---|---|---|---|
| **Very low** | Kondoa TC | 65,485 | 3% |
| **Low** | Chamwino DC | 377,642 | 15% |
| | Chemba DC | 260,244 | 10% |
| | Dodoma MC | 620,790 | 25% |
| | Kondoa DC | 233,752 | 9% |
| | Kongwa DC | 357,603 | 14% |
| | **1,850,031** | | **74%** |
| **Moderate** | Bahi DC | 245,916 | 10% |
| | Mpwapwa DC | 348,523 | 14% |
| | **594,439** | | **24%** |
| **Total** | | **2,509,955** | |

## GEITA

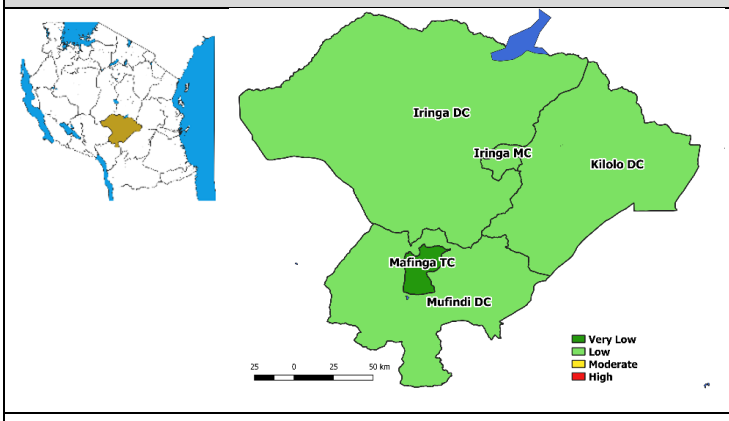


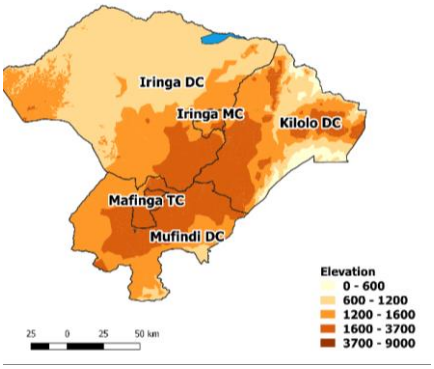



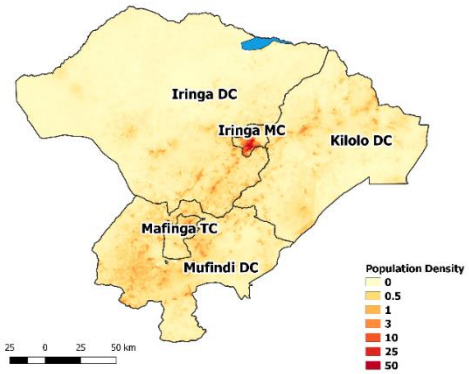




| Strata | District | Population | |
|---|---|---|---|
| **Moderate** | Bukombe DC | 230,212 | 12% |
| | Geita TC | 223,400 | 11% |
| | **453,612** | | **23%** |
| **High** | Chato DC | 423,282 | 22% |
| | Geita DC | 712,852 | 36% |
| | Mbogwe DC | 200,805 | 10% |
| | Nyang'hwale DC | 169,454 | 9% |
| | **1,506,393** | | **77%** |
| **Total** | | **1,960,005** | |

## IRINGA

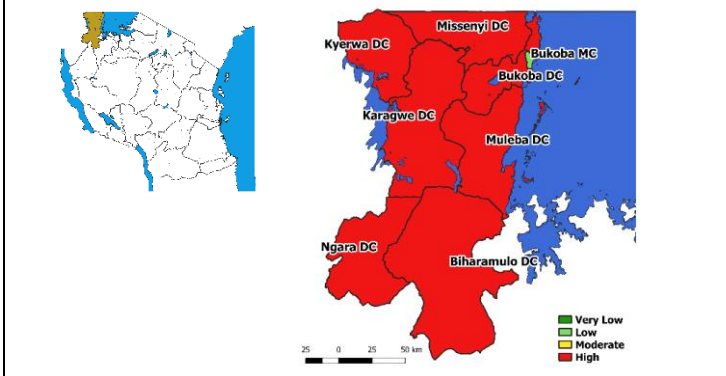


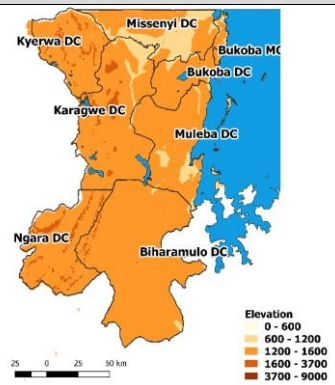



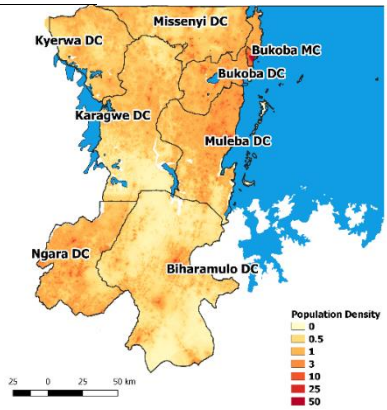




| Strata | District | Population | |
|---|---|---|---|
| Very low | Mafinga TC | 64,370 | 6% |
| low | Iringa DC | 259,153 | 26% |
| | Iringa MC | 179,750 | 18% |
| | Kilolo DC | 225,872 | 22% |
| | Mufindi DC | 275,264 | 27% |
| | | **940,040** | **94%** |
| **Total** | | **1,004,411** | |

## KAGERA

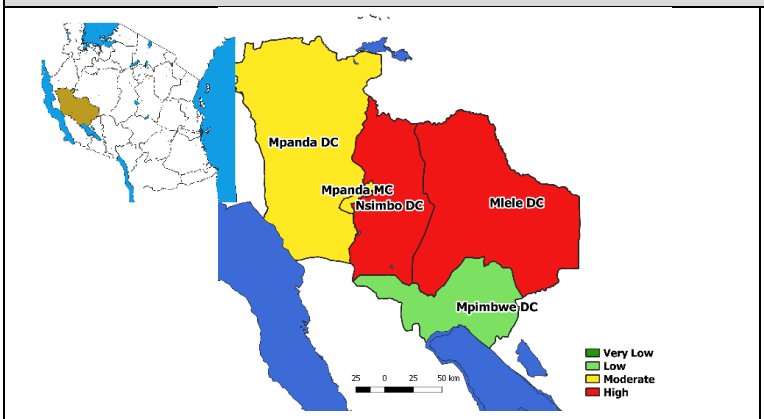


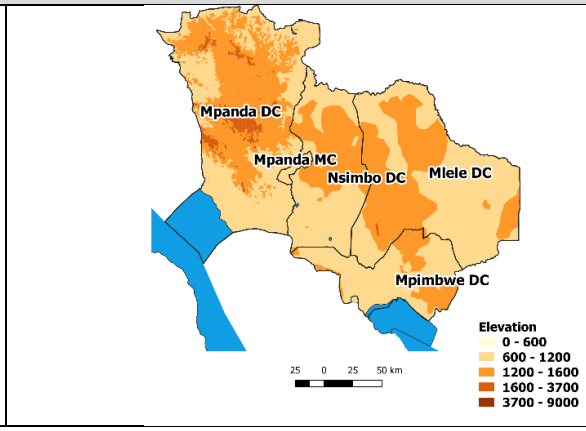



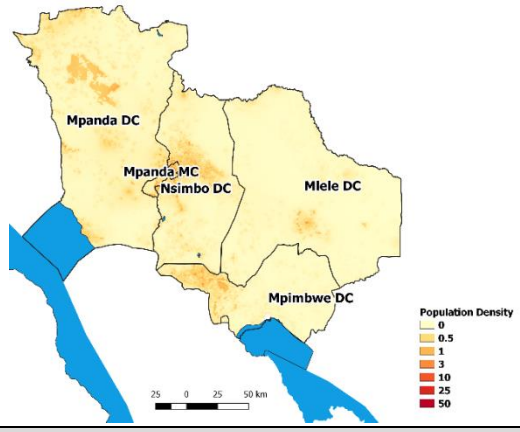




| Strata | District | Population | |
|---|---|---|---|
| low | Bukoba MC | 162,045 | 5% |
| high | Biharamulo DC | 455,830 | 15% |
| | Bukoba DC | 316,725 | 11% |
| | Karagwe DC | 423,751 | 14% |
| | Kyerwa DC | 409,720 | 14% |
| | Missenyi DC | 232,634 | 8% |
| | Muleba DC | 638,625 | 22% |
| | Ngara DC | 313,706 | 11% |
| | | **2,790,991** | **95%** |
| **Total** | | **2,953,036** | |

## KATAVI

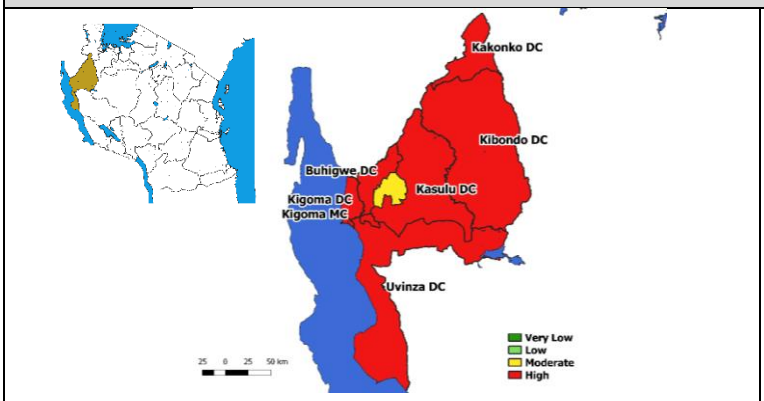


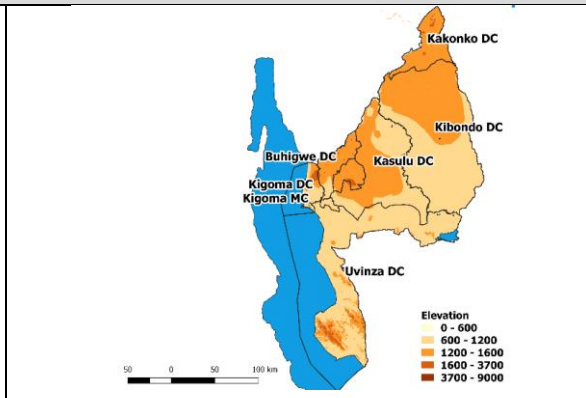



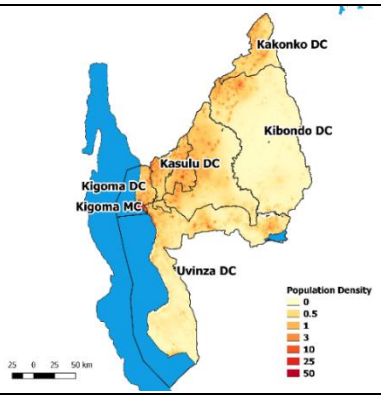




| Strata | District | Population | |
|---|---|---|---|
| low | Mpimbwe DC | 111,634 | 17% |
| moderate | Mpanda DC | 239,724 | 36% |
| | Mpanda MC | 135,189 | 20% |
| | | **374,913** | **56%** |
| high | Mlele DC | 37,380 | 6% |
| | Nsimbo DC | 147,687 | 22% |
| | | **185,067** | **28%** |
| Total | | **671,613** | |

## KIGOMA

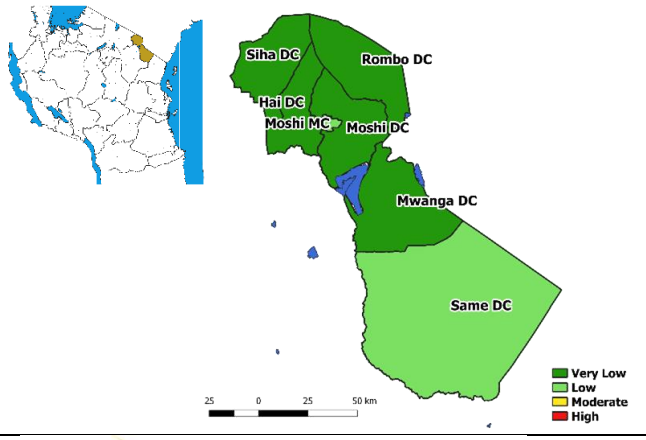


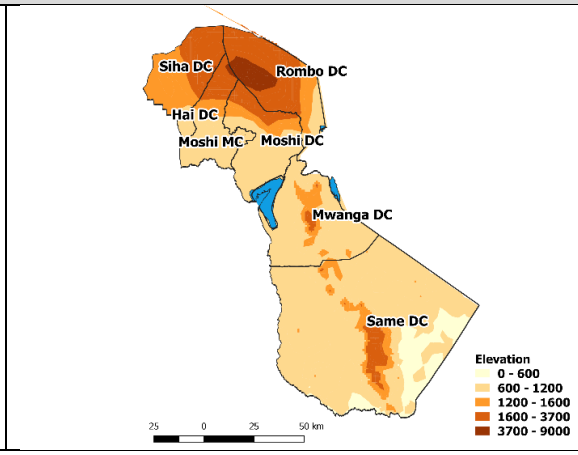



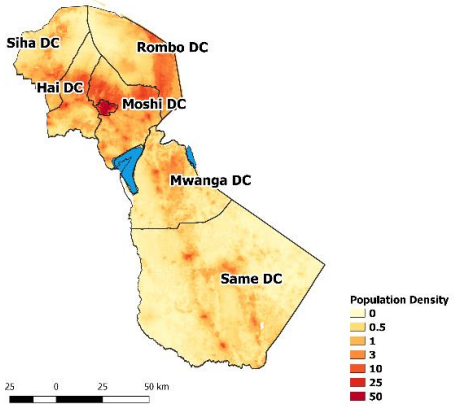




| Strata | District | Population | |
|---|---|---|---|
| Moderate | Kasulu TC | 272,167 | 11% |
| High | Buhigwe DC | 293,424 | 12% |
| | Kakonko DC | 167,555 | 7% |
| | Kasulu DC | 556,496 | 22% |
| | Kibondo DC | 291,370 | 12% |
| | Kigoma DC | 214,759 | 9% |
| | Kigoma MC | 262,138 | 10% |
| | Uvinza DC | 444,744 | 18% |
| | | **2,230,485** | **89%** |
| Total | | **2,502,651** | |

## KILIMANJARO

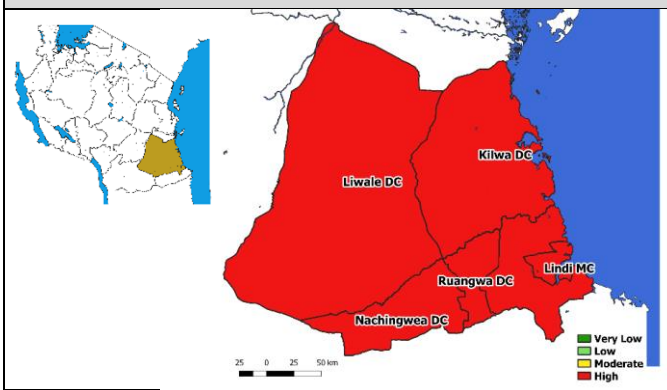


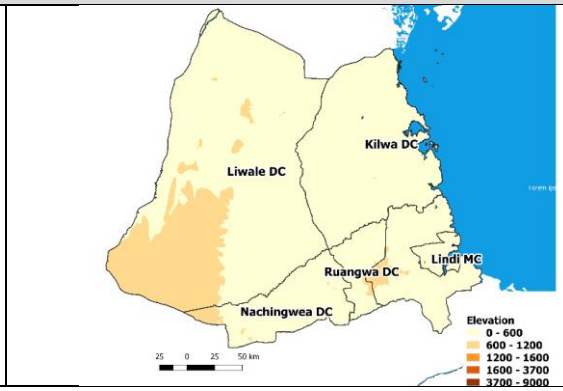



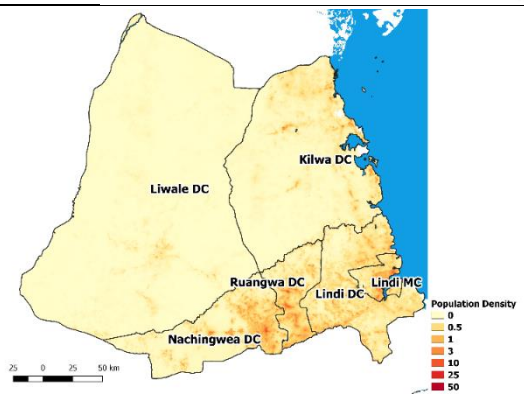




| Strata | District | Population | |
|---|---|---|---|
| **Very low** | Hai DC | 234,733 | 13% |
| | Moshi DC | 502,808 | 28% |
| | Mwanga DC | 140,211 | 8% |
| | Rombo DC | 268,886 | 15% |
| | Siha DC | 132,886 | 7% |
| | | **1,279,525** | **71%** |
| **low** | Moshi MC | 208,509 | 12% |
| | Same DC | 303,776 | 17% |
| | | **512,285** | **29%** |
| **Total** | | **1,791,810** | |

## LINDI

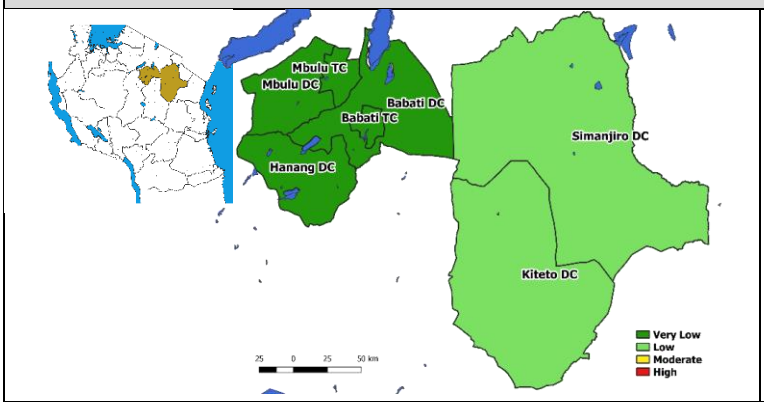


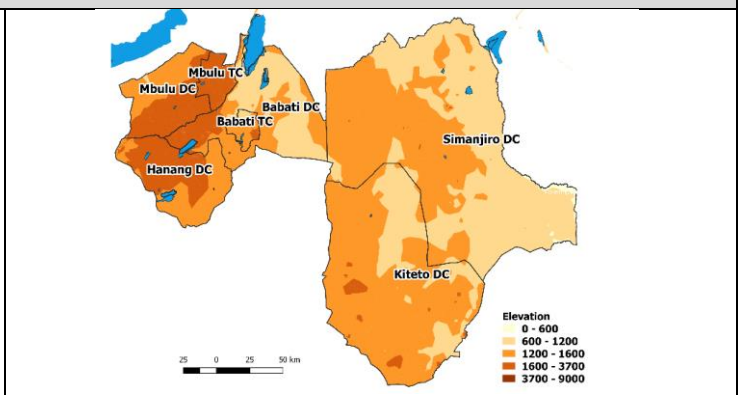



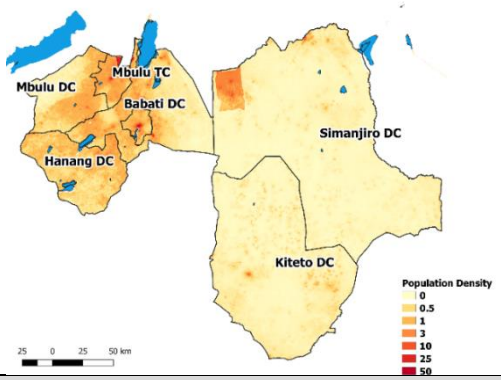




| Strata | District | Population | |
|---|---|---|---|
| **high** | Kilwa DC | 201,468 | 22% |
| | Lindi DC | 184,628 | 20% |
| | Lindi MC | 108,019 | 12% |
| | Liwale DC | 100,891 | 11% |
| | Nachingwea DC | 187,567 | 20% |
| | Ruangwa DC | 135,060 | 15% |
| **Total** | | **917,634** | |

## MANYARA

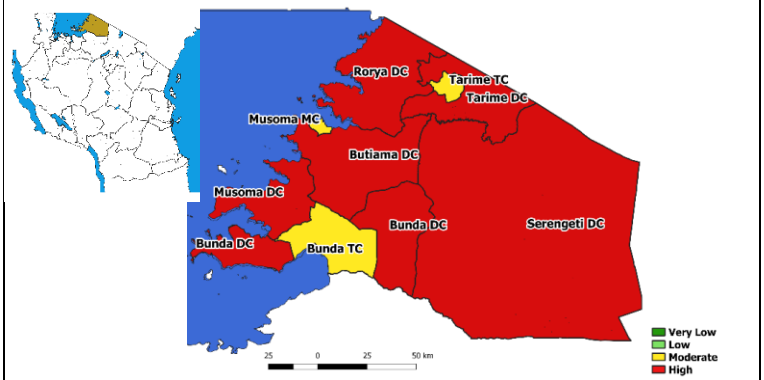


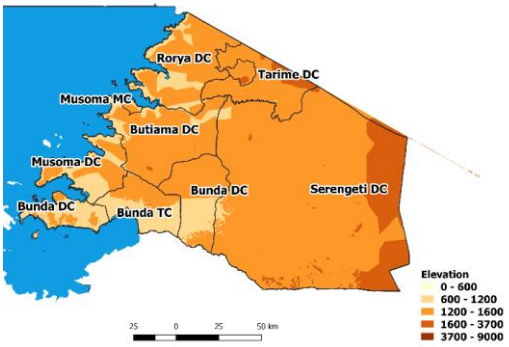



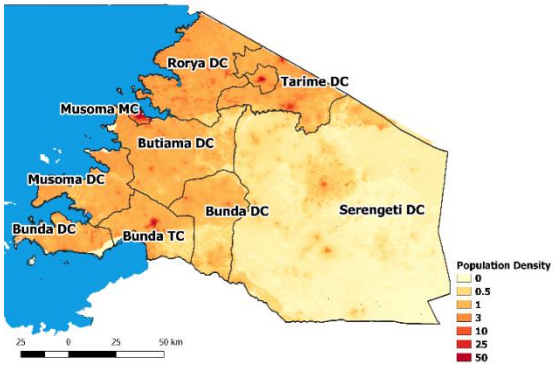




| Strata | District | Population | |
|---|---|---|---|
| **Very low** | Babati DC | 372,820 | 22% |
| | Babati TC | 97,857 | 6% |
| | Hanang DC | 319,948 | 19% |
| | Mbulu DC | 222,082 | 13% |
| | Mbulu TC | 149,209 | 9% |
| | | **1,161,916** | **70%** |
| **low** | Kiteto DC | 307,831 | 18% |
| | Simanjiro DC | 201,190 | 12% |
| | | **509,021** | **30%** |
| **Total** | | **1,670,938** | |

## MARA

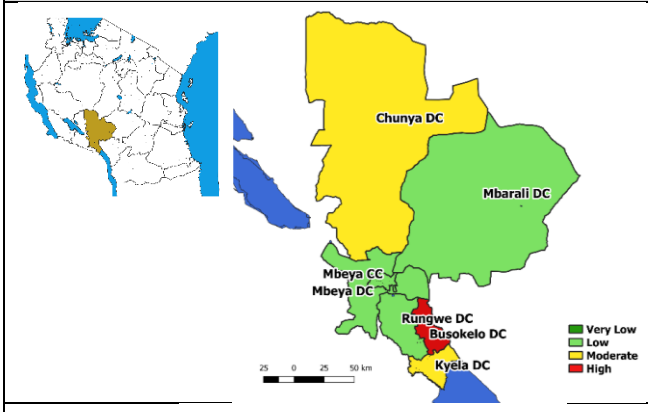


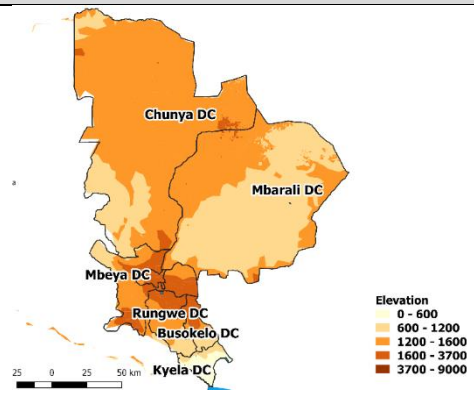



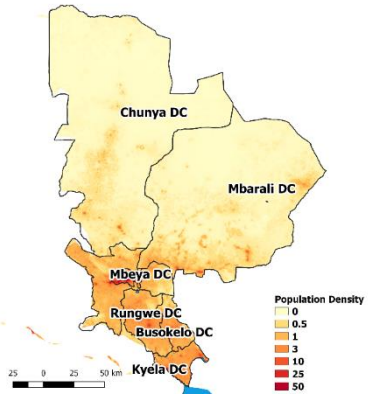




| Strata | District | Population | |
|---|---|---|---|
| **moderate** | Bunda TC | 152,324 | 8% |
| | Musoma MC | 149,768 | 8% |
| | Tarime TC | 87,007 | 4% |
| | | **389,098** | **20%** |
| **high** | Bunda DC | 228,620 | 12% |
| | Butiama DC | 269,519 | 14% |
| | Musoma DC | 203,770 | 10% |
| | Rorya DC | 292,847 | 15% |
| | Serengeti DC | 296,233 | 15% |
| | Tarime DC | 291,621 | 15% |
| | | **1,582,610** | **80%** |
| **Total** | | **1,971,708** | |

## MBEYA

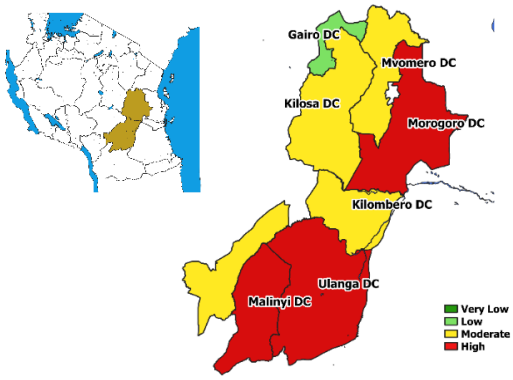


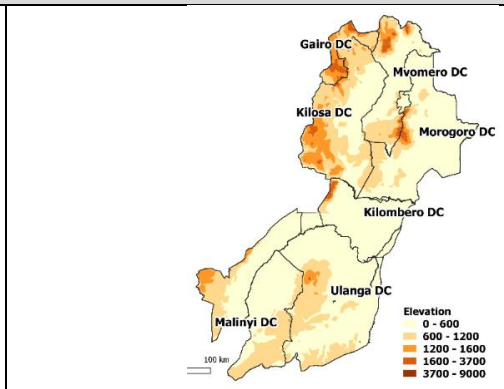



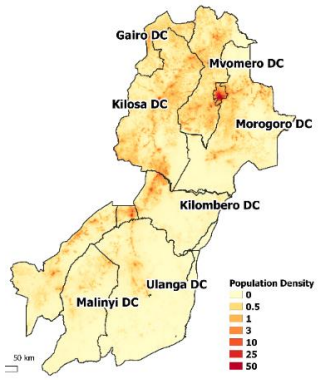




| Strata | District | Population | |
|---|---|---|---|
| low | Mbarali DC | 340,007 | 18% |
| | Mbeya CC | 462,029 | 24% |
| | Mbeya DC | 333,805 | 17% |
| | Rungwe DC | 251,237 | 13% |
| | | **1,387,078** | **72%** |
| moderate | Chunya DC | 185,315 | 10% |
| | Kyela DC | 249,376 | 13% |
| | | **434,690** | **23%** |
| high | Busokelo DC | 105,221 | 5% |
| Total | | **1,926,989** | |

## MOROGORO

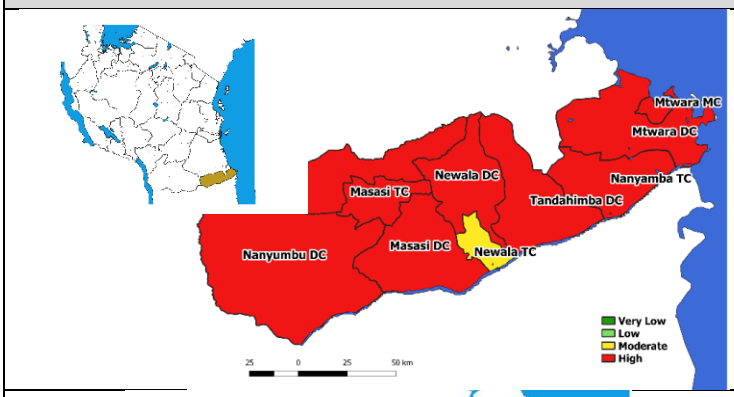


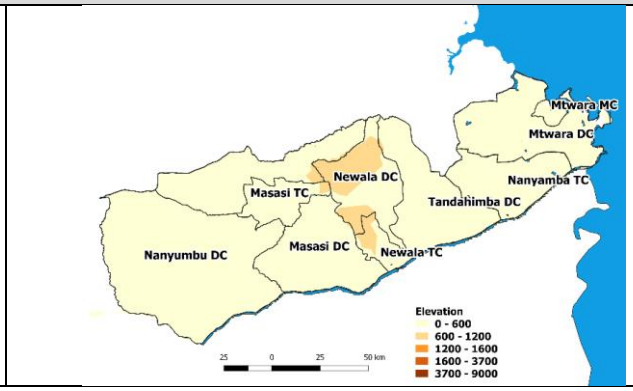



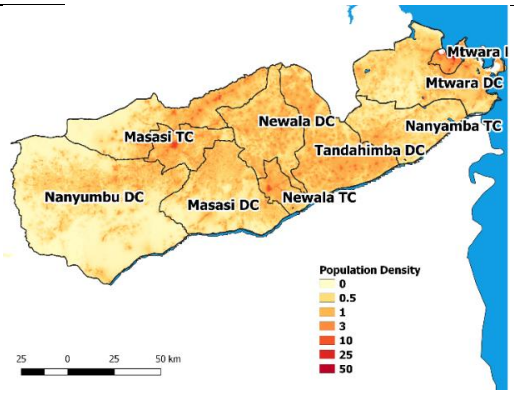




| Strata | District | Population | |
|---|---|---|---|
| low | Gairo DC | 224,841 | 9% |
| moderate | Ifakara TC | 119,823 | 5% |
| | Kilombero DC | 339,409 | 14% |
| | Kilosa DC | 493,341 | 20% |
| | Morogoro MC | 371,539 | 15% |
| | Mvomero DC | 342,908 | 14% |
| | | **1,667,020** | **67%** |
| high | Malinyi DC | 133,682 | 5% |
| | Morogoro DC | 297,883 | 12% |
| | Ulanga DC | 176,758 | 7% |
| | | **608,322** | **24%** |
| Total | | **2,500,183** | |

## MTWARA

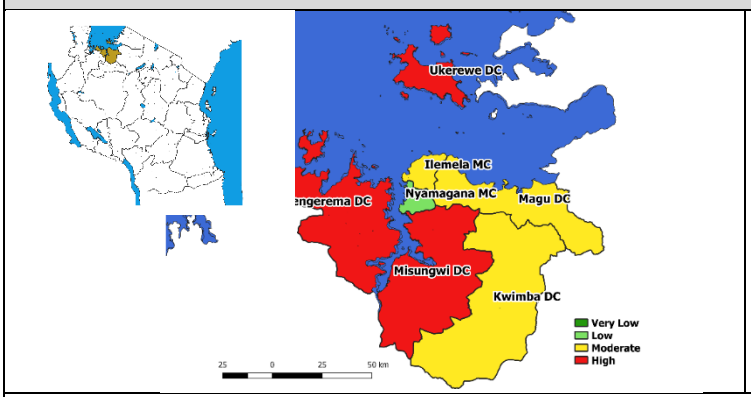


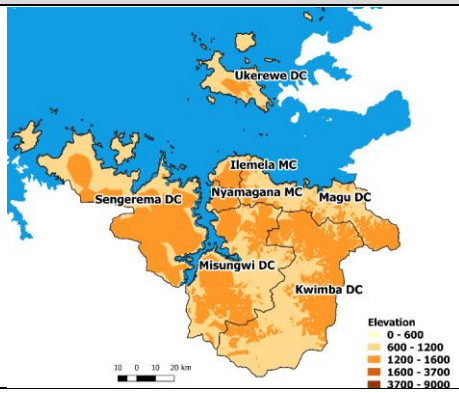



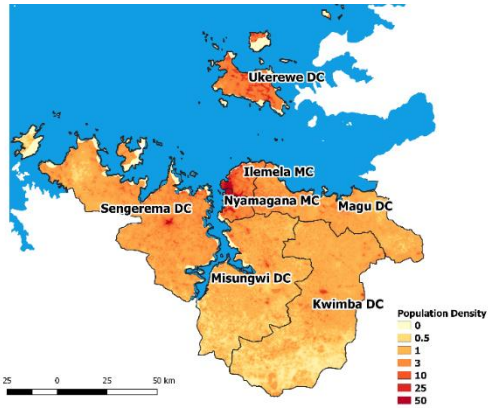




| Strata | District | Population | |
|---|---|---|---|
| **moderate** | Newala TC | 81,455 | 6% |
| **high** | Masasi DC | 263,234 | 19% |
| | Masasi TC | 110,633 | 8% |
| | Mtwara DC | 140,803 | 10% |
| | Mtwara MC | 117,245 | 9% |
| | Nanyamba TC | 100,019 | 7% |
| | Nanyumbu DC | 161,717 | 12% |
| | Newala DC | 135,591 | 10% |
| | Tandahimba DC | 240,306 | 18% |
| | | **1,269,547** | **94%** |
| **Total** | | **1,351,001** | |

## MWANZA

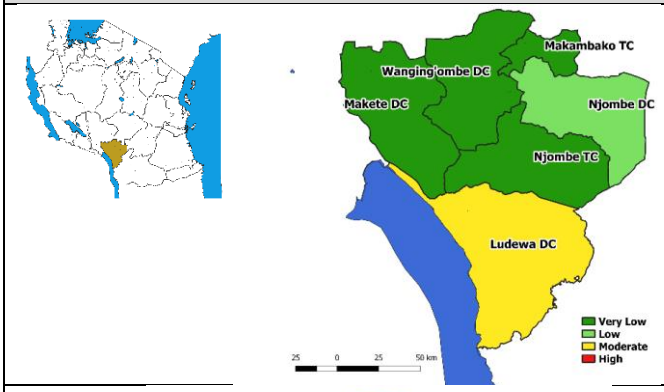


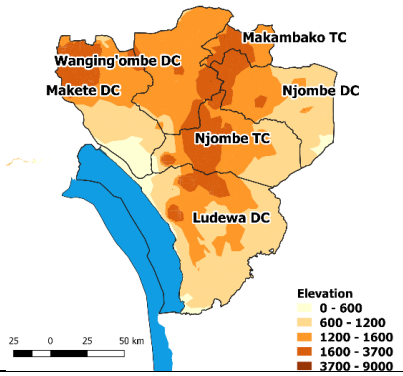



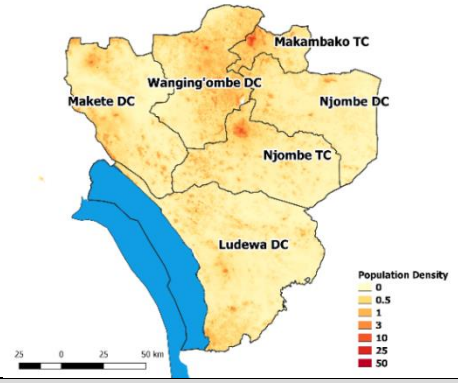




| Strata | District | Population | |
|---|---|---|---|
| **low** | Nyamagana MC | 475,017 | 15% |
| **moderate** | Ilemela MC | 389,971 | 12% |
| | Kwimba DC | 462,176 | 14% |
| | Magu DC | 330,958 | 10% |
| | | **1,183,105** | **37%** |
| **high** | Buchosa DC | 376,297 | 12% |
| | Misungwi DC | 411,582 | 13% |
| | Sengerema DC | 384,908 | 12% |
| | Ukerewe DC | 396,250 | 12% |
| | | **1,569,037** | **49%** |
| **Total** | | **3,227,158** | |

## NJOMBE

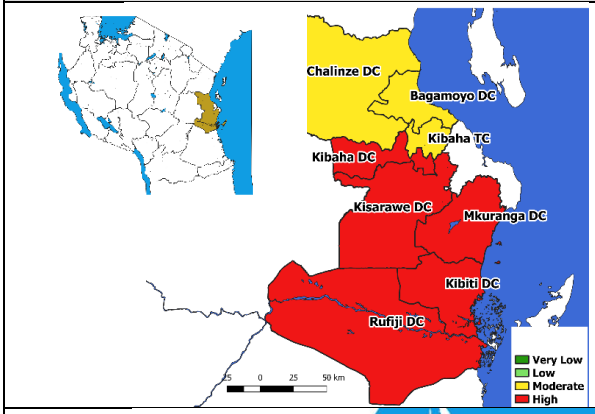


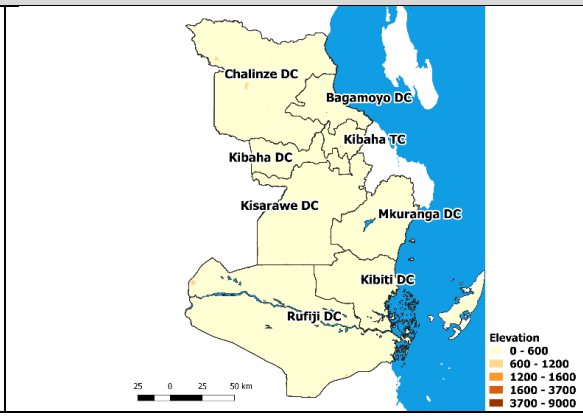



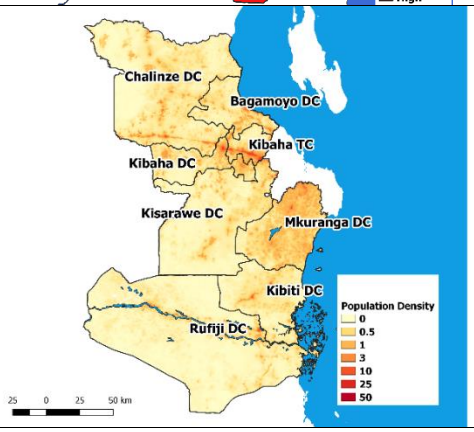




| Strata | District | Population | |
|---|---|---|---|
| **Very low** | Makambako TC | 109,300 | 15% |
| | Makete DC | 93,437 | 13% |
| | Njombe TC | 139,597 | 19% |
| | Wanging'ombe DC | 166,729 | 23% |
| | | **509,064** | **70%** |
| **low** | Njombe DC | 86,608 | 12% |
| **moderate** | Ludewa DC | 135,904 | 19% |
| **Total** | | **731,576** | |

## PWANI

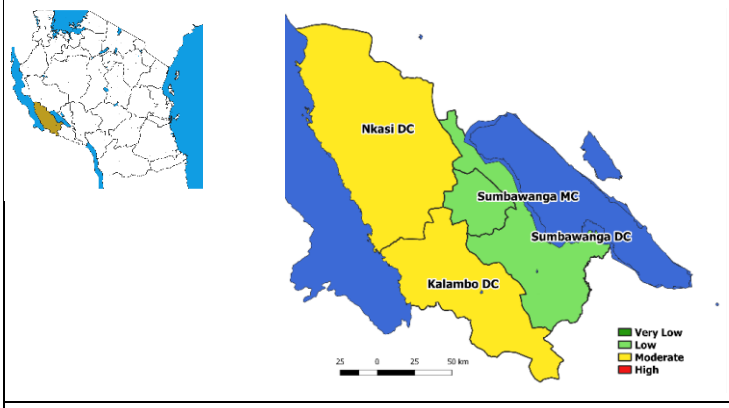


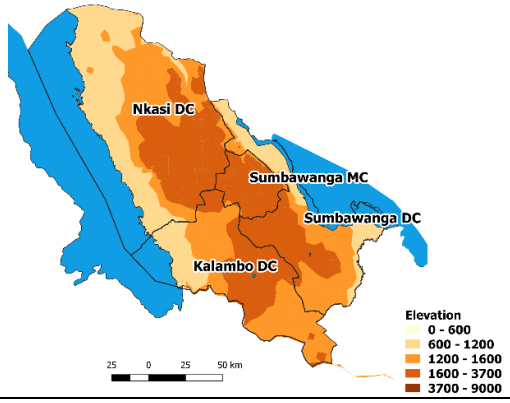



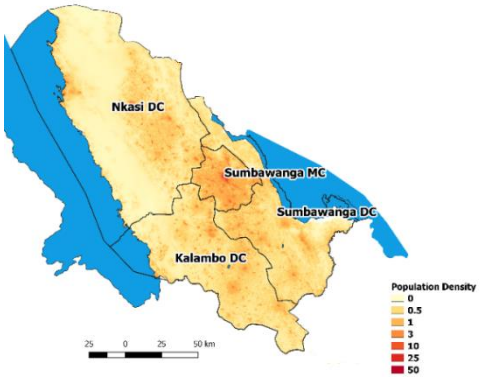




| Strata | District | Population | |
|---|---|---|---|
| **moderate** | Bagamoyo DC | 113,765 | 9% |
| | Chalinze DC | 249,384 | 20% |
| | Kibaha TC | 163,987 | 13% |
| | | **527,137** | **43%** |
| **high** | Kibaha DC | 80,213 | 7% |
| | Kibiti DC | 127,001 | 10% |
| | Kisarawe DC | 104,683 | 9% |
| | Mafia DC | 49,781 | 4% |
| | Mkuranga DC | 243,719 | 20% |
| | Rufiji DC | 97,985 | 8% |
| | | **703,382** | **57%** |
| **Total** | | **1,230,519** | |

## RUKWA

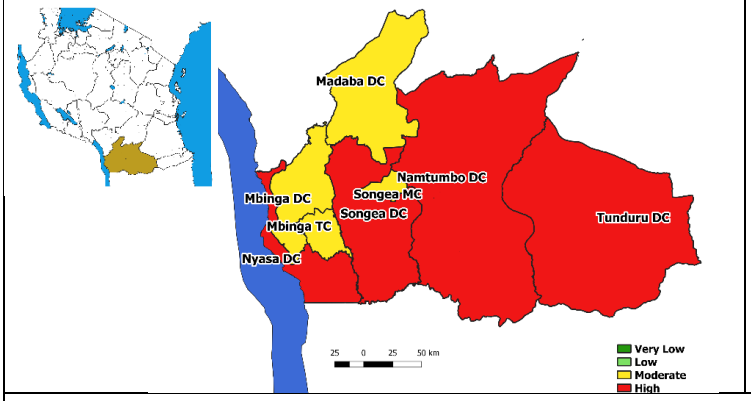


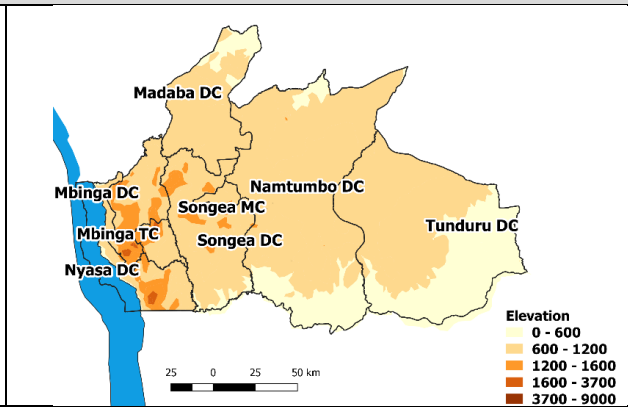



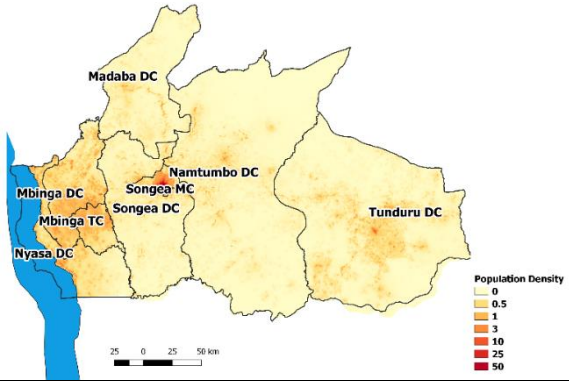




| Strata | District | Population | |
|---|---|---|---|
| **low** | Sumbawanga DC | 419,036 | 35% |
| | Sumbawanga MC | 250,374 | 21% |
| | | **669,410** | 56% |
| **moderate** | Kalambo DC | 205,631 | 17% |
| | Nkasi DC | 325,988 | 27% |
| | | **531,619** | **44%** |
| **Total** | | **1,201,029** | |

## RUVUMA

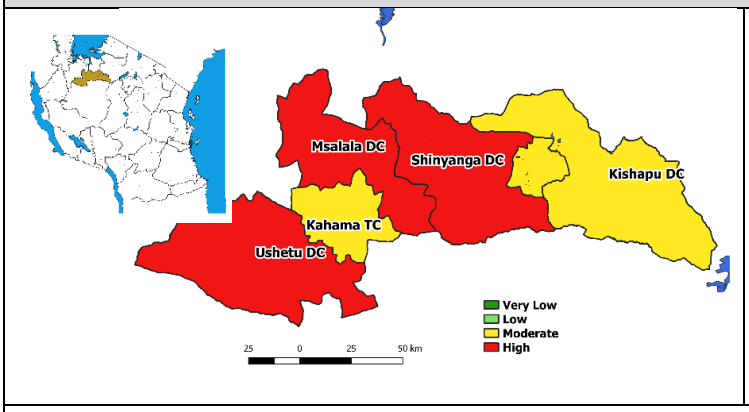


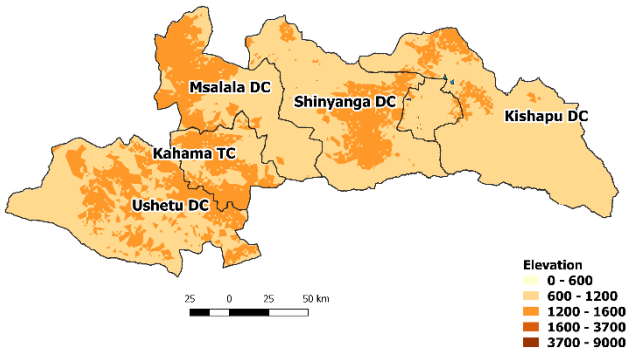



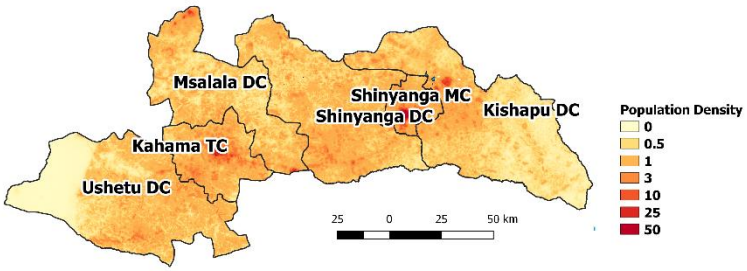




| Strata | District | Population | |
|---|---|---|---|
| **moderate** | Madaba DC | 50,211 | 3% |
| | Mbinga DC | 259,254 | 17% |
| | Mbinga TC | 129,330 | 8% |
| | Songea MC | 252,150 | 16% |
| | | **690,945** | **45%** |
| **high** | Namtumbo DC | 216,155 | 14% |
| | Nyasa DC | 166,986 | 11% |
| | Songea DC | 132,477 | 9% |
| | Tunduru DC | 327,713 | 21% |
| | | **843,330** | **55%** |
| **Total** | | **1,534,276** | |

## SHINYANGA

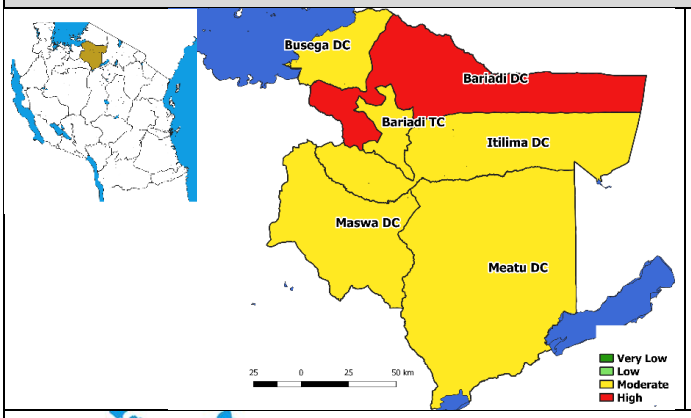


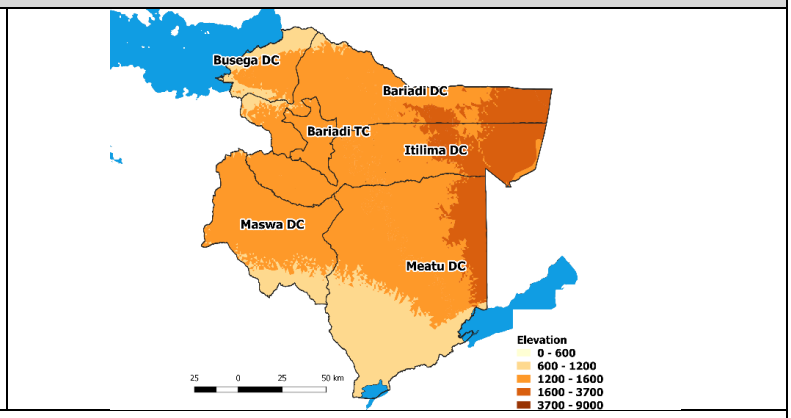



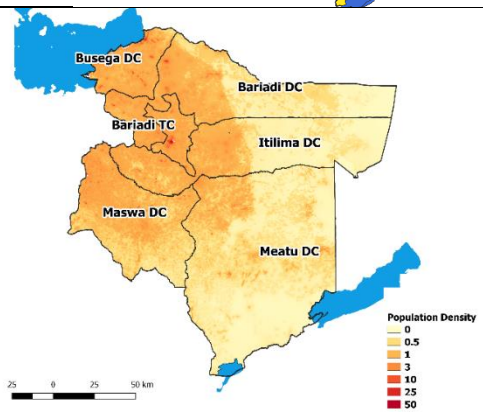




| Strata | District | Population | |
|---|---|---|---|
| **moderate** | Kahama TC | 296,103 | 17% |
| | Kishapu DC | 291,202 | 17% |
| | Shinyanga MC | 176,449 | 10% |
| | | **763,753** | **45%** |
| **high** | Msalala DC | 275,469 | 16% |
| | Shinyanga DC | 367,417 | 22% |
| | Ushetu DC | 300,022 | 18% |
| | | **942,907** | **55%** |
| **Total** | | **1,706,660** | |

## SIMIYU

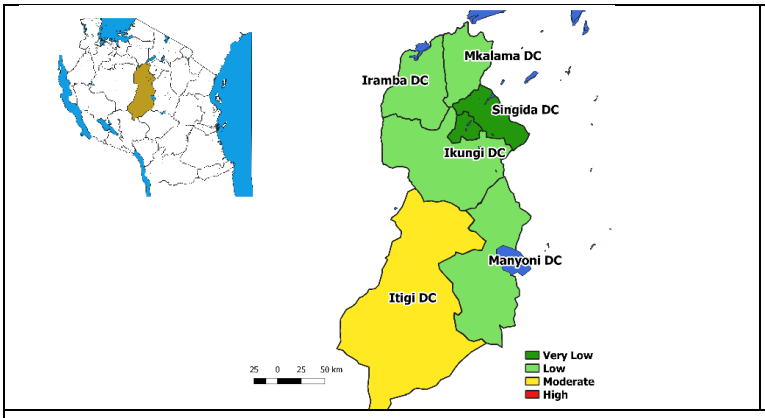


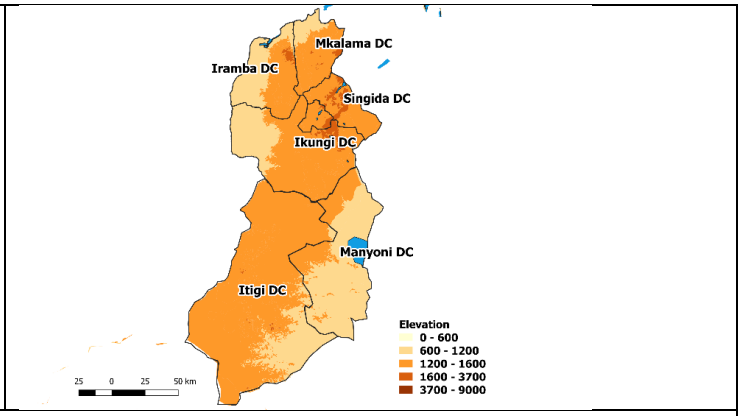



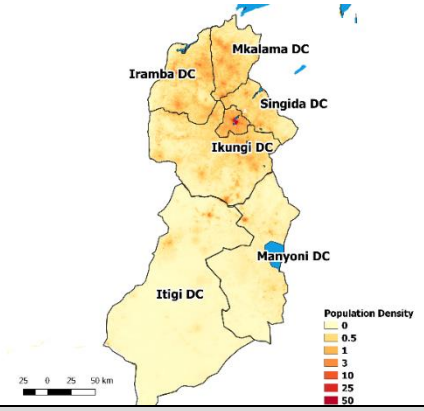




| Strata | District | Population | |
|---|---|---|---|
| **moderate** | Bariadi TC | 160,962 | 9% |
| | Busega DC | 222,592 | 13% |
| | Itilima DC | 341,504 | 20% |
| | Maswa DC | 365,274 | 21% |
| | Meatu DC | 329,185 | 19% |
| | | **1,419,517** | **82%** |
| **high** | Bariadi DC | 310,568 | 18% |
| **Total** | | **1,730,085** | |

## SINGIDA

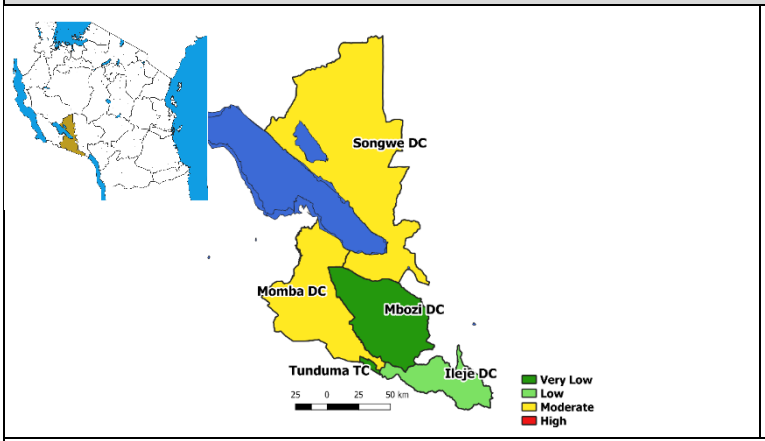


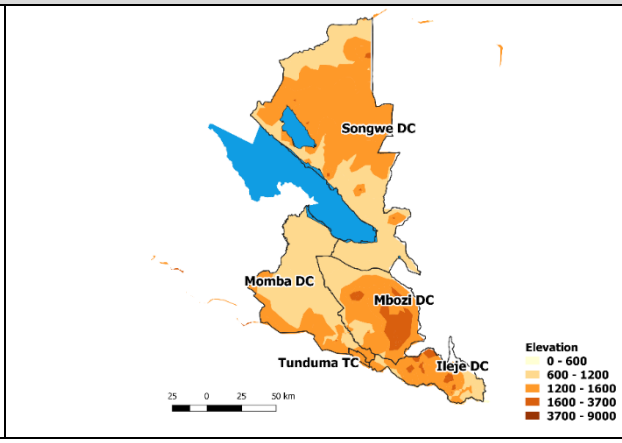



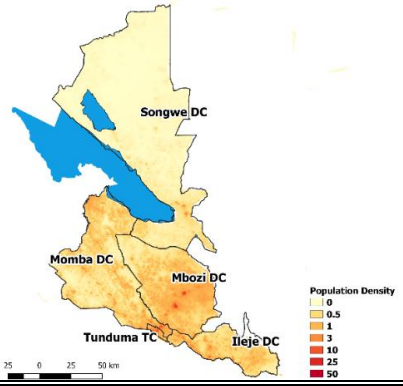




| Strata | District | Population | |
|---|---|---|---|
| **Very low** | Singida DC | 245,353 | 15% |
| | Singida MC | 171,806 | 11% |
| | | **417,160** | **26%** |
| **low** | Ikungi DC | 310,337 | 20% |
| | Iramba DC | 337,639 | 21% |
| | Manyoni DC | 220,891 | 14% |
| | Mkalama DC | 162,071 | 10% |
| | | **1,030,939** | **65%** |
| **moderate** | Itigi DC | 134,989 | 9% |
| **Total** | | **1,583,087** | |

## SONGWE

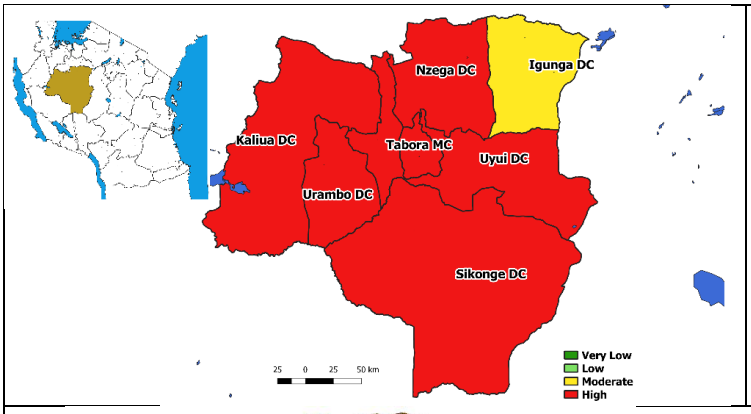


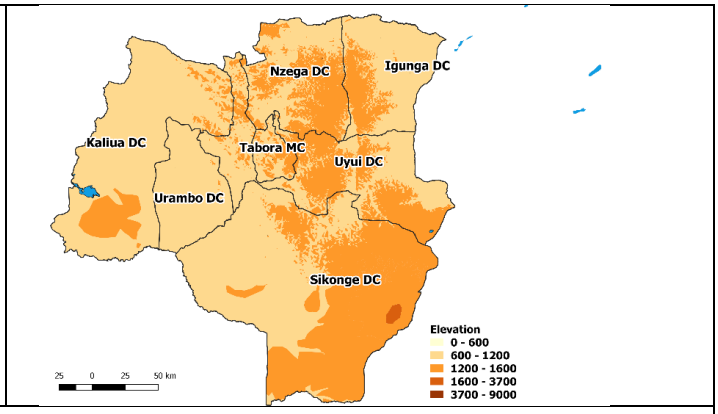



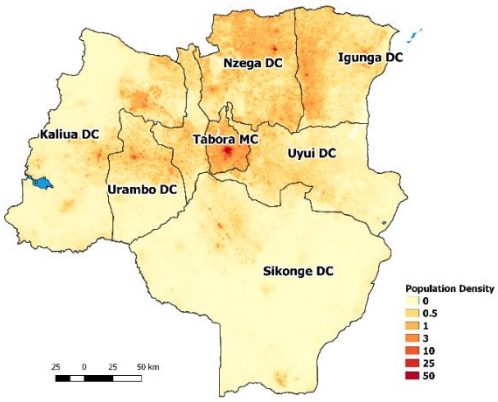




| Strata | District | Population | |
|---|---|---|---|
| **Very low** | Mbozi DC | 504,992 | 43% |
| | Tunduma TC | 132,418 | 11% |
| | | **637,410** | **54%** |
| **low** | Ileje DC | 132,099 | 11% |
| **moderate** | Momba DC | 258,455 | 22% |
| | Songwe DC | 158,019 | 13% |
| | | **416,473** | **35%** |
| **Total** | | **1,185,982** | |

## TABORA

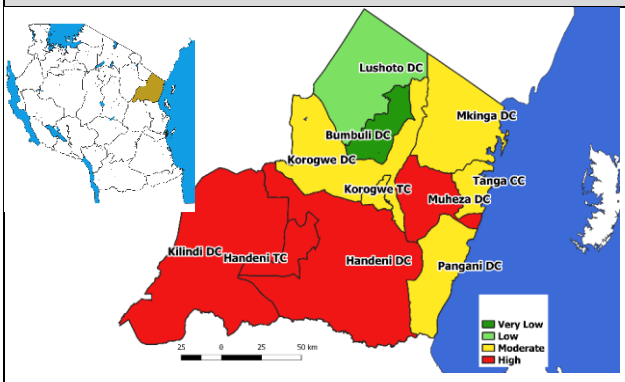


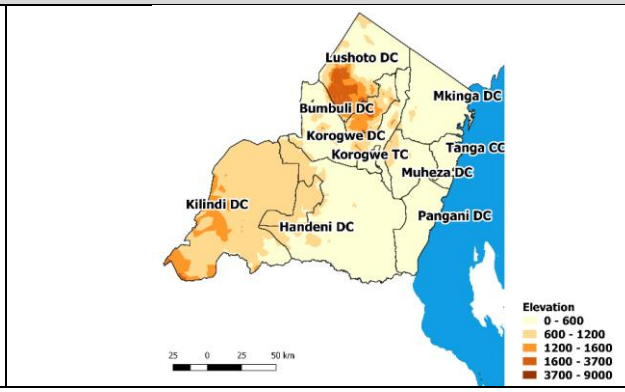



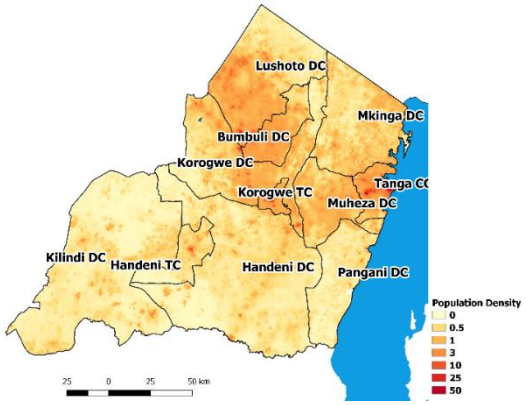




| Strata | District | Population | |
|---|---|---|---|
| **moderate** | Igunga DC | 443,499 | 17% |
| **high** | Kaliua DC | 506,835 | 19% |
| | Nzega DC | 469,912 | 18% |
| | Nzega TC | 81,902 | 3% |
| | Sikonge DC | 208,534 | 8% |
| | Tabora MC | 249,399 | 9% |
| | Urambo DC | 230,072 | 9% |
| | Uyui DC | 468,792 | 18% |
| | | **2,215,446** | **83%** |
| **Total** | | **2,658,944** | |

## TANGA




| Strata | District | Population | |
|---|---|---|---|
| **Very low** | Bumbuli DC | 173,222 | 8% |
| **low** | Lushoto DC | 359,896 | 16% |
| **moderate** | Korogwe DC | 260,744 | 11% |
| | Korogwe TC | 77,662 | 3% |
| | Mkinga DC | 130,994 | 6% |
| | Pangani DC | 59,941 | 3% |
| | Tanga CC | 290,130 | 13% |
| | | **819,470** | **36%** |
| **high** | Handeni DC | 330,159 | 14% |
| | Handeni TC | 94,348 | 4% |
| | Kilindi DC | 302,266 | 13% |
| | Muheza DC | 215,956 | 9% |
| | | **942,729** | **41%** |
| **Total** | | **2,295,317** | |

## Councils allocation to strata and Population

*Table 21: List of Region and Districts in proposed Tanzania malaria stratification*

| | Population 2018 | 1 Very Low | 2 Low | 3 Moderate | 4 High | 5 Urban | Total |
|---|---|---|---|---|---|---|---|
| **Arusha Region** | **2000291** | **6** | | | | **1** | **7** |
| Arusha CC | 494364 | | | | | 1 | 1 |
| Arusha DC | 374811 | 1 | | | | | 1 |
| Karatu DC | 268488 | 1 | | | | | 1 |
| Longido DC | 156729 | 1 | | | | | 1 |
| Meru DC | 293200 | 1 | | | | | 1 |
| Monduli DC | 204602 | 1 | | | | | 1 |
| Ngorongoro DC | 208097 | 1 | | | | | 1 |
| **Dar Es Salaam Region** | **6066125** | | | | | **5** | **5** |
| Ilala MC | 1781045 | | | | | 1 | 1 |
| Kigamboni MC | 316575 | | | | | 1 | 1 |
| Kinondoni MC | 1238759 | | | | | 1 | 1 |
| Temeke MC | 1603330 | | | | | 1 | 1 |
| Ubungo MC | 1126416 | | | | | 1 | 1 |
| **Dodoma Region** | **2609973** | **1** | **4** | **2** | | **1** | **8** |
| Bahi DC | 251080 | | | 1 | | | 1 |
| Chamwino DC | 387838 | | 1 | | | | 1 |
| Chemba DC | 265449 | | 1 | | | | 1 |
| Dodoma MC | 674178 | | | | | 1 | 1 |
| Kondoa DC | 238661 | | 1 | | | | 1 |
| Kondoa TC | 66860 | 1 | | | | | 1 |
| Kongwa DC | 367973 | | 1 | | | | 1 |
| Mpwapwa DC | 357933 | | | 1 | | | 1 |
| **Geita Region** | **2007923** | | | **2** | **4** | | **6** |
| Bukombe DC | 231363 | | | 1 | | | 1 |
| Chato DC | 435981 | | | | 1 | | 1 |
| Geita DC | 734237 | | | | 1 | | 1 |
| Geita TC | 230102 | | | 1 | | | 1 |
| Mbogwe DC | 202211 | | | | 1 | | 1 |
| Nyang'hwale DC | 174029 | | | | 1 | | 1 |
| **Iringa Region** | **1018079** | **1** | **3** | | | **1** | **5** |
| Iringa DC | 260190 | | 1 | | | | 1 |
| Iringa MC | 186042 | | | | | 1 | 1 |
| Kilolo DC | 227453 | | 1 | | | | 1 |
| Mafinga TC | 67203 | 1 | | | | | 1 |
| Mufindi DC | 277191 | | 1 | | | | 1 |
| **Kagera Region** | **3067363** | | | | **7** | **1** | **8** |
| Biharamulo DC | 488194 | | | | 1 | | 1 |
| Bukoba DC | 322426 | | | | 1 | | 1 |
| Bukoba MC | 169661 | | | | | 1 | 1 |
| Karagwe DC | 444939 | | | | 1 | | 1 |
| Kyerwa DC | 430206 | | | | 1 | | 1 |
| Missenyi DC | 239148 | | | | 1 | | 1 |
| Muleba DC | 660338 | | | | 1 | | 1 |

| | Population 2018 | 1 Very Low | 2 Low | 3 Moderate | 4 High | 5 Urban | Total |
|---|---|---|---|---|---|---|---|
| Ngara DC | 312451 | | | | 1 | | 1 |
| **Katavi Region** | **696125** | | **1** | **1** | **2** | **1** | **5** |
| Mlele DC | 37940 | | | | 1 | | 1 |
| Mpanda DC | 254108 | | | 1 | | | 1 |
| Mpanda MC | 140867 | | | | | 1 | 1 |
| Mpimbwe DC | 113308 | | 1 | | | | 1 |
| Nsimbo DC | 149902 | | | | 1 | | 1 |
| **Kigoma Region** | **2502651** | | | **1** | **6** | **1** | **8** |
| Buhigwe DC | 301933 | | | | 1 | | 1 |
| Kakonko DC | 167555 | | | | 1 | | 1 |
| Kasulu DC | 587103 | | | | 1 | | 1 |
| Kasulu TC | 287136 | | | 1 | | | 1 |
| Kibondo DC | 297781 | | | | 1 | | 1 |
| Kigoma DC | 215403 | | | | 1 | | 1 |
| Kigoma MC | 272623 | | | | | 1 | 1 |
| Uvinza DC | 458086 | | | | 1 | | 1 |
| **Kilimanjaro Region** | **1824044** | **5** | **1** | | | **1** | **7** |
| Hai DC | 239897 | 1 | | | | | 1 |
| Moshi DC | 510350 | 1 | | | | | 1 |
| Moshi MC | 213722 | | | | | 1 | 1 |
| Mwanga DC | 142034 | 1 | | | | | 1 |
| Rombo DC | 270500 | 1 | | | | | 1 |
| Same DC | 311066 | | 1 | | | | 1 |
| Siha DC | 136474 | 1 | | | | | 1 |
| **Lindi Region** | **929729** | | | | **5** | **1** | **6** |
| Kilwa DC | 203684 | | | | 1 | | 1 |
| Lindi DC | 182782 | | | | 1 | | 1 |
| Lindi MC | 115040 | | | | | 1 | 1 |
| Liwale DC | 102909 | | | | 1 | | 1 |
| Nachingwea DC | 189443 | | | | 1 | | 1 |
| Ruangwa DC | 135870 | | | | 1 | | 1 |
| **Manyara Region** | **1725372** | **5** | **2** | | | | **7** |
| Babati DC | 386241 | 1 | | | | | 1 |
| Babati TC | 98836 | 1 | | | | | 1 |
| Hanang DC | 329546 | 1 | | | | | 1 |
| Kiteto DC | 322299 | | 1 | | | | 1 |
| Mbulu DC | 228745 | 1 | | | | | 1 |
| Mbulu TC | 153685 | 1 | | | | | 1 |
| Simanjiro DC | 206019 | | 1 | | | | 1 |
| **Mara Region** | **2020894** | | | **2** | **6** | **1** | **9** |
| Bunda DC | 234564 | | | | 1 | | 1 |
| Bunda TC | 156284 | | | 1 | | | 1 |
| Butiama DC | 275448 | | | | 1 | | 1 |
| Musoma DC | 209272 | | | | 1 | | 1 |
| Musoma MC | 153062 | | | | | 1 | 1 |
| Rorya DC | 298704 | | | | 1 | | 1 |

| | Population 2018 | 1 Very Low | 2 Low | 3 Moderate | 4 High | 5 Urban | Total |
|---|---|---|---|---|---|---|---|
| Serengeti DC | 306601 | | | | 1 | | 1 |
| Tarime DC | 298037 | | | | 1 | | 1 |
| Tarime TC | 88921 | | | 1 | | | 1 |
| **Mbeya Region** | **1974443** | | **3** | **2** | **1** | **1** | **7** |
| Busokelo DC | 106273 | | | | 1 | | 1 |
| Chunya DC | 191615 | | | 1 | | | 1 |
| Kyela DC | 255361 | | | 1 | | | 1 |
| Mbarali DC | 348508 | | 1 | | | | 1 |
| Mbeya CC | 479124 | | | | | 1 | 1 |
| Mbeya DC | 339813 | | 1 | | | | 1 |
| Rungwe DC | 253749 | | 1 | | | | 1 |
| **Morogoro Region** | **2561108** | | **1** | **4** | **3** | **1** | **9** |
| Gairo DC | 231811 | | 1 | | | | 1 |
| Ifakara TC | 122699 | | | 1 | | | 1 |
| Kilombero DC | 347555 | | | 1 | | | 1 |
| Kilosa DC | 505181 | | | 1 | | | 1 |
| Malinyi DC | 137960 | | | | 1 | | 1 |
| Morogoro DC | 300266 | | | | 1 | | 1 |
| Morogoro MC | 383800 | | | | | 1 | 1 |
| Mvomero DC | 349423 | | | 1 | | | 1 |
| Ulanga DC | 182414 | | | | 1 | | 1 |
| **Mtwara Region** | **1367640** | | | **1** | **7** | **1** | **9** |
| Masasi DC | 266393 | | | | 1 | | 1 |
| Masasi TC | 112292 | | | | 1 | | 1 |
| Mtwara DC | 142352 | | | | 1 | | 1 |
| Mtwara MC | 119121 | | | | | 1 | 1 |
| Nanyamba TC | 101119 | | | | 1 | | 1 |
| Nanyumbu DC | 163981 | | | | 1 | | 1 |
| Newala DC | 137082 | | | | 1 | | 1 |
| Newala TC | 82351 | | | 1 | | | 1 |
| Tandahimba DC | 242949 | | | | 1 | | 1 |
| **Mwanza Region** | **3327639** | | | **2** | **4** | **2** | **8** |
| Buchosa DC | 386833 | | | | 1 | | 1 |
| Ilemela MC | 400110 | | | | | 1 | 1 |
| Kwimba DC | 474192 | | | 1 | | | 1 |
| Magu DC | 337577 | | | 1 | | | 1 |
| Misungwi DC | 424752 | | | | 1 | | 1 |
| Nyamagana MC | 501143 | | | | | 1 | 1 |
| Sengerema DC | 395685 | | | | 1 | | 1 |
| Ukerewe DC | 407345 | | | | 1 | | 1 |
| **Njombe Region** | **737888** | **4** | **1** | **1** | | | **6** |
| Ludewa DC | 136447 | | | 1 | | | 1 |
| Makambako TC | 112689 | 1 | | | | | 1 |
| Makete DC | 92690 | 1 | | | | | 1 |
| Njombe DC | 86781 | | 1 | | | | 1 |
| Njombe TC | 141552 | 1 | | | | | 1 |
| Wanging'ombe DC | 167729 | 1 | | | | | 1 |

| | Population 2018 | 1 Very Low | 2 Low | 3 Moderate | 4 High | 5 Urban | Total |
|---|---|---|---|---|---|---|---|
| **Pwani Region** | **1259428** | | | **3** | **6** | | **9** |
| Bagamoyo DC | 117292 | | | 1 | | | 1 |
| Chalinze DC | 257115 | | | 1 | | | 1 |
| Kibaha DC | 82379 | | | | 1 | | 1 |
| Kibaha TC | 172186 | | | 1 | | | 1 |
| Kibiti DC | 127890 | | | | 1 | | 1 |
| Kisarawe DC | 105311 | | | | 1 | | 1 |
| Mafia DC | 50478 | | | | 1 | | 1 |
| Mkuranga DC | 248106 | | | | 1 | | 1 |
| Rufiji DC | 98670 | | | | 1 | | 1 |
| **Rukwa Region** | **1246648** | | **1** | **2** | | **1** | **4** |
| Kalambo DC | 205220 | | | 1 | | | 1 |
| Nkasi DC | 335768 | | | 1 | | | 1 |
| Sumbawanga DC | 446273 | | 1 | | | | 1 |
| Sumbawanga MC | 259388 | | | | | 1 | 1 |
| **Ruvuma Region** | **1568342** | | | **3** | **4** | **1** | **8** |
| Madaba DC | 50713 | | | 1 | | | 1 |
| Mbinga DC | 264180 | | | 1 | | | 1 |
| Mbinga TC | 131787 | | | 1 | | | 1 |
| Namtumbo DC | 219181 | | | | 1 | | 1 |
| Nyasa DC | 171495 | | | | 1 | | 1 |
| Songea DC | 133801 | | | | 1 | | 1 |
| Songea MC | 263245 | | | | | 1 | 1 |
| Tunduru DC | 333939 | | | | 1 | | 1 |
| **Shinyanga Region** | **1743677** | | | **2** | **3** | **1** | **6** |
| Kahama TC | 308243 | | | 1 | | | 1 |
| Kishapu DC | 294987 | | | 1 | | | 1 |
| Msalala DC | 280702 | | | | 1 | | 1 |
| Shinyanga DC | 374398 | | | | 1 | | 1 |
| Shinyanga MC | 179625 | | | | | 1 | 1 |
| Ushetu DC | 305722 | | | | 1 | | 1 |
| **Simiyu Region** | **1760909** | | | **5** | **1** | | **6** |
| Bariadi DC | 317400 | | | | 1 | | 1 |
| Bariadi TC | 164503 | | | 1 | | | 1 |
| Busega DC | 226599 | | | 1 | | | 1 |
| Itilima DC | 347310 | | | 1 | | | 1 |
| Maswa DC | 369657 | | | 1 | | | 1 |
| Meatu DC | 335440 | | | 1 | | | 1 |
| **Singida Region** | **1633256** | **1** | **4** | **1** | | **1** | **7** |
| Ikungi DC | 318406 | | 1 | | | | 1 |
| Iramba DC | 362624 | | 1 | | | | 1 |
| Itigi DC | 139983 | | | 1 | | | 1 |
| Manyoni DC | 229064 | | 1 | | | | 1 |
| Mkalama DC | 157209 | | 1 | | | | 1 |
| Singida DC | 249524 | 1 | | | | | 1 |
| Singida MC | 176445 | | | | | 1 | 1 |
| **Songwe Region** | **1228381** | **2** | **1** | **2** | | | **5** |

| | Population 2018 | 1 Very Low | 2 Low | 3 Moderate | 4 High | 5 Urban | Total |
|---|---|---|---|---|---|---|---|
| Ileje DC | 133685 | | 1 | | | | 1 |
| Mbozi DC | 517616 | 1 | | | | | 1 |
| Momba DC | 272928 | | | 1 | | | 1 |
| Songwe DC | 163391 | | | 1 | | | 1 |
| Tunduma TC | 140760 | 1 | | | | | 1 |
| **Tabora Region** | **2740314** | | | **1** | **6** | **1** | **8** |
| Igunga DC | 452812 | | | 1 | | | 1 |
| Kaliua DC | 533191 | | | | 1 | | 1 |
| Nzega DC | 478840 | | | | 1 | | 1 |
| Nzega TC | 83458 | | | | 1 | | 1 |
| Sikonge DC | 214790 | | | | 1 | | 1 |
| Tabora MC | 254138 | | | | | 1 | 1 |
| Urambo DC | 238354 | | | | 1 | | 1 |
| Uyui DC | 484731 | | | | 1 | | 1 |
| **Tanga Region** | **2350039** | **1** | **1** | **4** | **4** | **1** | **11** |
| Bumbuli DC | 175993 | 1 | | | | | 1 |
| Handeni DC | 342045 | | | | 1 | | 1 |
| Handeni TC | 97745 | | | | 1 | | 1 |
| Kilindi DC | 317379 | | | | 1 | | 1 |
| Korogwe DC | 264655 | | | 1 | | | 1 |
| Korogwe TC | 79681 | | | 1 | | | 1 |
| Lushoto DC | 365654 | | 1 | | | | 1 |
| Mkinga DC | 133744 | | | 1 | | | 1 |
| Muheza DC | 218332 | | | | 1 | | 1 |
| Pangani DC | 61200 | | | 1 | | | 1 |
| Tanga CC | 293612 | | | | | 1 | 1 |
| **Grand Total** | **52,053,246** | **26** | **23** | **41** | **69** | **25** | **184** |

# Appendix D: Malaria Interventions included in the Supplementary Malaria Midterm Strategic Plan 2018-2020

Strata code: Very Low; Low; Moderate; High; Urban

Evidence, Transmission reduction, Service effectiveness, Operation feasibility, Costs, Equity: Key:
* very low; ** low; *** moderate; **** high

## Malaria vector control

| | Mechanism/ Approach | Description | Remarks |
|---|---|---|---|
| **LLIN** | | **LLINs are nets treated in the factory with an insecticide incorporated into the net fabric which makes the insecticide last at least 20 washes in standard laboratory testing and three years of recommended use under field conditions.** | **Long-lasting insecticidal nets (LLINs) have played an important role in the remarkable success in reducing malaria burden over the past decade. They are a core prevention tool, and widely used by people at risk of malaria[21].**<br>**Mass campaigns are a cost-effective way to rapidly achieve high and equitable coverage, but coverage gaps start to appear almost immediately post-campaign through net deterioration, loss of nets, and population growth, requiring complementary continuous distribution channels[22].** |
| | RCH distribution | All infants attending the EPI clinic for measles-rubella vaccination and pregnant women attending the ANC for the first time are eligible to be issued LLIN<br>Evidence: ****<br>Transmission Reduction: *<br>Service Effectiveness: ***<br>Operation Feasibility: ***<br>Costs: ***<br>Equity: **<br>Potential for Burden reduction: *<br>Potential for Elimination: * | The strategy goal is primarily to cover the biological vulnerable groups and to contribute to keep up the LLIN access in the population.<br>This approach is the cheapest one for LLIN distribution since is using routine mechanisms within the health sector.<br>The scheme is currently operational in all regions of Tanzania mainland. |
| | School Net Program (SNP) distribution | School going children will be issued a LLIN once per year according to a predetermined distribution scheme based on the desired expected LLIN coverage in the community.<br>Evidence: **<br>Transmission Reduction: ****<br>Service Effectiveness: ***<br>Operation Feasibility: ****<br>Costs: ***<br>Equity: **<br>Potential for Burden reduction ****<br>Potential for Elimination ** | The strategy goal is primarily to keep up the LLIN access in the population. To be effective, the SNP scheme should be initiated as soon as possible after a mass replacement campaign.<br>This approach is the relatively cheap and efficient since is using easily accessible institutions once per year.<br>The scheme is currently operative in 14 regions of Tanzania. |

[21] *World Health Organization. Conditions for deployment of mosquito nets treated with a pyrethroid and piperonyl butoxide. revised 2017*

[22] *World Health Organization. Achieving universal coverage with long lasting nets in malaria control March 2014*

<table>
<tr><th></th><th>Mechanism/ Approach</th><th>Description</th><th>Remarks</th></tr>
<tr><td></td><td>Mass replacement campaign (MRC)</td><td>MRC intends to improve drastically and in a short time the access to LLIN in a way that one LLIN will be distributed and available to 2 persons.<br><br>In the current country landscape MRC is intended to assure optimal access of net in areas where the continuous distribution system has not been operationalized.<br><br>This should be the last mass LLIN replacement efforts in the country before the full effective implementation of a LLIN keep up strategy based on continuous net distribution through different channels<br><table><tr><td>Evidence:</td><td>****</td></tr><tr><td>Transmission Reduction:</td><td>****</td></tr><tr><td>Service Effectiveness:</td><td>**</td></tr><tr><td>Operation Feasibility:</td><td>***</td></tr><tr><td>Costs:</td><td>****</td></tr><tr><td>Equity:</td><td>****</td></tr><tr><td>Potential for Burden reduction:</td><td>****</td></tr><tr><td>Potential for Elimination:</td><td>**</td></tr></table></td><td>The mass distribution campaigns are usually managed by logistic contractors.<br><br>This approach is the more expensive compared to other distribution systems due to the high logistic efforts to reach all communities in a short period.<br><br>Three mass distribution campaigns have been implemented in the country between 2009 and 2017.</td></tr>
<tr><td></td><td>Targeted LLIN distribution for keep up strategy</td><td>SNP is the backbone of keep up strategy. Nevertheless, other keep up initiatives might be needed to maintain the desired coverage. Amon them:<br><br>• Specific vulnerable groups distribution (In CTC for patients seeking ARV treatment, admitted patients especially those with a malaria diagnosis)<br>• Targeted replacement campaigns for special socio economic disadvantaged people (e.g. cities)<br>• Very low transmission areas with evidence of malaria rebound<br><table><tr><td>Evidence:</td><td>**</td></tr><tr><td>Transmission Reduction:</td><td>**</td></tr><tr><td>Service Effectiveness:</td><td>***</td></tr><tr><td>Operation Feasibility:</td><td>****</td></tr><tr><td>Costs:</td><td>**</td></tr><tr><td>Equity:</td><td>****</td></tr><tr><td>Potential for Burden reduction</td><td>*</td></tr><tr><td>Potential for Elimination</td><td>*</td></tr></table></td><td>Targeted LLIN distribution needs a very intensive and responsive information system</td></tr>
<tr><td></td><td>Commercial Sector</td><td>Commercial sector nets delivery could benefit from the presence of a vibrant private sector from manufacturing, wholesalers and retail and outlets.<br><br>This distribution approach is potential to improve access to nets in urbanized areas such as city Municipal councils.<br><table><tr><td>Evidence:</td><td>****</td></tr><tr><td>Transmission Reduction:</td><td>**</td></tr><tr><td>Service Effectiveness:</td><td>*</td></tr><tr><td>Operation Feasibility:</td><td>**</td></tr><tr><td>Costs:</td><td>*</td></tr><tr><td>Equity:</td><td>*</td></tr><tr><td>Potential for Burden reduction</td><td>*</td></tr><tr><td>Potential for Elimination</td><td>*</td></tr></table></td><td>Conventional not treated nets are largely available in the private market.<br><br>There might be quality assurance concerns regarding the available nets in the private market.<br><br>The country previously experienced a successful full involvement of the private sector in the implementation of the national voucher scheme<br><table><tr><td></td><td>2015/16 before MRC (%)</td><td>2017 after MRC (*)</td><td>Expected MRC contribution (*)</td></tr><tr><td>Under-fives sleeping under a ITN</td><td>60.6</td><td>64.2</td><td>3.6</td></tr><tr><td>Population sleeping under ITN</td><td>48.1</td><td>65.8</td><td>17.7</td></tr><tr><td>Household with 1 ITN every 2 people</td><td>36.4</td><td>54.7</td><td>18.3</td></tr><tr><td>Household with at least 1 ITN</td><td>65.9</td><td>78.6</td><td>12.7</td></tr><tr><td>ITN Access (*)</td><td>52.9</td><td>70</td><td>17.1</td></tr></table>(*) de facto household population who could sleep under an ITN if each ITN in the household were used by 2 people</td></tr>
</table>

<table>
<tr><th></th><th>Mechanism/ Approach</th><th>Description</th><th>Remarks</th></tr>
<tr><td></td><td>PBO and next generation LLIN</td><td>A new class of bed net that includes a synergist piperonyl butoxide (PBO) appear to have similar or better efficacy against mosquitoes with metabolic based resistance, under controlled household conditions than standard long-lasting insecticidal nets that do not have PBO.<br><br>Currently there are no next generation LLIN with alternative insecticide classes.<table><tr><td>Evidence:</td><td>***</td></tr><tr><td>Transmission Reduction:</td><td>****</td></tr><tr><td>Service Effectiveness:</td><td>***</td></tr><tr><td>Operation Feasibility:</td><td>***</td></tr><tr><td>Costs:</td><td>****</td></tr><tr><td>Equity:</td><td>?</td></tr><tr><td>Potential for Burden reduction:</td><td>***</td></tr><tr><td>Potential for Elimination:</td><td>***</td></tr></table></td><td>These new approach should target defined areas as a tool to mitigate insecticide resistance.<br><br>PBO has been shown to significantly reduce malaria infection in children at one site in Tanzania, according to new research published in the Lancet[23]. WHO recommendations on pyrethroid-PBO nets were revised in late 2017 based on the results of this study, among others[24].</td></tr>
<tr><td colspan="2">IRS</td><td>IRS is the application of a long-lasting, residual insecticide to potential malaria vector resting surfaces such as internal walls, eaves and ceilings of all houses or structures (including domestic animal shelters) where such vectors might come into contact with the insecticide.</td><td>The approach should be adapted to the specific challenges and opportunities presented by individual ecological situation and within the context of the integrated malaria vector management (IVM). IVM is defined as “a rational decision-making process for the optimal use of resources for vector control”. The approach seeks to improve the efficacy, cost-effectiveness, ecological soundness and sustainability of disease vector-control. IVM is not simply throwing multiple interventions together, nor is it a separate programme. Rather, it is a management approach that enables vector-control efforts to be adapted, broadened, optimally deployed and sustained.</td></tr>
<tr><td></td><td>Pro-active focal IRS</td><td>Pro-active implementation of IRS could be effectively implemented in identified transmission foci within very low and low transmission strata with the aim to interrupt localized transmission.<table><tr><td>Evidence:</td><td>****</td></tr><tr><td>Transmission Reduction:</td><td>****</td></tr><tr><td>Service Effectiveness:</td><td>**</td></tr><tr><td>Operation Feasibility:</td><td>*</td></tr><tr><td>Costs:</td><td>****</td></tr><tr><td>Equity:</td><td>***</td></tr><tr><td>Potential for Burden reduction</td><td>*</td></tr><tr><td>Potential for Elimination</td><td>****</td></tr></table></td><td>As programmes move towards malaria elimination, transmission becomes focal. In such situations, the use of focal IRS becomes more appropriate. Improved entomological and disease surveillance is critical in identifying the transmission foci.<br><br>Logistics around pro-active IRS should be well addressed due to the possible limited size of the intervention.<br><br>Specific environmental compliance schemes, capacity building, storage of insecticide, strategic stock of spray equipment should be strategically and efficiently set up at sub national level (e.g. zonal or regional level).</td></tr>
<tr><td></td><td>Blanket IRS</td><td>This approach in implementing IRS aim at covering large geographical and ecological areas of the country.<br><br>Blanket IRS intends to address the needs of intensified vector control initiatives in areas with high and very high malaria transmission and more specifically to those areas resilient to changes in term of reduction of malaria burden.<table><tr><td>Evidence:</td><td>****</td></tr><tr><td>Transmission Reduction:</td><td>****</td></tr><tr><td>Service Effectiveness:</td><td>****</td></tr><tr><td>Operation Feasibility:</td><td>*</td></tr><tr><td>Costs:</td><td>****</td></tr><tr><td>Equity:</td><td>***</td></tr><tr><td>Potential for Burden reduction</td><td>****</td></tr><tr><td>Potential for Elimination</td><td>*</td></tr></table></td><td>In high-transmission areas, IRS can be used to rapidly bring malaria transmission down to a level that can subsequently be sustained through a high proportion of the population using LLINs[25].</td></tr>
</table>

[23] *Protoporoff Natacha et al. Effectiveness of a long-lasting piperonyl butoxide-treated insecticidal net and indoor residual spray interventions, separately and together, against malaria transmitted by pyrethroid-resistant mosquitoes: a cluster, randomized controlled, two-by-two factorial design trial. The lancet. 2018; 391: 1577-88*

[24] *World Health Organization. Conditions for deployment of mosquito nets treated with a pyrethroid and piperonyl butoxide. 2017*

[25] *WHO. Indoor Residual Spraying: An operational manual for indoor residual spraying (IRS) for malaria transmission control and elimination. 2nd edition. 2015.*

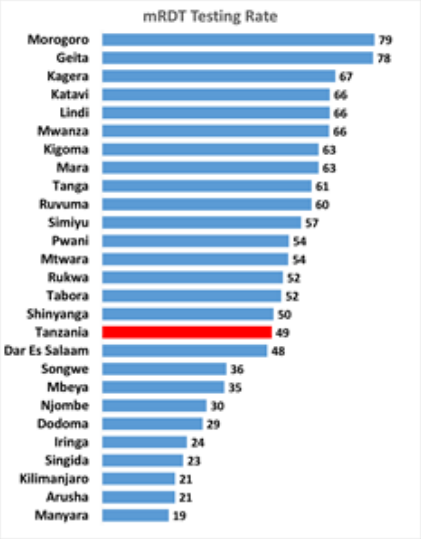
| | Mechanism/ Approach | Description | Remarks |
|---|---|---|---|
| | Targeted IRS | This approach in implementing IRS should target sub-regional or sub-district levels.<br><br>Targeted IRS is meant to focus specific areas as a tool to mitigate insecticide resistance.<br><br>Evidence: **<br>Transmission Reduction: ***<br>Service Effectiveness: NA<br>Operation Feasibility: **<br>Costs: ***<br>Equity: ***<br>Potential for Burden reduction **<br>Potential for Elimination ** | As per pro-active IRS |
| **LSM** | | | |
| | Blanket bio-larviciding | Larval source management (LSM) refers to the targeted management of mosquito breeding sites, with the objective to reduce the number of mosquito larvae and pupae. LSM is only recommended as a supplementary malaria vector control measure; it should not be used to replace core vector control interventions, such as long-lasting insecticidal nets (LLINs) and indoor residual spraying (IRS)[26].<br><br>This approach is ideal for areas where all (or the majority) of breeding sites are few, fixed and findable.<br><br>Only a few areas of the country meet the above criteria, essentially areas with high population density and relatively high development standards (city and municipal councils).<br><br>Evidence: ***<br>Transmission Reduction: **<br>Service Effectiveness: NA<br>Operation Feasibility: **<br>Costs: ***<br>Equity: ?<br>Potential for Burden reduction **<br>Potential for Elimination ** | LSM is a quite complex interventions that need to establish adequate logistic arrangements to avoid incorrect targeting and application of larviciding products.<br><br>Correct timing of biolarviciding application is crucial for effective interventions: a) during wet season is potential to decrease vector abundance while b) during dry season is potential to decrease parasite transmission<br><br>This intervention might benefit from high political willingness and needs full involvement of local government authorities and communities. |
| | Targeted bio-larviciding | Targeted LSM should address well defined situations such as identified localized foci of malaria transmission in very low and low malaria transmission areas. In this case LSM is a potential tool to stop transmission especially if deployed during the driest months.<br><br>Other potential use of this approach is to target well recognized geographical and ecological areas within district and town councils, mainly the more highly densely populated ones.<br><br>Evidence: ***<br>Transmission Reduction: **<br>Service Effectiveness: NA<br>Operation Feasibility: ***<br>Costs: ***<br>Equity: **<br>Potential for Burden reduction **<br>Potential for Elimination **** | As above |

[26] *World Health Organization. Larval Source Management: supplementary measure for malaria vector control: An Operational manual 2013.*

## Malaria case management

<table>
<tr><th></th><th>Mechanism/ Approach</th><th>Description</th><th>Remarks</th></tr>
<tr><td colspan="2">Malaria testing</td><td>All malaria cases needs to be verified through parasitological diagnosis.<br><br>Malaria testing rate is monitored through MIS. The indicators used is proportion of children below the age of five years with history of fever in the two weeks before the survey who had a blood test. The SMP target is 80% and the 2017 achievement is 43%.<br><br>Universal access to malaria testing in Tanzania is unlikely to be reached through the routine access to the existing operational health facilities.</td><td>Early and accurate diagnosis of malaria is essential for both rapid and effective disease management and surveillance. High-quality malaria diagnosis is important in all settings as misdiagnosis can result in significant morbidity and mortality. WHO recommends prompt malaria diagnosis either by microscopy or malaria rapid diagnostic test (RDT) in all patients with suspected malaria before treatment is administered. Diagnostic testing improves the overall management of patients with febrile illnesses, and may also help to reduce the emergence and spread of drug resistance by reserving antimalarials for those who actually have the disease[27].</td></tr>
<tr><td>●<br>●<br>●<br>●<br>●</td><td>Strengthen quality control/ assurance schemes of malaria diagnosis in HF</td><td>Quality assurance (QA) is a total process that include performance standards, good laboratory practice and management skills to achieve and maintain a quality service and provide for continuing improvement. Quality control (QC) describes all the activities taken by a laboratory to monitor each stage of a test procedure to ensure that tests are performed correctly and are accurate and precise[28].<br><br>Two dedicated MSDQI modules (mRDT and malaria microscopy) are used to assess the quality of malaria testing services and to provide a platform for implementing quality improvement plans. Each health facility providing mRDT and microscopy services should be assessed according to the set plan.
<table>
<tr><td>Evidence:</td><td>***</td></tr>
<tr><td>Transmission Reduction:</td><td>**</td></tr>
<tr><td>Service Effectiveness:</td><td>****</td></tr>
<tr><td>Operation Feasibility:</td><td>***</td></tr>
<tr><td>Costs:</td><td>**</td></tr>
<tr><td>Equity:</td><td>***</td></tr>
<tr><td>Potential for Burden reduction</td><td>***</td></tr>
<tr><td>Potential for Elimination</td><td>***</td></tr>
</table></td><td>The purpose of quality assurance is to provide reliable, relevant, timely test results that are interpreted correctly thereby increasing efficiency, effectiveness, enhancing patient satisfaction and decreasing costs brought about by misdiagnosis. This is increasingly important with the advent of combination therapies and their higher associated costs. A quality assurance process for malaria RDTs should aim to ensure high accuracy of tests in the hands of end-users. This will include both monitoring of the technical standard of the RDTs, processes to minimize environmental insult and training and monitoring of preparation and interpretation by end-users[29].</td></tr>
</table>

[27] *World Health Organization. Universal access to malaria diagnostic testing: An operational manual 2011.*
[28] *World Health Organization. Malaria microscopy quality assurance manual version 2. 2016*
[29] *World Health Organization. Malaria rapid diagnostic test performance. Results of WHO product testing of malaria RDTs: round 8 (2016-2018)*

<table>
<tr><th></th><th>Mechanism/ Approach</th><th>Description</th><th>Remarks</th></tr>
<tr><td></td><td>Increased testing targets in health facilities</td><td>Increasing malaria testing rate in areas with very low and low transmission, will enhance the likelihood of detecting the majority of malaria cases in health facilities. Therefore, testing should target all patients visiting the health facility's OPD unreceptively from the history and clinical features.<table><tr><td>Evidence:</td><td>***</td></tr><tr><td>Transmission Reduction:</td><td>**</td></tr><tr><td>Service Effectiveness:</td><td>****</td></tr><tr><td>Operation Feasibility:</td><td>***</td></tr><tr><td>Costs:</td><td>**</td></tr><tr><td>Equity:</td><td>**</td></tr><tr><td>Potential for Burden reduction</td><td>*</td></tr><tr><td>Potential for Elimination</td><td>***</td></tr></table></td><td>The national proportion of OPD patients tested for malaria is around 50%. In very low and low transmission the value 30%) is much lower compared to moderate and high transmission 70%). 
</td></tr>
<tr><td></td><td>Increase malaria testing points (mRDT) in the informal retail health delivery system (ADDO)</td><td>To improve access to testing services, use of mRDT will be extended to ADDOs. To successfully introduce malaria testing into retail system, regulatory issues should be considered and, eventually, modified. Appropriate capacity building alongside with supportive supervision is needed.<table><tr><td>Evidence:</td><td>****</td></tr><tr><td>Transmission Reduction:</td><td>**</td></tr><tr><td>Service Effectiveness:</td><td>****</td></tr><tr><td>Operation Feasibility:</td><td>***</td></tr><tr><td>Costs:</td><td>**</td></tr><tr><td>Equity:</td><td>***</td></tr><tr><td>Potential for Burden reduction:</td><td>****</td></tr><tr><td>Potential for Elimination:</td><td>**</td></tr></table></td><td>While national guidelines require parasite-based diagnosis prior to treatment, it is estimated that more than half of suspected malaria treatment-seeking in Tanzania initiates in the private retail sector, where diagnosis by malaria rapid diagnostic test (RDT) or microscopy is not allowed[30].<br><br>**Evidence**: *Trained and supervised ADDO dispensers in rural Tanzania performed and sold RDTs under real market conditions to two-thirds of suspected malaria patients during this one-year pilot. These results support the hypothesis that introducing RDTs into regulated private retail sector settings can improve malaria testing and treatment practices without an RDT subsidy*</td></tr>
<tr><td></td><td>Increase malaria testing points in the communities by using iCCM approach</td><td>iCCM is an equity-focused strategy that aims to provide timely and effective treatment of malaria, pneumonia and diarrhoea in areas with limited access to facility-based health care providers, especially for children under five[31].<br><br>In the context of the renewed CBHC framework, iCCM can be effectively deployed in the remote and hard to reach areas of the country.<table><tr><td>Evidence:</td><td>***</td></tr><tr><td>Transmission Reduction:</td><td>**</td></tr><tr><td>Service Effectiveness:</td><td>****</td></tr><tr><td>Operation Feasibility:</td><td>***</td></tr><tr><td>Costs:</td><td>**</td></tr><tr><td>Equity:</td><td>****</td></tr><tr><td>Potential for Burden reduction:</td><td>****</td></tr><tr><td>Potential for Elimination:</td><td>**</td></tr></table></td><td>Community case management of malaria (CCMm) promotes the early recognition, prompt diagnostic testing and appropriate treatment of malaria among children under five years of age in the home or community. Over the last few years, CCMm has evolved into a more comprehensive strategy that addresses all three main childhood killers in Africa: malaria, pneumonia and diarrhoea. This new approach is called integrated community case management (iCCM).</td></tr>
<tr><td colspan="2">Malaria treatment</td><td></td><td></td></tr>
</table>

[30] *Maloney K et al. Expanding access to private-based malaria diagnosis through retail drug shops in Tanzania: evidence from a randomized trial and implications for treatment. Malar J 2017. 16: 6*

[31] *WHO/UNICEF. Integrated community Case Management: An equity-focused strategy to improve access to essential treatment services for children 2012*

<table>
<tr><th></th><th>Mechanism/ Approach</th><th>Description</th><th>Remarks</th></tr>
<tr><td></td><td>Strengthen quality of uncomplicated malaria clinical management in HF</td><td>One dedicated MSDQI module (OPD) is used to assess the quality of uncomplicated malaria clinical management in HF and to provide a platform for implementing quality improvement plans.<br><br>Each health facility providing uncomplicated malaria clinical management services should be assessed according to the set plan.<table><tr><td>Evidence:</td><td>****</td></tr><tr><td>Transmission Reduction:</td><td>***</td></tr><tr><td>Service Effectiveness:</td><td>****</td></tr><tr><td>Operation Feasibility:</td><td>***</td></tr><tr><td>Costs:</td><td>**</td></tr><tr><td>Equity:</td><td>***</td></tr><tr><td>Potential for Burden reduction</td><td>***</td></tr><tr><td>Potential for Elimination</td><td>***</td></tr></table></td><td>Appropriate management of uncomplicated malaria patients is potential to avoid the occurrence of severe cases and, therefore, unnecessary deaths due to malaria</td></tr>
<tr><td></td><td>Strengthen quality of severe malaria clinical management in HF</td><td>Appropriate management of severe malaria admitted patients is potential to avoid unnecessary deaths due to malaria<br><br>One dedicated MSDQI module (IPD) is used to assess the quality of severe malaria clinical management in HF and to provide a platform for implementing quality improvement plans.<br><br>Each health facility providing severe malaria clinical management services should be assessed according to the set plan.<table><tr><td>Evidence:</td><td>***</td></tr><tr><td>Transmission Reduction:</td><td>*</td></tr><tr><td>Service Effectiveness:</td><td>****</td></tr><tr><td>Operation Feasibility:</td><td>***</td></tr><tr><td>Costs:</td><td>**</td></tr><tr><td>Equity:</td><td>**</td></tr><tr><td>Potential for Burden reduction</td><td>***</td></tr><tr><td>Potential for Elimination</td><td>*</td></tr></table></td><td>MSDQI provides a platform for monitoring non routine reported indicators such as treatment prescription according to test outcomes and diagnosis. These indicators are essential to monitor the adherence to the national diagnosis and treatment guidelines.</td></tr>
<tr><td></td><td>Add Primaquine to confirmed malaria treatment</td><td>A single 0.25 mg base/kg primaquine dose should be given to all patients with parasitologically-confirmed P. falciparum malaria on the first day of treatment in addition to an ACT, except for pregnant women and infants <1 year of age<table><tr><td>Evidence:</td><td>****</td></tr><tr><td>Transmission Reduction:</td><td>***</td></tr><tr><td>Service Effectiveness:</td><td>***</td></tr><tr><td>Operation Feasibility:</td><td>***</td></tr><tr><td>Costs:</td><td>**</td></tr><tr><td>Equity:</td><td>**</td></tr><tr><td>Potential for Burden reduction:</td><td>*</td></tr><tr><td>Potential for Elimination:</td><td>****</td></tr></table></td><td>Primaquine potentially has a major role in reducing malaria transmission, especially in efforts to eliminate Plasmodium falciparum malaria. The population benefits of reducing malaria transmission by gametocytocidal drugs require that a very high proportion of patients receive these medicines.<br><br>WHO has conducted a review of the evidence on the safety and effectiveness of primaquine as gametocytocide of P. falciparum, which indicates that a single 0.25mg base/kg is effective in blocking transmission and is unlikely to cause serious toxicity in subjects with any of the G6PD variants.[32,33]</td></tr>
</table>

[32] *World Health Organization. Updated WHO policy recommendation: Single dose primaquine as a gametocytocide in Plasmodium falciparum malaria 2012.*
[33] *World Health Organization Evidence Review Group: The safety and effectiveness of single dose primaquine as a P. falciparum gametocide 2012*

<table>
<tr><th></th><th>Mechanism/ Approach</th><th>Description</th><th>Remarks</th></tr>
<tr><td></td><td>Non malaria fever management</td><td>With the increasing deployment of universal parasitological confirmation (RDTs) of suspected malaria prior to treatment, and the decreasing trend of malaria transmission in many endemic areas, an increasing proportion of febrile patients are being diagnosed as not having malaria.<br><br>In absence of differential antigen testing (other than malaria), malaria diagnostic testing and treatment should be deployed as part of promoting programmes for the integrated management of fevers, based on algorithms available for different age groups and levels of care (IMCI, iCCM, IMAI)<table><tr><td>Evidence:</td><td>***</td></tr><tr><td>Transmission Reduction:</td><td>*</td></tr><tr><td>Service Effectiveness:</td><td>****</td></tr><tr><td>Operation Feasibility:</td><td>*</td></tr><tr><td>Costs:</td><td>***</td></tr><tr><td>Equity:</td><td>NA</td></tr><tr><td>Potential for Burden reduction:</td><td>**</td></tr><tr><td>Potential for Elimination:</td><td>**</td></tr></table></td><td>Following many years' practice of treating fever as assumed malaria, health workers may ignore negative test results and still treat the patient with an antimalarial. This problem is made more difficult to resolve given the absence of guidance and medicines for the management of non-malaria febrile illnesses. This undermines the clinical benefits of parasitological confirmation of diagnosis, and aggravates the wastage of antimalarial drugs and drug pressure on parasites. In places where clinicians have been convinced not to prescribe antimalarials in RDT negative patients, limited guidance has resulted in over-prescription of antibiotics, another poor practice which will promote the emergence of antibiotic resistance, replacing one problem by another[34].</td></tr>
<tr><td></td><td>Increase access to medicines: iCCM</td><td>See also the above malaria diagnosis section<table><tr><td>Evidence:</td><td>****</td></tr><tr><td>Transmission Reduction:</td><td>***</td></tr><tr><td>Service Effectiveness:</td><td>***</td></tr><tr><td>Operation Feasibility:</td><td>**</td></tr><tr><td>Costs:</td><td>***</td></tr><tr><td>Equity:</td><td>****</td></tr><tr><td>Potential for Burden reduction:</td><td>****</td></tr><tr><td>Potential for Elimination:</td><td>**</td></tr></table></td><td>See also the above malaria diagnosis section</td></tr>
<tr><td></td><td>Improve pre referral management of severe malaria by introducing Rectal Artesunate</td><td>Rectal artesunate is recommended for pre-referral treatment of severe malaria in children under 6 years of age in remote areas, so that cases of suspected malaria, e.g. at community level, can be treated without delay, pending immediate transfer to a higher-level facility where comprehensive care can be given.<table><tr><td>Evidence:</td><td>****</td></tr><tr><td>Transmission Reduction:</td><td>*</td></tr><tr><td>Service Effectiveness:</td><td>***</td></tr><tr><td>Operation Feasibility:</td><td>**</td></tr><tr><td>Costs:</td><td>***</td></tr><tr><td>Equity:</td><td>****</td></tr><tr><td>Potential for Burden reduction:</td><td>*</td></tr><tr><td>Potential for Elimination:</td><td>*</td></tr></table></td><td>Severe malaria is a medical emergency: mortality from untreated severe malaria approaches 100%. With prompt, effective antimalarial treatment and supportive care, however, this rate falls to 10–20% overall. In areas, where comprehensive treatment and care cannot be provided, a number of pre-referral treatment options could be used, depending on the age of the patient and the availability of medicines.</td></tr>
<tr><td colspan="2">Malaria case management in private sector</td><td></td><td></td></tr>
<tr><td></td><td>Improve quality of malaria diagnosis and treatment in the private sector</td><td>Private health sector accounts for about 40% share in term of malaria patients care (DHS).<br><br>The proportion is higher in urban setting where up 75% of health facilities are managed by private for profit authorities.<br><br>Quality of malaria diagnosis, especially using microscopy, is doubtful and seriously unconvincing.<br><br>All private health facility providing mRDT and microscopy services should be assessed by using three dedicated MSDQI modules (OPD, mRDT and malaria microscopy) and should</td><td>The availability of high-quality, inexpensive RDTs in the public sector has significantly improved and expanded diagnostic testing. Success of malaria control will depend on effective diagnosis and treatment strategies in the private sector, including the introduction of malaria RDTs. These are being considered for use in a diverse private for-profit sector consisting of hospitals and clinics, local pharmacies, drug shops and itinerant drug sellers[35].</td></tr>
</table>

[34] *World Health Organization. Training Module on Malaria Control: Case Management 2013.*

[35] *Visser T, Bruxvoort K, Maloney K, Leslie T, Barat LM, Allan R, et al. (2017) Introducing malaria rapid diagnostic tests in private medicine retail outlets: A systematic literature review. PLoS ONE 12(3): e0173093.*

<table>
<tr><th></th><th>Mechanism/ Approach</th><th>Description</th><th>Remarks</th></tr>
<tr><td></td><td></td><td>implement stringent quality improvement plans. Regular staff certification and facility accreditation should also carried out according to the guidelines.
<table>
<tr><td>Evidence:</td><td>***</td></tr>
<tr><td>Transmission Reduction:</td><td>*</td></tr>
<tr><td>Service Effectiveness:</td><td>****</td></tr>
<tr><td>Operation Feasibility:</td><td>***</td></tr>
<tr><td>Costs:</td><td>*</td></tr>
<tr><td>Equity:</td><td>***</td></tr>
<tr><td>Potential for Burden reduction:</td><td>***</td></tr>
<tr><td>Potential for Elimination:</td><td>***</td></tr>
</table></td><td></td></tr>
<tr><td>●</td><td>Accreditation and certification of private laboratory facilities</td><td>The NMCP is currently developing a comprehensive QA/QC system for the private sector laboratories.<br><br>Alongside with established MSDQI all private laboratories will be going through a stringent process of periodic malaria microscopy accreditation and certification.
<table>
<tr><td>Evidence:</td><td>***</td></tr>
<tr><td>Transmission Reduction:</td><td>*</td></tr>
<tr><td>Service Effectiveness:</td><td>****</td></tr>
<tr><td>Operation Feasibility:</td><td>***</td></tr>
<tr><td>Costs:</td><td>**</td></tr>
<tr><td>Equity:</td><td>***</td></tr>
<tr><td>Potential for Burden reduction:</td><td>***</td></tr>
<tr><td>Potential for Elimination:</td><td>***</td></tr>
</table></td><td>Quality of routine microscopy in the private sector has been documented in the recent past and the outcomes are showing both poor sensitivity and specificity[36].</td></tr>
<tr><td colspan="2">Malaria in pregnancy</td><td>Malaria infection during pregnancy is a significant public health problem with substantial risks for the pregnant woman, her fetus, and the newborn child. Malaria-associated maternal illness and low birth weight is mostly the result of Plasmodium falciparum infection and occurs predominantly in Africa.</td><td>The symptoms and complications of malaria in pregnancy vary according to malaria transmission intensity in the given geographical area, and the individual’s level of acquired immunity.<br><br>High-transmission settings<br><br>In high-transmission settings, where levels of acquired immunity tend to be high, P. falciparum infection is usually asymptomatic in pregnancy. Yet, parasites may be present in the placenta and contribute to maternal anaemia even in the absence of documented peripheral parasitaemia. Both maternal anaemia and placental parasitaemia can lead to low birth weight, which is an important contributor to infant mortality. In high-transmission settings, the adverse effects of P. falciparum infection in pregnancy are most pronounced for women in their first pregnancy.<br><br>Low-transmission settings<br><br>In low-transmission settings, where women of reproductive age have relatively little acquired immunity to malaria, malaria in pregnancy is associated with anaemia, an increased risk of severe malaria, and it may lead to spontaneous abortion, stillbirth, prematurity and low birth weight. In such settings, all pregnant women, regardless of the number of times they have been pregnant, are highly vulnerable to malaria.</td></tr>
</table>

[36] *Kahama-Maro, Judith & D'Acremont, Valerie & Mtasiwa, Deo & Genton, Blaise & Lengeler, Christian. (2011). Low quality of routine microscopy for malaria at different levels of the health system in Dar Es Salaam. Malaria journal 1475-2875-10-332.*

<table>
<tr><th></th><th>Mechanism/ Approach</th><th>Description</th><th>Remarks</th></tr>
<tr><td></td><td>Improve management of malaria in pregnancy by large scale use of ACT for uncomplicated and Artesunate severe malaria treatment</td><td>National guidelines do not include yet the most recent WHO indications on treatment options for the first trimester.<table><tr><td>Evidence:</td><td>****</td></tr><tr><td>Transmission Reduction:</td><td>**</td></tr><tr><td>Service Effectiveness:</td><td>****</td></tr><tr><td>Operation Feasibility:</td><td>****</td></tr><tr><td>Costs:</td><td>*</td></tr><tr><td>Equity:</td><td>?</td></tr><tr><td>Potential for Burden reduction</td><td>*</td></tr><tr><td>Potential for Elimination</td><td>*</td></tr></table></td><td>As malaria prevalence in a country declines, the clinical manifestations of malaria infection in pregnant women become more severe due to reduced immunity. Having strong public and private health systems in place to rapidly detect and treat MiP becomes increasingly important as malaria transmission levels fall.<br><br>Evidence: New evidence from pregnancies with confirmed artemisinin exposure in the first trimester indicates that artemisinins are not associated with an increased risk of miscarriage, stillbirths or major congenital malformations compared to non-artemisinin regimens. Moreover, comparison of carefully documented and prospectively collected safety data on women exposed only to artemisinin-based treatment with data collected on women exposed only to quinine in the first trimester of pregnancy showed that artemisinin was associated with a significantly reduced rate of miscarriage compared to quinine[37]</td></tr>
<tr><td></td><td>Strengthen quality of prevention of malaria in pregnancy management in HF</td><td>The MIP services provided in HF are: a) diagnosis and treatment of uncomplicated and severe malaria; b) malaria prevention (IPTp and LLIN); c) anaemia management and prevention and; c) screening and treatment at first attendance.<br><br>One dedicated MSDQI module (ANC) is used to assess the quality of pregnant women services in HF and to provide a platform for implementing quality improvement plans.<br><br>Each health facility providing ANC services should be assessed according to the set plan.<table><tr><td>Evidence:</td><td>***</td></tr><tr><td>Transmission Reduction:</td><td>*</td></tr><tr><td>Service Effectiveness:</td><td>***</td></tr><tr><td>Operation Feasibility:</td><td>***</td></tr><tr><td>Costs:</td><td>*</td></tr><tr><td>Equity:</td><td>***</td></tr><tr><td>Potential for Burden reduction:</td><td>*</td></tr><tr><td>Potential for Elimination:</td><td>*</td></tr></table></td><td>MSDQI provides a platform for monitoring non routine reported indicators such as IPTp 1 and IPT4+ administration, Hb measurement, positivity rate by gravidity.</td></tr>
<tr><td colspan="2">Preventive therapies</td><td></td><td></td></tr>
</table>

[37] ***Citation:*** *Dellicour S, Sevene E, McGready R, Tinto H, Mosha D, Manyando C, et al. (2017) First-trimester artemisinin derivatives and quinine treatments and the risk of adverse pregnancy outcomes in Africa and Asia: A meta-analysis of observational studies. PLoS Med 14(5): e1002290*

| | Mechanism/ Approach | Description | Remarks |
|---|---|---|---|
| | IPTp | Intermittent preventive treatment of malaria in pregnancy is a full therapeutic course of antimalarial medicine given to pregnant women at routine antenatal care visits, regardless of whether the recipient is infected with malaria. IPTp reduces maternal malaria episodes, maternal and fetal anaemia, placental parasitaemia, low birth weight, and neonatal mortality.<br>Evidence: ****<br>Transmission Reduction: *<br>Service Effectiveness: ****<br>Operation Feasibility: ****<br>Costs: *<br>Equity: ***<br>Potential for Burden reduction: *<br>Potential for Elimination: * | WHO recommends the administration of IPTp for pregnant women in areas of moderate to high malaria transmission in Africa[38].<br>The threshold level of malaria transmission below which IPTp-SP is no longer cost-effective has not been identified. Therefore, in areas where IPTp-SP is implemented and transmission has been reduced to low levels as a result of successful control strategies, WHO recommends continued IPTp-SP implementation until the area approaches interruption of transmission[39]<br>Research groups should be able to find alternative drug for SP in IPTp because SP has shown overwhelming resistance in the region.<br>**Evidence**: *Recent studies have shown that IPTp with dihydroartemisinin-piperaquine (DHA-PPQ) does not reduce the incidence of low birth weight compared to IPTp-SP, but that it is more efficacious in reducing maternal malaria parasitaemia and anaemia at delivery, incidence of malaria infection and clinical malaria during pregnancy, and stillbirths and early infant mortality (i.e. within 6–8 weeks).*[38] |
| | IPTi | Intermittent preventive treatment in infants (IPTi) is a full therapeutic course of antimalarial medicine delivered to infants through routine immunization services, regardless of whether the child is infected with malaria. IPTi reduces clinical malaria, anaemia and severe malaria in the first year of life. Treatment is given 3 times during the first year of life at approximately 10 weeks, 14 weeks, and 9 months of age, corresponding to the routine vaccination schedule of the Expanded Programme on Immunization (EPI).<br>This intervention in Tanzania has limited therapeutical options due to the high level of SP resistance. However it is a potential intervention to reducing the malaria burden in infants in areas with very high/resilient transmission.<br>IPTi is not expected to contribute to transmission reduction in the population but is expected to increase the effectiveness of malaria case management in infants.<br>Evidence: ****<br>Transmission Reduction: ***<br>Service Effectiveness: ***<br>Operation Feasibility: ***<br>Costs: *<br>Equity: ***<br>Potential for Burden reduction: **<br>Potential for Elimination: * | WHO recommends the administration of IPTi for infants in areas of moderate to high malaria transmission in Africa. The administration of the therapy should correspond to the routine vaccination schedule[40].<br>By coordinating IPTi delivery with EPI, IPTi coverage can be extended. Administration is safe, simple, cost-effective and well accepted by health workers and communities. It has been confirmed that IPTi-SP has no negative effect on the protective efficacy of EPI vaccines.<br>IPTi is intended to complement ongoing malaria control activities such as prompt diagnosis of suspected malaria and treatment of confirmed cases with an artemisinin-based combination therapy, and vector control measures such as the use of long-lasting insecticidal nets and indoor residual spraying.<br>***Evidence**: a) SP-IPTi delivered through EPI provides an overall protection in the first year of life against clinical malaria [30.3% (95% CI: 19.8%–39.4%)], anemia [21.3% (95% CI: 8.3%–32.5%)], hospital admissions associated with malaria parasitemia [38.1% (95% CI 12.5%–56.2%)], and all-cause hospital admissions [22.9% (95% CI: 10.0%–34.0%)] and; b) SP-IPTi offers a personal protection against clinical malaria for a period of approximately 35 days following the administration of each dose*[40] |

[38] *World Health Organization. Intermittent screening and treatment in pregnancy and the safety of ACTs in the first trimester 2015*
[39] *World Health Organization. WHO policy brief for the implementation of intermittent preventive treatment of malaria in pregnancy using sulfadoxine-pyrimethamine (IPTp-SP) 2013.*
[40] *World Health Organization. WHO policy recommendation on Intermittent Preventive Treatment during infancy with sulphadoxine-pyrmethamine (SP-IPTi) for plasmodium falciparum malaria control in Africa 2010.*

| | Mechanism/ Approach | Description | Remarks |
|---|---|---|---|
| | SMC / IPTc | Seasonal malaria chemoprevention (SMC) previously referred to as Intermittent preventive treatment in children (IPTc) is defined as the intermittent administration of full treatment courses of an antimalarial medicine during the malaria season to prevent malarial illness with the objective of maintaining therapeutic antimalarial drug concentrations in the blood throughout the period of greatest malarial risk.<br>Evidence: ***<br>Transmission Reduction: ***<br>Service Effectiveness: ***<br>Operation Feasibility: ***<br>Costs: **<br>Equity: ***<br>Potential for Burden reduction: *<br>Potential for Elimination: * | *WHO recommends the administration of SMC for children under 5 years of age in areas with highly seasonal malaria transmission in the Sahel sub-region in Africa[41].*<br>***Evidence**: Across the Sahel sub-region, most childhood malarial disease and deaths occur during the rainy season, which is generally short (3-4 months). [42]Giving effective antimalarial treatment at monthly intervals during this period has been shown to be 75% protective against uncomplicated and severe malaria in children under 5 years of age. SMC is cost-effective and safe and can be administered by community-health workers. In areas where SMC is implemented, intermittent preventive treatment in infants (IPTi) should not be deployed.* |
| | IPTsc | This approach is worth to be introduced in areas with very high/resilient transmission to increase malaria case management effectiveness and to have additional effect in reducing the burden of disease. The additional effect should be in top of optimal access to MCM and MVC initiatives.<br>Another reason of introducing IPTsc is that malaria epidemiology is shifting from under-fives up to school aged children.<br>Evidence: **<br>Transmission Reduction: **<br>Service Effectiveness: ***<br>Operation Feasibility: ****<br>Costs: *<br>Equity: ***<br>Potential for Burden reduction: ***<br>Potential for Elimination: * | *School-aged children represent 26% of the African population, and an increasing percentage of them are scholarized. Malaria is causing 50% of deaths in this age group and malaria control efforts may shift the malaria burden to older age groups.*<br>*Schools have been suggested as a platform for health interventions delivery (SNP, deworming, iron-folic acid, nutrients supplementation, boost-immunization and as a possible delivery system for IPT in schoolchildren (IPTsc).*<br>***Evidence**: The current evidence on the efficacy and safety of IPTsc is limited and the optimal therapeutic regimen remains controversial. Evidence show that IPTsc reduces the malaria-related burden in school children. However, more studies assessing efficacy of IPT in particular against malaria-related anaemia and clinical malaria in schoolchildren must be conducted.*<br>*Most IPTsc regimes demonstrated substantial protection against malaria parasitaemia, with dihydroartemisinin-piperaquine (DP) given monthly having the highest protective effect (PE) (94 %; 95 % CI 93–96). Contrarily, SP did not provide any PE against parasitaemia. However, no IPT regimen provided a PE above 50 % in regard to anaemia, and highest protection was provided by SP+amodiaquine (AQ) given four-monthly (50 %; 95 % CI 41–53). The best protection against clinical malaria was observed in children monthly treated with DP (97 %; 95 % CI 87–98). However, there was no protection when the drug was given three-monthly. No severe adverse events were associated with the drugs used for IPTsc[43].* |
| | MDA | Mass drug administration (MDA) consists of administering a full therapeutic course of antimalarial medicine (irrespective of the presence of symptoms or infection) to a defined population living in a defined geographical area (except for those for whom the medicine is contraindicated) at approximately the same time and often repeated at intervals[44].<br>Evidence: **<br>Transmission Reduction: **** | WHO recommend use of MDA in a) low transmission, b) complex emergency ad c) outbreak response.[44]<br>There is insufficient evidence to provide guidance on use of MDA in settings with moderate or high transmission; more research is required to inform future recommendations.<br>Modelling can help guide the optimum method of administering MDA in different epidemiological circumstances and predict its likely impact. |

*[41] World Health Organization. Seasonal Malaria Chemoprevention with sulfadoxine-pyrimethamine plus amodiaquine in children: A field guide 2013.*
*[42] Noor AM, Kibuchi E, Mitto B, Coulibaly D, Doumbo OK, Snow RW (2015). Sub-national targeting of seasonal malaria chemoprevention in the Sahelian countries of the Nouakchott initiative, PLOS One 10(8):e0136919*
*[43] Matangila JR, Mitashi P, Inocencio da Luz RA, Lutumba PT, Van Geertruyden JP (2015). Efficacy and safety of intermittent preventive treatment for malaria in schoolchildren: a systematic review. Malar J 14:450*
*[44] World Health Organization. Mass drug Administration for falciparum malaria: A practical field manual. 2017*

| | Mechanism/ Approach | Description | Remarks |
|---|---|---|---|
| | | Service Effectiveness: *** <br> Operation Feasibility: ** <br> Costs: *** <br> Equity: **** <br> Potential for Burden reduction: ** <br> Potential for Elimination: **** | |
| **Logistics** | | | |
| | Strengthen quality of logistic management for malaria commodities in HF | One dedicated MSDQI module (Pha) is used to assess the quality of logistic and pharmaceutical management in HF and to provide a platform for implementing quality improvement plans.<br><br>Each health facility dispensing malaria commodities should be assessed according to the set plan.<br>Evidence: *** <br> Transmission Reduction: * <br> Service Effectiveness: **** <br> Operation Feasibility: *** <br> Costs: ** <br> Equity: *** <br> Potential for Burden reduction: * <br> Potential for Elimination: * | Effectiveness of malaria case management depends highly on availability of all the commodities at any given time in the health facilities. |
| | Strengthen the logistic and supply chain management | A concerted efforts between a number of stakeholders (NMCP, MSD, LMU, TFDA and Implementing partners) is essential to provide efficient supply of malaria commodities to the health facilities.<br>Evidence: **** <br> Transmission Reduction: ** <br> Service Effectiveness: **** <br> Operation Feasibility: *** <br> Costs: ** <br> Equity: *** <br> Potential for Burden reduction: ** <br> Potential for Elimination: ** | Procurement, appropriate storage and timely distribution of quality assured commodities is crucial for the effectiveness of malaria case management. |
| **Response to special situation** | | | |
| | Outbreak response | Management of uncomplicated malaria: a combination of passive and active detection is used to mitigate the effect of a malaria outbreak. Diagnosis is most of the time not needed once an outbreak is incumbent. Fever management with ACT is of high value to timely reduce the risk of progressing towards severe form of the disease.<br><br>Management of severe malaria: since the population affected by malaria outbreaks is often non or semi immune, the risk of occurrence of severe malaria is high. Timely and effective management of severe malaria is hampered by the massive case load in IPS. Use of intramuscular Artemether injectable formulation is recommended.<br>Evidence: ** <br> Transmission Reduction: ** <br> Service Effectiveness: **** <br> Operation Feasibility: ** <br> Costs: ** <br> Potential for Burden reduction: * <br> Potential for Elimination: ** | Outbreak response must be initiated as soon as possible after the notification of an outbreak.<br><br>Vector control initiatives might follow after effective malaria case management is established |

| | Mechanism/ Approach | Description | Remarks |
|---|---|---|---|
| | Emergency Response | Influx of refugees and other possible complex emergencies (flooding, heart quake, etc) needs appropriate malaria case management especially by using preventive therapies.<br>Evidence: ***<br>Transmission Reduction: **<br>Service Effectiveness: ****<br>Operation Feasibility: **<br>Costs: ***<br>Equity: ****<br>Potential for Burden reduction: **<br>Potential for Elimination: * | The medicine of choice should be ACT alternative to the first line (DP). Micro-stratification is essential to detect possible candidate areas (wards). |
| | MSAT and FSAT | MSAT is screening of an entire population followed by treating positive individuals, whereas FSAT involves screening all individuals in a defined geographical region, followed by treating those who are positive As malaria transmission decreases, it is often concentrated in foci or smaller regions.<br>MSAT and FSAT provide a targeted approach to malaria control, by deploying treatment to the detected populations of parasitaemic individuals, with the aim of reducing the parasite reservoir. Since it is widely known that submicroscopic carriers contribute to onward transmission of malaria, these methods rely on the use of highly sensitive detection tests.<br>Evidence: *<br>Transmission Reduction: **<br>Service Effectiveness: ***<br>Operation Feasibility: **<br>Costs: **<br>Equity: ***<br>Potential for Burden reduction: *<br>Potential for Elimination: ** | Mass screening and treatment and focal screening and treatment for malaria are not recommended by WHO as interventions to interrupt malaria transmission.<br>These approaches might have some value to be deployed as a response in limited situations like outbreak control and complex emergency.<br>FSAT could provide some benefits in the context of CBS to compliment re-ACD |

## Surveillance

| | Mechanism/ Approach | Description | Remarks |
|---|---|---|---|
| **Routine HF surveillance and response** | | | |
| | Case detection | Active and passive case detection should be strengthened and encouraged according to the epidemiological situation. Passive detection is recommended in all transmission strata while a combination of the two should be introduced in very low and low transmission strata.<br>Evidence: **<br>Transmission Reduction: **<br>Service Effectiveness: ****<br>Operation Feasibility: ***<br>Costs: **<br>Equity: ****<br>Potential for Burden reduction: NA<br>Potential for Elimination: NA | Passive detection is usually performed in HFs through screening of suspect malaria cases, essentially all people presenting with fever or history of fever.<br>So far, Tanzania mainland doesn't have much experience in ACD, other than current ACD routinely performed in HFs (ACT malaria screening) or in large scale periodic surveys (SMPS).<br>An innovative form of ACD is obtained by increasing the testing scope in very low and low transmission areas to include also non suspect malaria cases (see dedicated section). |

<table>
<tr><th></th><th>Mechanism/ Approach</th><th>Description</th><th>Remarks</th></tr>
<tr><td></td><td>Surveillance reporting and analysis</td><td>Disease surveillance includes all routine information about malaria reported by HFs at monthly (HMIS) and weekly (IDSR) intervals. These two components constitute the foundation of passive surveillance and are well established in Tanzania's health care delivery system[45]
<table>
<tr><td>Evidence:</td><td>NA</td></tr>
<tr><td>Transmission Reduction:</td><td>NA</td></tr>
<tr><td>Service Effectiveness:</td><td>***</td></tr>
<tr><td>Operation Feasibility:</td><td>***</td></tr>
<tr><td>Costs:</td><td>**</td></tr>
<tr><td>Equity:</td><td>****</td></tr>
<tr><td>Potential for Burden reduction:</td><td>NA</td></tr>
<tr><td>Potential for Elimination:</td><td>NA</td></tr>
</table></td><td>NMCP DHIS2 interactive dashboard has been established to provide a platform for quick analysis and interpretation of HMIS data at national, regional, council and health facility level.</td></tr>
<tr><td></td><td>Data quality audit</td><td>One dedicated MSDQI module (DQA) is used to assess the quality of data management (recording and reporting) in HF and to provide a platform for implementing quality improvement plans.<br><br>Each health facility should be assessed for data quality according to the set plan.
<table>
<tr><td>Evidence:</td><td>NA</td></tr>
<tr><td>Transmission Reduction:</td><td>NA</td></tr>
<tr><td>Service Effectiveness:</td><td>***</td></tr>
<tr><td>Operation Feasibility:</td><td>***</td></tr>
<tr><td>Costs:</td><td>**</td></tr>
<tr><td>Equity:</td><td>****</td></tr>
<tr><td>Potential for Burden reduction:</td><td>NA</td></tr>
<tr><td>Potential for Elimination:</td><td>NA</td></tr>
</table></td><td>Data QA is of paramount importance to ensure that correct information is provided to the HF, council, regional, and national managers. HMIS, NMCP, and partners are establishing a data QA system with the ultimate goal of improving the availability of accurate evidence about the malaria situation[45]</td></tr>
<tr><td></td><td>Strengthen surveillance in the private sector and community health workers</td><td>Apart from operational (formal) private health facilities, the reporting of malaria cases is quite deficient in the private sector.<br><br>There is an impellent need to establish effective system to integrate the less formal health sectors (retail outlets and communities system) into the mainstream malaria surveillance through a unique DHIS2 based platform
<table>
<tr><td>Evidence:</td><td>NA</td></tr>
<tr><td>Transmission Reduction:</td><td>NA</td></tr>
<tr><td>Service Effectiveness:</td><td>***</td></tr>
<tr><td>Operation Feasibility:</td><td>*</td></tr>
<tr><td>Costs:</td><td>*</td></tr>
<tr><td>Equity:</td><td>****</td></tr>
<tr><td>Potential for Burden reduction:</td><td>NA</td></tr>
<tr><td>Potential for Elimination:</td><td>NA</td></tr>
</table></td><td>The private sector is insufficiently regulated compared to the public sector and has limited capacity for accurate diagnosis and reporting. In some instances the private sector may not recognize the value of reporting data. Thus, surveillance in the private sector is often inconsistent, with limited reporting to the national health information system[46]<br><br>The intention of establishing CHW is to extend the public health services to hard-to-reach areas or underserved populations to expand diagnosis and treatment. The health facilities staff should oversee their activities and provide health commodities. In areas with relatively high caseloads, CHWs may report aggregated data monthly to the respective HF. In very low and low transmission settings, they should be capable of immediate diagnosis, treatment and case notification and, when possible, participate in ACD, case and transmission foci investigations.<br><br>The minimum data collected during community surveillance are the same as those collected at health facility (e.g. patients tested for malaria, positives, treatments dispensed). The records of such services should be reported and analysed monthly together with the ones of operational HFs[46]</td></tr>
</table>

[45] *National Malaria Control Programme. Guidelines for malaria surveillance and response in mainland Tanzania, 2017*
[46] *World Health Organization. Malaria Surveillance, Monitoring & Evaluation: A reference manual 2018.*

| | Mechanism/ Approach | Description | Remarks |
|---|---|---|---|
| | Strengthen mortality reporting | As malaria is approaching elimination phase, the mortality due to the disease is expected to fall down rapidly. Accurate aggregate reporting of malaria deaths is recommended in moderate and high transmission settings while individual reporting and stringent investigations are required for very low-low ones.<br>Evidence: NA<br>Transmission Reduction: NA<br>Service Effectiveness: ****<br>Operation Feasibility: **<br>Costs: *<br>Equity: ****<br>Potential for Burden reduction: NA<br>Potential for Elimination: NA | Mortality auditing of fatalities due to febrile conditions should be established in elimination targeted areas. |
| | Micro stratification | Due to the fragile malaria control achievements in borderline transmission settings and due to the demonstrated high heterogeneity at sub-district level, it is recommended in this phase to map malaria transmission intensity at ward level (see stratification section). Micro stratification are mostly needed in highly heterogeneous areas, especially within low and moderate transmission levels.<br>Evidence: NA<br>Transmission Reduction: NA<br>Service Effectiveness: **<br>Operation Feasibility: **<br>Costs: *<br>Equity: ****<br>Potential for Burden reduction: NA<br>Potential for Elimination: NA | DHIS2 based information should ideally lead the micro-stratification. A template has been already developed by NMCP and needs to be operationalized. |
| **Case based surveillance** | | | |
| | Case based surveillance (CBS) | The aim of case based surveillance (or case investigation) is to determine whether an infection was acquired locally and the likely location of infection, and therefore whether there is indigenous malaria transmission or factors that may lead to onward transmission. The collection of a detailed history of an index case at a fixed point of care (health facility or CHW) is the basis of initial case investigation. Recording of detailed patient history is an integral part of surveillance for elimination and should be implemented at the fixed points of care irrespective of onward follow up irrespective from onward follow. Follow-up of a case to ensure compliance with treatment and complete cure is also part of case investigation[47].<br>Evidence: ***<br>Transmission Reduction: ***<br>Service Effectiveness: ***<br>Operation Feasibility: **<br>Costs: ***<br>Equity: ***<br>Potential for Burden reduction: *<br>Potential for Elimination: **** | CBS is a new initiative in the country. The entire system for malaria elimination (guidelines, etc.) will be required to be developed based on evidence and experiences from the best practices experienced in neighboring countries. |
| | ReACD | ReACD is triggered by the identification and notification of an index case. After the investigation and classification of the index case, ReACD may be implemented within the household of the index case, or over a radius around the household or within the whole focus[47]<br>Evidence: ** | Re-ACD is a new initiative in the country. System and SoP are needed to be developed based on evidence and experiences from neighboring countries. |

[47] *World Health Organization. A framework for malaria elimination, 2018*

| | Mechanism/ Approach | Description | Remarks |
|---|---|---|---|
| | | Transmission Reduction: ***<br>Service Effectiveness: ***<br>Operation Feasibility: **<br>Costs: **<br>Equity: ****<br>Potential for Burden reduction: *<br>Potential for Elimination: *** | |
| | Foci investigation | A "focus" is a defined, circumscribed area situated in a currently or formerly malarious area that contains the epidemiological and ecological factors necessary for malaria transmission.<br><br>A focus investigation is conducted to identify the main features of a location, including the populations at greatest risk, the rates of infection or disease, the distribution of vectors responsible for malaria transmission and the underlying conditions that support it. Such an investigation therefore involves demographic, epidemiological, entomological and environmental surveillance and monitoring of intervention coverage and quality[47].<br>Evidence: **<br>Transmission Reduction: ****<br>Service Effectiveness: **<br>Operation Feasibility: **<br>Costs: ***<br>Equity: ***<br>Potential for Burden reduction: *<br>Potential for Elimination: **** | The heterogeneity of malaria across the continuum of transmission results, in most settings, in spatial clusters of relatively higher transmission, which can be referred to practically as foci of transmission. For the purpose of malaria surveillance, however, the term "focus" is used mainly to refer to the few definable areas in which transmission persists during the final stages of elimination[47]. |
| **Epidemic detection and response** | | | |
| | Malaria epidemic early warning system (MEEWS) | The malaria epidemic early warning system (MEEWS) is a surveillance system that collects, analyzes, and interprets meteorological data, population vulnerability, and operational and environmental factors to determine whether or not epidemic-conducive conditions are already present at a given time and place. The aim of this system is to alert district managers to take measures to stop an epidemic from happening [45]<br><br>The main MEEWS source of information in Tanzania is the web based platform (www.tma.maproom) of the Meteorological Agency<br>Evidence: NA<br>Transmission Reduction: NA<br>Service Effectiveness: **<br>Operation Feasibility: *<br>Costs: *<br>Equity: NA<br>Potential for Burden reduction: NA<br>Potential for Elimination: NA | Early warning systems rely mainly on the patterns of rainfall, humidity and temperature measured monthly or every 10 days. The warning should be made available 3 months before the transmission season. Other indicators that are useful in predicting the probable severity of an epidemic include mosquito and larval densities, nutritional status, drug and insecticide resistance, loss of immunity because of a recent reduction in population exposure and human population movements in and out of endemic areas[46]. |

<table>
<tr><th></th><th>Mechanism/ Approach</th><th>Description</th><th>Remarks</th></tr>
<tr><td></td><td>Malaria Early Epidemic Detection System (MEEDS)</td><td>The Malaria Early Epidemic Detection System (MEEDS) system is a passive surveillance system that is based on weekly reporting through eIDSR via a mobile technology applicable [45]<table><tr><td>Evidence:</td><td>NA</td></tr><tr><td>Transmission Reduction:</td><td>NA</td></tr><tr><td>Service Effectiveness:</td><td>***</td></tr><tr><td>Operation Feasibility:</td><td>**</td></tr><tr><td>Costs:</td><td>*</td></tr><tr><td>Equity:</td><td>NA</td></tr><tr><td>Potential for Burden reduction:</td><td>NA</td></tr><tr><td>Potential for Elimination:</td><td>NA</td></tr></table></td><td>Early detection requires recognition of the beginning of an epidemic by the observation of changes in local disease incidence or number of cases, mainly from surveillance data; the purpose is to detect the likelihood or the occurrence of an epidemic. There will be only a few days or at most 2 weeks to detect whether an epidemic is under way. Recognition is quickly followed by verification, and, if an epidemic is confirmed, response activities must be set in motion to avert or reduce excess morbidity and mortality. Epidemic thresholds that are appropriate to the epidemiological context of the area should determine their occurrence. In epidemic-prone areas, where immunity is low, all age groups are at risk[46].</td></tr>
<tr><td></td><td>Investigations and outbreak verification</td><td>Following the timely detection of a suspected outbreak, an investigation is performed to confirm the outbreak. The main aim is to identify the causes and factors associated with an outbreak and its progression to control and prevent the occurrence of similar outbreaks in the future. The timely investigation and confirmation of an outbreak reduces the morbidity and mortality and prevent its further spread. These activities also increase our understanding of the nature of the disease and document the outbreak for future record and reference. Outbreak investigations advance the knowledge about a disease and provide training opportunities[45.]<table><tr><td>Evidence:</td><td>*</td></tr><tr><td>Transmission Reduction:</td><td>**</td></tr><tr><td>Service Effectiveness:</td><td>***</td></tr><tr><td>Operation Feasibility:</td><td>**</td></tr><tr><td>Costs:</td><td>**</td></tr><tr><td>Equity:</td><td>NA</td></tr><tr><td>Potential for Burden reduction:</td><td>*</td></tr><tr><td>Potential for Elimination:</td><td>**</td></tr></table></td><td>The council health team should establish a team (ideally with a medical officer with epidemiological competence, an environmental health officer with a vector control training and a laboratory technician) to verify cases in the field. In areas where coverage of parasitological diagnosis is poor, malaria is often confused with other causes of fever, and additional confirmation in the field may be required to ensure that the reported fevers are the result of malaria infections. Verification of a malaria epidemic may be combined with confirmation of other notifiable febrile diseases to ensure quick response to those diseases as well.</td></tr>
<tr><td></td><td>Response</td><td>The objective of the response is to reduce morbidity and mortality as quickly as possible through: a) Management of Uncomplicated Malaria Cases; b) Management of Severe Malaria Cases; c) Malaria Diagnosis and Parasitological Monitoring of Treatment; d) Mass Fever Treatment (MFT); MSAT and MDA; e) Preventive Measures; f) IEC/BCC Campaigns During Epidemics[45]<table><tr><td>Evidence:</td><td>*</td></tr><tr><td>Transmission Reduction:</td><td>**</td></tr><tr><td>Service Effectiveness:</td><td>****</td></tr><tr><td>Operation Feasibility:</td><td>**</td></tr><tr><td>Costs:</td><td>***</td></tr><tr><td>Equity:</td><td>***</td></tr><tr><td>Potential for Burden reduction:</td><td>*</td></tr><tr><td>Potential for Elimination:</td><td>**</td></tr></table></td><td>Malaria outbreaks is currently a quite a rare event and often undetected. The response mechanisms should be included into an appropriate preparedness plan and the council teams need to be oriented in all steps of malaria epidemic detection and response.</td></tr>
<tr><td colspan="2">Other</td><td></td><td></td></tr>
</table>

| | Mechanism/ Approach | Description | Remarks |
|---|---|---|---|
| | Therapeutic Efficacy Testing (TES) | TES are prospective evaluations of patients' clinical and parasitological responses to treatment for uncomplicated malaria. Studies conducted according to the WHO protocol, repeatedly at the same sites and at regular intervals, allow early detection of changes in treatment efficacy and comparison of results within and across regions over time.<br><br>The routine monitoring of the therapeutic efficacy of ACTs is essential for timely changes to treatment policy, and it can facilitate detecting early changes in *P. falciparum* sensitivity to artemisinins. The country currently recommends changing the antimalarial treatment policy when the treatment failure rate in a 28-or 42-day follow-up study exceeds 10%. Currently there are 8 established TES sentinel sites in Tanzania[45].<br><br>Evidence: ****<br>Transmission Reduction: *<br>Service Effectiveness: ****<br>Operation Feasibility: ***<br>Costs: **<br>Equity: NA<br>Potential for Burden reduction: NA<br>Potential for Elimination: NA | Information on the efficacy of recommended malaria treatment is critical for ensuring progress towards elimination and ensuring that patients receive efficacious treatment. WHO has prepared a standard protocol for therapeutic efficacy studies (TES).<br><br>In areas in which there are very few malaria cases, it will be difficult to recruit enough patients to obtain interpretable information on drug efficacy. If these areas are pursuing malaria elimination, their surveillance systems will likely have been strengthened to improve case detection, increase case reporting from all sectors (private and public), ensure that all patients receive the full, supervised, recommended treatment (including radical cure) and confirm complete cure by following up patients at regular intervals. In these areas, monitoring of drug efficacy can be integrated into the routine surveillance system[45] |
| | Insecticide Resistance Monitoring (IRM) | NMCP established a dedicated task force to monitor the susceptibility to different classes of insecticide nationwide. This task force represents a variety of research institutions. Insecticide resistance studies are conducted bi-annually in 28 selected national representative sites, and the results are shared annually with stakeholders. Programmatic actions are being undertaken to further develop/update the national insecticide resistance management plan[45]<br><br>Evidence: ****<br>Transmission Reduction: *<br>Service Effectiveness: ****<br>Operation Feasibility: ****<br>Costs: **<br>Equity: NA<br>Potential for Burden reduction: ***<br>Potential for Elimination: ** | Monitoring of physiological resistance is essential and should be conducted across the continuum of malaria transmission. Representative sentinel sites will be required, the location of which should be based on the eco-epidemiological stratification, the distribution of important vectors and the types of interventions and situations likely to promote resistance, such as intensive insecticide use for IRS and agriculture. Where insecticide resistance has been confirmed, the intensity of resistance and/or the underlying resistance mechanisms should be determined. Knowledge of resistance mechanisms is important for understanding cross-resistance, which can occur even between insecticide classes with different modes of action. Understanding intensity of resistance and the mechanism involved is essential for making operational decisions, such as the choice of an alternative insecticide for IRS and rotation of insecticides with different modes of action for resistance management. Proper interpretation of data on insecticide resistance requires understanding of the biology and behavioural ecology of the local vector species responsible for transmission[46]. |
| | Malaria Vector Surveillance | NMCP selected sentinel sites within 62 national representative councils. Mosquitoes are collected monthly/quarterly from three houses in each sentinel site by using indoor and outdoor traps. At the respective districts, the mosquitoes are classified according to their distinctive morphological features into genus and abdominal status by trained vector control officers (VCOs) and are subsequently appropriately recorded, packed, labeled, and stored. The results are sent to the NMCP on monthly/quarterly bases[45].<br><br>Evidence: ***<br>Transmission Reduction: *<br>Service Effectiveness: *<br>Operation Feasibility: ***<br>Costs: **<br>Equity: NA<br>Potential for Burden reduction: *<br>Potential for Elimination: ** | Correct deployment of vector control interventions is necessary to ensure adequate coverage of the targeted populations. This requires appropriate strategies for distributing LLINs, timely, quality-controlled IRS and correct application of larvicides, supported by the necessary information, education and communication activities. As this information is usually obtained outside entomological surveillance systems and is part of routine programme monitoring[46]. |

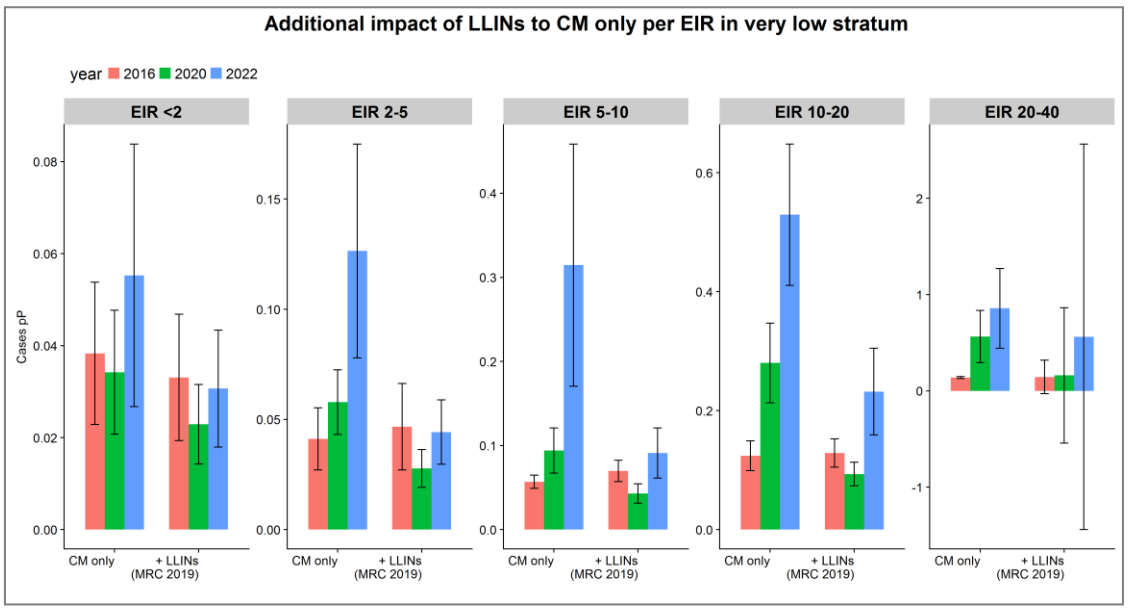
# Appendix E: Additional modeling in-depth analysis

### Impact of LLINs in urban and very low stratum

In the urban stratum discontinuing large scale LLIN distributions led to a rebound in prevalence until 2020, in the low stratum the predicted prevalence in 2020 was approximately the same as the baseline prevalence and in the very low stratum the predicted prevalence in 2020 was lower as the baseline prevalence.

The impact of discontinuation of large scale LLIN distributions in the very low stratum considering pre-intervention EIR was further analysed, as the predicted prevalence varied by estimated pre-intervention EIR. At pre-intervention EIR of less than two, additional nets had only a marginal impact, as the predicted prevalence was very similar in both scenarios in 2020 and also in 2022. At pre-intervention EIRs between two and five, LLINs had higher impact compared to no additional LLINs, however, the predicted prevalence in 2020 as well as in 2022 were below the baseline prevalence in 2016 and below 1% in both scenarios. At pre-intervention EIRs between five to ten additional LLINs had more impact as at the lower pre-intervention EIRs, while compared to 2016 the predicted prevalence in the scenario without additional LLINs was still reduced in 2020 but not in 2022, and reduced in both years in the scenario with additional LLINs. This trend continued and at pre-intervention EIRs between ten and twenty, CM without additional LLINs hardly maintained the baseline prevalence in 2016 but was reduced with additional LLINs (Figure 24).

*Figure 24: Additional impact of LLINs to CM per grouped EIR in very low stratum compared for year 2016, 2020 and 2022*



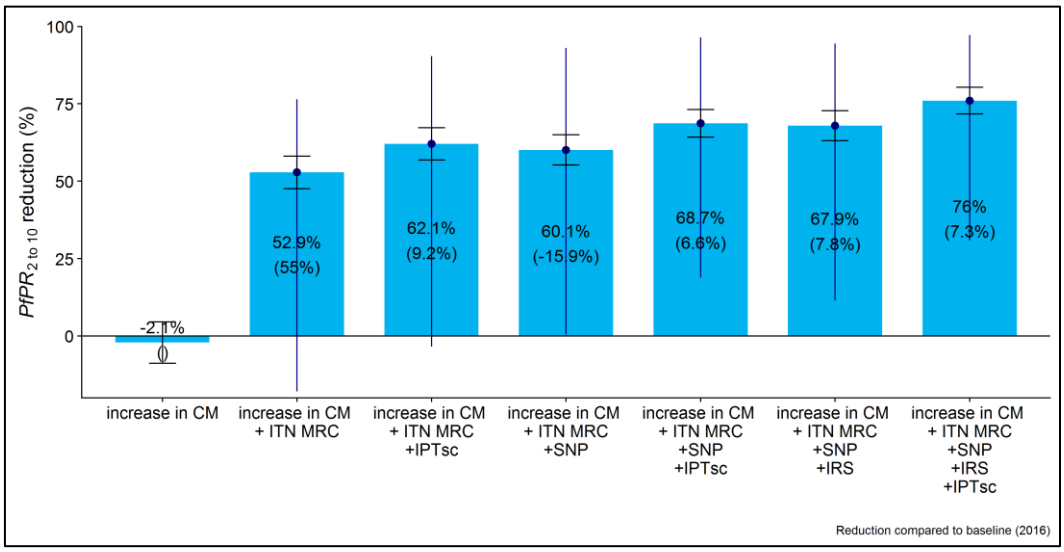

*Note: increase in CM stays constant until 2022, while LLINs were only deployed in 2019 (mass campaign 80% coverage).*

### Incremental intervention combinations in high stratum

The predicted prevalence reduction compared to the baseline in 2016 was plotted for incrementally added interventions. At an aggregated level, the highest reduction was achieved after adding LLINs to CM (55% reduction compared to CM only). The prevalence reduction compared to baseline was similar between SNP and IPTsc when added to CM+MRC (62.1% and 60.1% respectively), and between IRS and IPTsc when added to CM+MRC+SNP (68.7% and 67.9% respectively). With all intervention combined (CM+MRC+SNP+IRS+IPTsc) the highest reduction achieved was on average 76%. Overall, the variation in the predicted prevalence reduction was very high among the districts (

Figure 25).

*Figure 25: Predicted prevalence reduction compared to baseline per incremental intervention scenarios included in the revised Strategy in 2020 in the high stratum (n=73 districts)*




*Note: Reduction compared to baseline and in brackets reduction compared to previous intervention strategies (from left to right). The vertical bars show range among districts and horizontal bars indicate confidence intervals. Plot truncated at -10 as with CM only an increase in prevalence compared to baseline was predicted in most districts.*

However, the analysis at district level showed that in most districts in the high stratum CM and MRC might be enough to reduce the prevalence at least by half, while in some other districts additional interventions would be needed (Table 22). Likewise, to each a high reduction of above 80%, it would not be needed to combine all possible interventions everywhere. For example in fifteen districts the intervention combination CM, MRC and IRS was predicted to reach a prevalence reduction of above 80%, while with SNP instead of IRS eight out of the fifteen districts would also achieve a predicted reduction above 80%.

*Table 22: Number of districts in the high stratum by predicted prevalence reduction between 2016 and 2020, and incremental intervention scenarios included in the revised Strategy (n=73 districts),*

| **Incremental intervention scenario** | **Number of districts per predicted *PfPR* reduction** | | | | |
|---|---|---|---|---|---|
| | **increase** | **<10%** | **10-50%** | **>50%** | **>80%** |
| Improved CM (+CM) | 31 | 7 | 35 | 0 | 0 |
| +CM + ITN MRC | 4 | 0 | 15 | 54 | 0 |
| +CM + ITN MRC+ SNP | 0 | 3 | 13 | 53 | 4 |
| +CM + ITN MRC + IPTsc | 2 | 1 | 13 | 53 | 4 |
| +CM + ITN MRC + SNP + IPTsc | 0 | 0 | 13 | 46 | 14 |
| +CM + ITN MRC + SNP + IRS | 0 | 0 | 14 | 39 | 20 |
| +CM + ITN MRC + SNP + IRS + IPTsc | 0 | 0 | 12 | 16 | 45 |

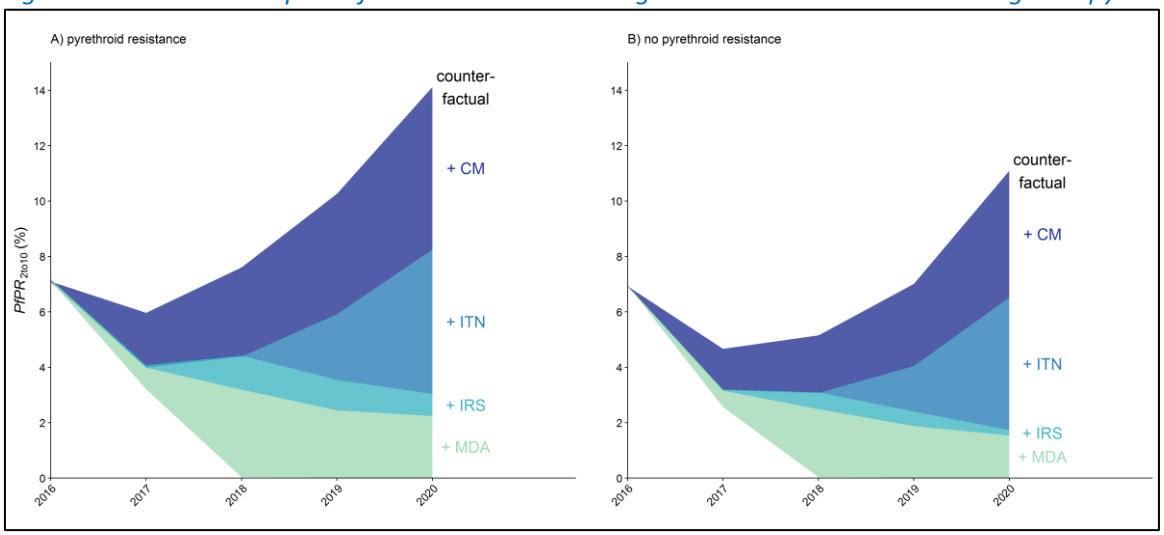
In around thirty districts, the predicted prevalence increased with improved CM (n=31) or while the prevalence was reduced in most districts (n=42). The combination of CM and LLINs (MRC) was not enough to reduce the prevalence in 4 districts; with additional IPTsc still 2 districts would have a prevalence higher in 2020 than it was in 2016. Overall, the impact, on the number of districts with higher predicted prevalence reduction, between CM and MRC in combination with SNP or IPTsc was very similar, while SNP in addition to CM and MRC had slightly more impact (more districts with higher predicted prevalence reduction). With the combination of all those interventions (CM, MRC, SNP, IRS, IPTsc), 45

districts had a predicted prevalence reduction above 80%, 16 districts between 50 to 80% and 12 districts between 10 to 50% (Table 22).

### Additional impact of IRS

Figure 26 shows the additional impact of CM, LLIN, IRS and MDA. Excluding MDA, which is highly effective but also very unlikely to be considered at a large scale intervention, CM and LLIN were predicted to have the highest impact on prevalence compared to IRS. The comparison between the two scenarios with and without pyrethroid resistance showed that the predicted additional benefit of IRS on top of LLINs was higher in case of resistance.

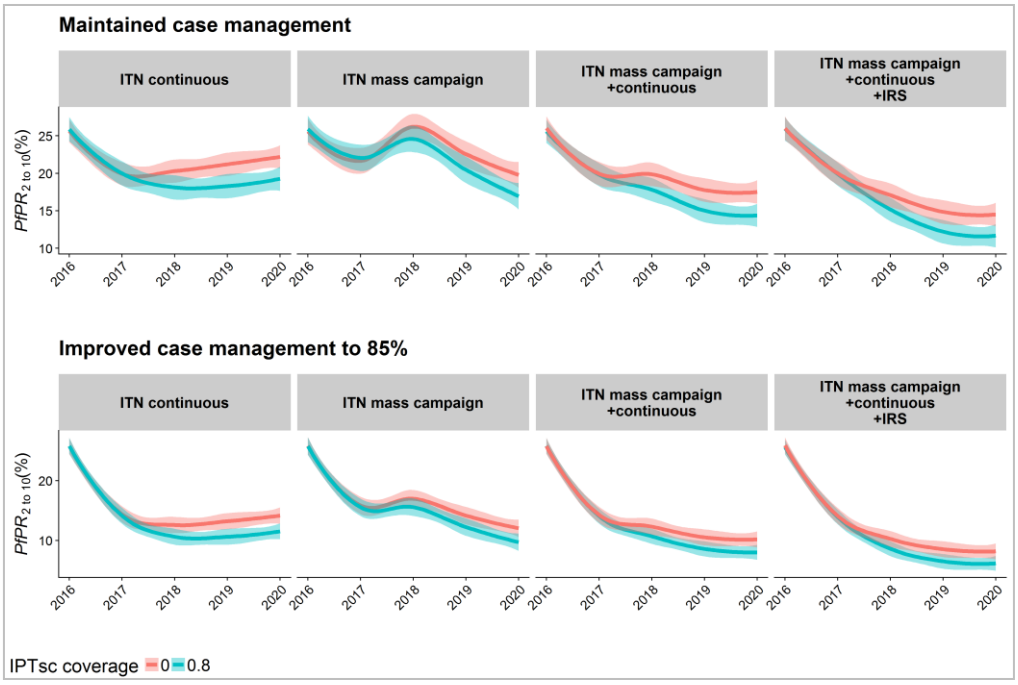
*Figure 26: Additional impact of interventions assuming with and without resistance against pyrethroids*




### Additional impact of IPTsc

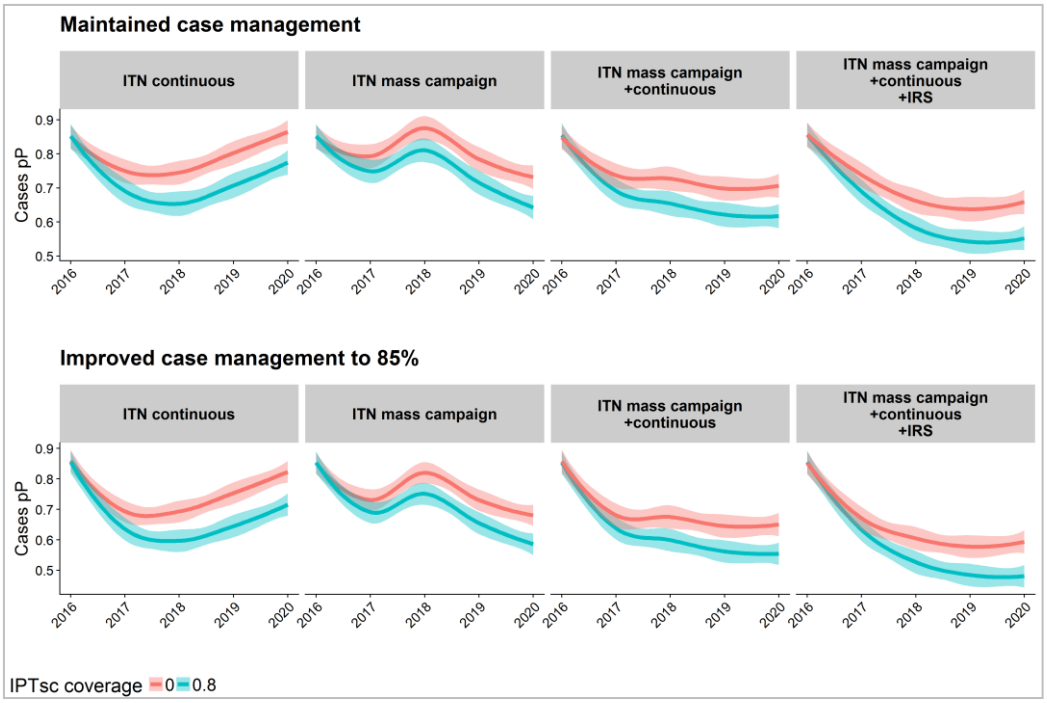
Intermittent preventive treatment is available for pregnant women, infant and school children. While only IPTp and IPTi are currently recommended by the WHO. However, IPTsc could be a useful intervention as it reduces transmission by targeting the parasite reservoir in school-aged children, a potential reservoir of transmission. The modelling was used to investigate on possible additional impact of IPTsc in districts in the high stratum in addition to selected combinations of vector control (LLIN MRC, SNP and IRS), and with or without improved CM. Figure 27 shows the impact of the introduction of IPTsc on prevalence in children aged 2 to 10 in districts in the high strata (n=69 excluding urban high-stratum districts).

*Figure 27: Additional impact on prevalence of IPTsc to vector control interventions in high stratum*




The Figure 27 shows the impact of IPTsc in addition to vector control assuming an improved CM to 85% or no improvement in CM on the prevalence. The predicted additional impact of IPTsc at aggregated level at the high stratum was small and not significant in most scenarios. However, analyses at district level showed high heterogeneity in the predicted impact of IPTsc suggesting that IPTsc might have a significant impact in some districts.

*Figure 28: Additional impact on cases of IPTsc to vector control interventions in high stratum*




The Figure 28 shows the impact of IPTsc in addition to vector control assuming an improved CM to 85% or no improvement in CM on total malaria cases[48]. The predicted additional impact of IPTsc at aggregated level at the high

[48] *All uncomplicated and severe malaria cases independent from access to health facility*

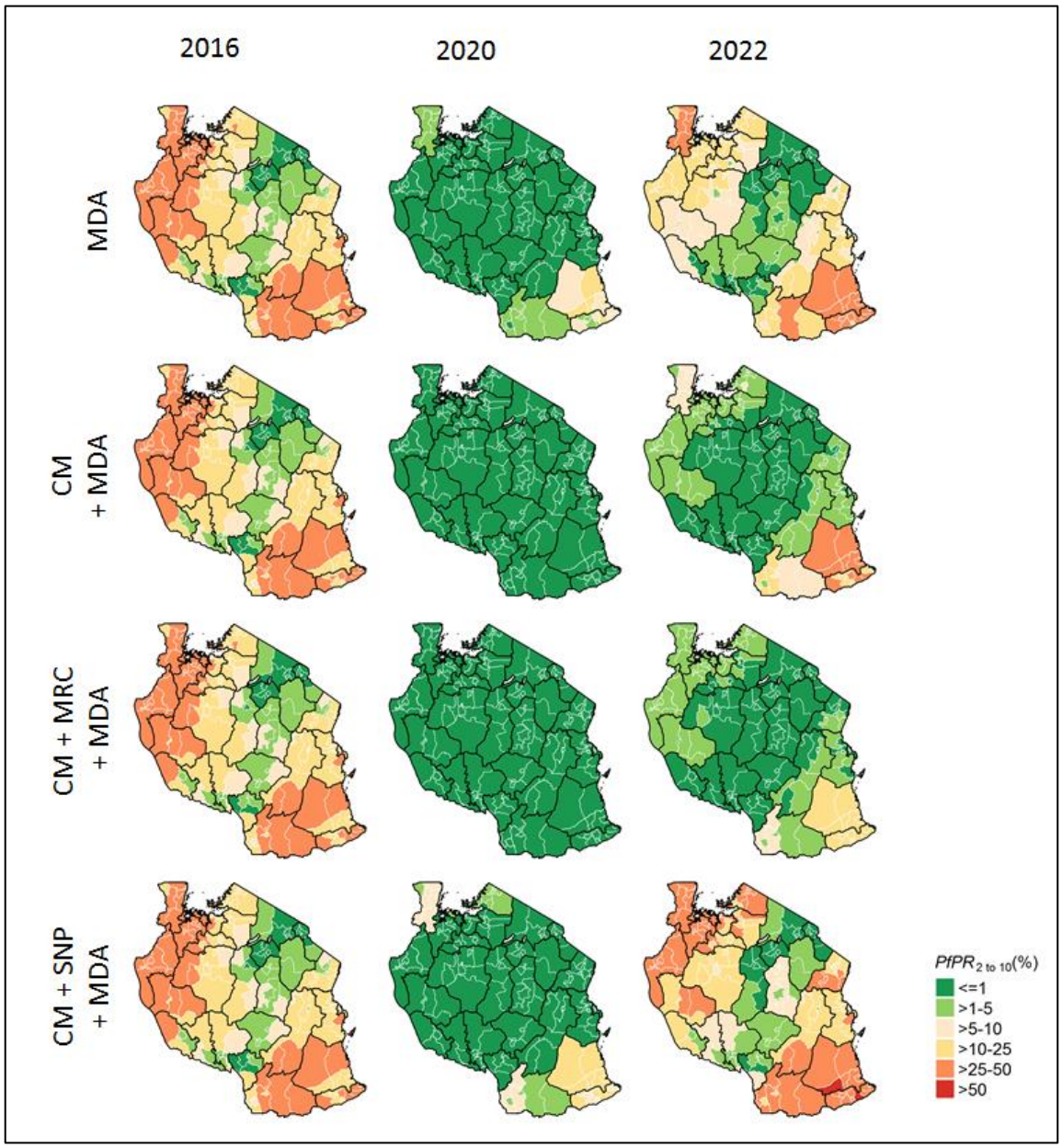
stratum was greater as on prevalence and significant. However, analyses at district level showed high heterogeneity in the predicted impact of IPTsc suggesting that IPTsc might have a significant impact in some districts.

### Resurgence in prevalence two years after MDA campaigns

The simulated MDA campaigns were predicted to reduce the prevalence to zero in 2020 in almost all districts. Depending on the baseline prevalence and pre-intervention EIR. However, the prevalence resurged up to baseline prevalence in 2016 or even higher after stopping MDA in most districts.

Figure 29 shows the simulated impact of MDA on prevalence in 2020, after 4 years with 3 rounds per year at 95% coverage, and in 2022, two years after MDA was stopped. With MDA alone, the prevalence was predicted to bounce back to levels even higher as it was in 2016 in most districts. With MDA and CM, the predicted prevalence was maintained below 1% in very low and low areas in the middle corridor of Tanzania, but not in the moderate and high transmission areas. With MDA in combination with CM and MRC, the predicted prevalence was maintained in more districts. However, at lower LLIN coverage the predicted prevalence was maintained in fewer districts than with reaching high LLIN coverage. These results summarize the predicted impact of MDA on prevalence in different epidemiological setting and are visualized as a map showing the predicted impact in each district.

*Figure 29: Comparing the impact of MDA on prevalence in 2016, 2020 and 2022 two years after intervention stop per district*



# Appendix F: Performance Framework

## Malaria Vector Control

| Year | | 2017 | 2020 | 2017 | 2020 | 2017 | 2020 | 2017 | 2020 | |
|---|---|---|---|---|---|---|---|---|---|---|
| Level | | National | | Very Low | | Low | | Moderate/ high | | |
| | | Baseline | Target | Baseline | Target | Baseline | Target | Actual | Target | Source |
| 2. Strategic Objective | Impact Indicator | | | | | | | | | |
| To reduce transmission of malaria by maintaining effective and efficient vector control interventions coverage recommended per malaria strata | Reduce entomological inoculation rate (EIR) to <0.25 [49] | NA | <0.25 | NA | <0.1 [50] | NA | <0.25 | NA | <5 | MVS in composite DB |
| 2.1. Specific Objective | Outcome Indicator | | | | | | | | | |
| Ensure adequate access to LLINs of the population at risk according to transmission settings | Percent of the household population with access to an LLIN within their household (assuming one LLIN covers two persons) | 62.5% | 80% | 63.7% | 50% | 57.8% | 85% | 62.3% | 85% | MIS |
| Strategic Interventions/approaches | Output indicators | | | | | | | | | |
| 1.1.6 Implement a mass replacement campaign to bring LLIN coverage to at least 80% of all households | Number of LLINs distributed through MRC cumulatively for the period 2018-2020[51] | 14M | 15M | 3M | 0 | 5M | 8M | 3.4M | 3.3M | NMCP CD |
| 1.1.7 Implement school LLIN distribution to keep up LLIN coverage to at least 80% of all households | Number of LLINs distributed through SNP for the period 2018-2020 [52] | 5.5 M | 10M | 0 | 1.1 | 0 | 2.6 | 5.5M | 6.3M | NMCP CD |
| 1.1.8 Implement RCH LLIN distribution to cover biological vulnerable groups and to keep up coverage at 80% of all households | Proportion of infants attending EPI clinic issued with a LLIN | 21.5% | 85% | 0% | 85% | 2.5% | 85% | 29.7% | 85% | NMCP DB |
| | Proportion of pregnant women attending ANC issued with a LLIN | 26.6% | 85% | 0.1% | 85% | 4.4% | 85% | 36.5 | 85% | |
| 1.1.9 Create an enabling environment to revive the commercial market for ITNs and LLINs | Proportion of ITN/LLIN distributed through commercial channels | 29% | 35% | 38% | 40% | 35% | 35% | 27% | 30% | MIS 2015/16 |
| 2.2. Specific Objective | Outcome Indicator | | | | | | | | | |
| Consolidate and expand IRS in epidemiologically and operationally suitable areas | Percent of house structures in the country sprayed with recommended insecticide(s) during the past 12 months | 3.7% | 25% | 1% | NApp | 1.5% | NApp | 5% | 35% | MIS 2015/16 |
| Strategic Interventions/approaches | Output indicators | | | | | | | | | |

[49] *Usually in hypoendemic, mesoendimc, hyperendemic and holoendemic areas the EIR is lower than 0.25; 0.25-10; 11-140 and more than 140 respectively. The national target has been set to an EIR of <0.25 by 2020 (more realistic and measurable compared to the previous target of <0.1).*

[50] *At low levels of transmission, the estimated entomological inoculation rate is difficult to monitor and might be not reliable. Alternative methods should be considered for evaluating transmission risk in very low transmission.*

[51] *Target obtained by dividing projected 2020 population per 1.8 LLINs*

[52] *Target obtained by calculating 18% of population to be school aged children*

| | | | Year | | 2017 | 2020 | 2017 | 2020 | 2017 | 2020 | 2017 | 2020 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Level | | National | | Very Low | | Low | | Moderate/ high | | |
| | | | | | Baseline | Target | Baseline | Target | Baseline | Target | Actual | Target | Source |
| 1.2.5 | Build capacity of local government authority and private sector to plan, manage, implement, and evaluate IRS | Cumulative number of councils capacitated to deliver quality IRS services | | | 18[53] | 26[54] | 0 | 0 | 0 | 0 | 18 | 26 | NMCP IP |
| 1.2.6 | Application of quality IRS in selected areas | Number of house structures sprayed in the IRS targeted areas (annually) | | | 625K | 1,125K | NApp | NApp | NApp | NApp | 625K | 1,125 K | NMCP DB |
| | | Percent of house structures in epidemiologically and operationally suitable areas sprayed with recommended insecticide(s) during the past 12 months | | | 95% | 95% | NApp | NApp | NApp | NApp | 95% | 95% | |
| 2.3. Specific Objective | | Outcome Indicator | | | | | | | | | | | |
| Implement appropriate, sustainable and quality larval source management interventions in suitable epidemiological and operational areas | | Number of councils implementing larval source management according to national integrated malaria vector control guidelines | | | NA | 184 | NA | 28 | NA | 34 | NA | 122 | Reports |
| Strategic Interventions/approaches | | Output indicators | | | | | | | | | | | |
| 1.3.6 | Application of appropriate, sustainable and quality blanket bio-larvicides in all city and municipal councils according to guidelines | Number and proportion of city and municipal councils implementing larviciding[55] | | | 5 (20%) | 25 (100%) | NA | 2(100%) | NA | 11 (100%) | NA | 12(100%) | Composite DB |
| 1.3.7 | Application of appropriate, sustainable and quality targeted bio-larvicides in town and district councils according to guidelines where mosquitoes breeding sites are few, fixed, and findable | Number and proportion of selected suitable town and district councils implementing targeted bio-larviciding[56] | | | NA | 131 (100%) | NApp | NApp | NApp | 23 (100%) | NApp | 110 (100%) | NMCP composite |
| 1.3.8 | Application of appropriate focal bio-larvicides in identified transmission foci in very low and low transmission areas a contribution to stop transmission | Number of councils implementing focal bio-larviciding[57] | | | NA | 28 (100%) | NA | 26 (100%) | NApp | NApp | NApp | NApp | NMCP composite |
| 1.3.9 | Ensure that the National Environmental Management Council (NEMC) includes larval source management as a prerequisite for conducting and approval of environmental Impact assessment/audit in all infrastructure/development projects | Proportion of environmental Impact assessment/audit conducted and approved in infrastructure/development projects with larval source management component | | | 0 | 10 | NApp | NApp | NApp | NApp | NApp | NApp | Implementation reports |

[53] 18 districts in Geita, Kagera, Mwanza, Mara regions
[54] *Additional 8 districts in Kigoma region*
[55] *Denominator number of municipal and city councils*
[56] *Denominator number of selected town and district councils planning for sustainable targeted larviciding application*
[57] *Denominator number of councils targeting elimination*

| Year | | | 2017 | 2020 | 2017 | 2020 | 2017 | 2020 | 2017 | 2020 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | | | National | | Very Low | | Low | | Moderate/ high | | |
| | | | Baseline | Target | Baseline | Target | Baseline | Target | Actual | Target | Source |
| 1.3.10 | Promote community-led environmental management initiatives in receptive conditions especially in highly densely populated areas | Number and proportion of City and Municipal councils delivering effective environmental initiatives according to guidelines | NA | 25 | NA | NA | NA | NA | NA | NA | Implementation reports |
| 2.4. Specific Objective | | Outcome Indicator | | | | | | | | | |
| Provide a strategic framework for coordination and continuous assessment for the implementation of evidence-based IMVC interventions | | Number of innovative evidence-based integrated initiatives for malaria vector control adopted and introduced in Tanzania | **2** | **4** | **NApp** | **NApp** | **NApp** | **NApp** | **NApp** | **NApp** | Implementation reports |
| Strategic Interventions/approaches | | Output indicators | | | | | | | | | |
| 1.4.4 | Encourage partners to research and develop new and appropriate vector control tools to create an evidence-base for scale up | Number of innovative IVC tools piloted (cumulative) | 2 | 2 | NApp | NApp | NApp | NApp | NApp | NApp | Research reports/papers |
| 1.4.5 | Implementation of insecticide resistance management plan | Proportion of Insecticide resistance management plan initiatives performed in every strata | 2 | 3[58] | NApp | NApp | NApp | NApp | NApp | NApp | Implementation reports |
| 1.4.6 | Work with national regulatory authorities to improve the monitoring and quality assurance of IMVC equipment and commodities | Proportion of commodities used in IMVC interventions registered by national regulatory authority | NA | 100% | NApp | NApp | NApp | NApp | NApp | NApp | TPRI web site |

## Malaria Case Management

| Year | | 2017 | 2020 | 2017 | 2020 | 2017 | 2020 | 2017 | 2020 | |
|---|---|---|---|---|---|---|---|---|---|---|
| Level | | National | | Very Low | | Low | | Moderate/ high | | |
| | | Baseline | Target | Baseline | Target | Baseline | Target | Baseline | Target | Source |
| 3 Strategic Objective | Impact Indicator | | | | | | | | | |
| To prevent the occurrence of mortality related to malaria infection through promotion of universal access to appropriate early diagnosis and prompt treatment and provision of preventive therapies in vulnerable groups | Reduce reported malaria mortality rate in health facilities to 5 per 100,000 [59] | 8 | 5 | 0.7 | 0 | 4 | 2 | 12.6 | 6 | HMIS/DHIS2 |
| 3.1 Specific Objective | Outcome Indicator | | | | | | | | | |
| Provide universal access to appropriate, quality and timely malaria diagnosis to all people with signs and symptoms of malaria | % of U5 children with fever who had a malaria test the same or next day after onset of a disease | 43% | 75% | 32.1% | 65% | 34% | 65% | 47% | 80% | MIS |
| Strategic Interventions/approaches | Output indicators | | | | | | | | | |

[58] PBO, New Insecticide class introduced and Next generation LLIN

[59] *Mortality attributed to malaria as underlying cause in health facilities*

| Year | | | 2017 | 2020 | 2017 | 2020 | 2017 | 2020 | 2017 | 2020 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | | | National | | Very Low | | Low | | Moderate/ high | | |
| | | | Baseline | Target | Baseline | Target | Baseline | Target | Baseline | Target | Source |
| 3.1.1 | Provide high-standard, accessible, affordable, equitable, and quality-assured testing for patients seeking treatment in the public sector | Proportion of malaria cases tested in the public healthcare delivery sector out of total OPD visits | 46% | 75% | 23% | 75% | 32% | 75% | 56% | 75% | Interactive dashboard |
| 3.1.2 | Facilitate the provision of high-standard, accessible, affordable, and quality-assured testing to patients seeking treatment in the private sector | Proportion of malaria cases tested in the private healthcare delivery sector out of total OPD visits | 47% | 75% | 27% | 75% | 42 | 75% | 54% | 75% | Interactive dashboard |
| 3.1.3 | Provide quality-assured malaria testing services from skilled providers | Proportion of health facilities providing QA/QC malaria testing with RDT [60] | 38% | 75% | NA | 75% | NA | 75% | 38% | 75% | MSDQI |
| | | Proportion of health facilities with laboratory services providing QA/QC malaria microscopy testing [61] | 16% | 75% | NA | 75% | NA | 75% | 16% | 75% | |
| 3.1.4 | Facilitate the provision of high-standard, accessible, affordable, and quality-assured testing to patients seeking treatment beyond the operational health facilities | Proportion of malaria tests performed in accredited drug dispensing outlets (ADDO) [62] | NA | 10% | NApp | NApp | NApp | NApp | NApp | NApp | interactive dashboard |
| | | Proportion of malaria tests performed in autonomous health laboratory (AHL) [63] | NA | 10% | NApp | NApp | NApp | NApp | NApp | NApp | |
| | | Proportion of malaria tests performed by community health workers (CHW) [64] | NA | 5% | NApp | NApp | NApp | NApp | NApp | NApp | |
| 3.1.5 | Introduce evidence-based, innovative diagnostic tools/system for malaria detection and differential diagnosis of other pathogens causing febrile illnesses | Number of initiatives introducing evidence based innovative diagnostic tools | 0 | 5% | NApp | NApp | NApp | NApp | NApp | NApp | Implementation reports |
| 3.2 Specific Objective | | Outcome Indicator | | | | | | | | | |
| Provide universal access to appropriate, quality and timely treatment to all people who have malaria | | % children under age 5 with fever who were treated with recommended antimalarial the same or next day following the onset of fever | 34.5% | 80% | 16% | 80% | 27% | 80% | 40% | 80% | MIS 2015/16 |
| Strategic Interventions/approaches | | Output indicators | | | | | | | | | |
| 3.2.1 | Provide highly efficacious, accessible, affordable, equitable, and quality-assured antimalarial to patients seeking treatment in the public sector | Proportion of malaria confirmed patients dispensed with a QAACT in public health facilities | 144% | 100% | 207% | 100% | 179% | 100% | 121% | 100% | NMCP interactive DB |
| 3.2.2 | Facilitate the provision of accessible, affordable, and quality-assured antimalarial to patients seeking treatment in the private sector | Proportion of malaria confirmed patients dispensed with a QAACT in private health facilities | 83% | 100% | 143% | 100% | 122% | 100% | 56% | 100% | NMCP interactive DB |
| 3.2.3 | Provide high-quality fever management services by skilled providers | Proportion of assessed public HF providing quality fever case management according to the set standards [65] | 29% | 80% | NA | 80% | NA | 80% | NA | 80% | MSDQI dashboard |
| | | Proportion of assessed private HF providing quality fever case management according to the set standards[66] | NA | 80% | NA | 80% | NA | 80% | NA | 80% | |

[60] *Proportion of health facilities with a MSDQI score higher than 75% for mRDT performance, Note: Data for period July 2017 – June 2018 and only available for lake zone*
[61] *Proportion of health facilities with a MSDQI score higher than 75% for malaria microscopy performances*
[62] *Out of total malaria test performed in the country*
[63] *Out of total malaria test performed in the country*
[64] *Out of total malaria test performed in the country*
[65] *Proportion of health facilities in the public sector assessed by MSDQI with a score higher than 75% for clinical management of fever cases, representative of few regions of lake zone*
[66] *Proportion of health facilities in the private sector assessed by MSDQI with a score higher than 75% for clinical management of fever cases*

| Year | | | 2017 | 2020 | 2017 | 2020 | 2017 | 2020 | 2017 | 2020 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | | | National | | Very Low | | Low | | Moderate/ high | | |
| | | | Baseline | Target | Baseline | Target | Baseline | Target | Baseline | Target | Source |
| 3.2.4 | Facilitate the provision of high-standard, accessible, affordable, and quality-assured management to patients seeking treatment beyond the operational health facilities[67] in identified suitable operational areas [68] | Number (and proportion) of patients managed beyond the operational health facilities at ADDO | 0% | 25% | NA | NA | NA | NA | NA | NA | Reports |
| | | Number (and proportion) of patients managed beyond the operational health facilities by CHW | NAppx | 20% | NApp | NApp | NApp | NApp | NApp | NApp | |
| 3.2.5 | Introducing highly effective gametocyde medicines in low transmission areas | Number (and proportion) of confirmed malaria patients in low transmission areas administered with a single low dose of primaquine | NApp | 80% | NA | 80% | NApp % | NApp % | NApp % | NApp% | Interactive dashboard |
| 3.3 Specific Objective | | Outcome Indicator | | | | | | | | | |
| Provide appropriate and effective services to reduce the risk of malaria infection and its complications among populations biologically and socioeconomically vulnerable to malaria | | % of women with live birth in the previous two years who received two doses or more of SP (IPTp2+) | 56.1 | 80% | 72% | 80% | 55% | 80% | 58% | 80% | MIS |
| Strategic Interventions/approaches | | Output indicators | | | | | | | | | |
| 3.3.1 | Increase the uptake of IPTp2+ to 80% in low, moderate and high transmission areas to reduce vulnerability in pregnancy | % of pregnant women attending ANC who receive IPTp2 | 66% | 80% | 75% | 0% | 70% | 80% | 65% | 80% | NMCP dashboard |
| 3.3.2 | Increase the uptake of IPTp3+ to 60% in low, moderate and high transmission areas to reduce vulnerability in pregnancy | % of pregnant women attending ANC who receive IPTp3+ | 33% | 80% | 43% | 0% | 36% | 80% | 32% | 80% | NMCP dashboard |
| 3.3.3 | Reduce risk among specific vulnerable groups: people with sickle cell, HIV, non-immune travellers | % of HIV eligible cases receiving CPT in ANC | 0% | 0% | NApp | NApp | NApp | NApp | NApp | NApp | DHIS2 |
| 3.3.4 | Introduce the provision of selected suitable antimalarial for IPT to the school children within high transmission areas | Proportion of School children who received IPTsc among all targeted school children in selected epidemiological strata | NA | 80% | NApp | NApp | NApp | NApp | NA | 80% | Implementation reports |
| 3.3.5 | Introduce the provision of selected suitable antimalarial for IPTi during vaccination schedule within high transmission areas | Proportion of infants who received IPT during vaccination schedule in selected epidemiological strata | NA | 80% | NApp | NApp | NApp | NApp | NApp | NApp | DHIS2 |
| 3.3.6 | In the event of the introduction of a malaria vaccine, the country is able to rapidly scale up its use in suitable epidemiological and operational areas | Number of initiatives introduced | 0% | 50% | NApp | NApp | NApp | NApp | NApp | NApp | Implementation reports |
| 3.4 Specific Objective | | Outcome Indicator | | | | | | | | | |
| Ensure that commodities used in malaria patient care and prevention are consistently safe, quality assured and available at the points of care | | Proportion of public healthcare facilities with no stock outs of ACT at the end of the month | 95% | 88% | NApp | NApp | NApp | NApp | NApp | NApp | NMCP Dashboard |
| | | Proportion of public healthcare facilities with no stock outs of mRDTs at the end of the month | 95% | 99% | NApp | NApp | NApp | NApp | NApp | NApp | |
| Strategic Interventions/approaches | | Output indicators | | | | | | | | | |

[67] Operational health facility is a registered HF and included in the Tanzania HMIS National Data Warehouse

[68] *Underserved and hard to reach areas*

| Year | | | 2017 | 2020 | 2017 | 2020 | 2017 | 2020 | 2017 | 2020 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | | | National | | Very Low | | Low | | Moderate/ high | | |
| | | | Baseline | Target | Baseline | Target | Baseline | Target | Baseline | Target | Source |
| **3.4.1** | **Facilitate malaria commodities procurement process as indicated by the comprehensive annual quantification through the provision of timely ordering and clear delivery schedule to the selected procurement agency** | **Percentage of public facilities that have no QAACT stock-out continuous for one week in the last 3 months** | NA | 100% | NA | 100% | NA | 100% | NA | 100% | MSDQI dashboard |
| **3.4.2** | **Improve logistic information system to facilitate the commodities supply chain from MSD to healthcare facilities and to respond to stock-outs** | **Proportion of health facilities reporting monthly stock status** | 96% | 100% | 95% | NA | 98% | NA | 97% | 100% | DHIS2 |
| **3.4.3** | **Eliminate counterfeit, suboptimal, substandard products through monitoring and regulation reinforcement** | **% of products assessed which are found to be counterfeit/ suboptimal/ substandard** | NA | 0% | NApp | NApp | NApp | NApp | NApp | NApp | TFDA reports |
| **3.4.4** | **Facilitate the relevant regulatory authorities to conduct pharmacovigilance for antimalarial medicines** | **Number of ADR reports for antimalarial received by TFDA** | 2 | 2 | NApp | NApp | NApp | NApp | NApp | NApp | TFDA reports |
| **3.5 Specific Objective** | | **Outcome Indicator** | | | | | | | | | |
| **Deploy appropriate malaria case management and preventive therapies interventions in suitable epidemiological and operational areas, and in the event of special situations, (e.g. emergency, outbreaks and resurgence) to reduce the risk of severe morbidity and mortality** | | **Number and proportion of special situations in which specific malaria case management interventions** | NA | 5 (100%) | NApp | NApp | NApp | NApp | NApp | NApp | |
| **Strategic Interventions/approaches** | | **Output indicators** | | | | | | | | | |
| **3.5.1** | **Provide appropriate initiatives as response to emergency situation including outbreak** | **Number and proportion of refugees identified with appropriate case management and preventive therapies** | 300K | 250K [69] | NApp | NApp | NApp | NApp | NApp | NApp | |
| **3.5.2** | **Introduce reactive case detection as part of case based surveillance in identified low transmission areas** | **Number and proportion of people actively screened** | NA | 250K | NApp | NApp | NApp | NApp | NApp | NApp | Implementation reports/DHIS |
| **3.5.3** | **Introduce the provision of selected suitable antimalarial as risk mitigation for chemoprevention, focal screening and treatment, and mass drug administration [70] in suitable epidemiological and operational areas** | **Number and proportion of suitable epidemiological and operational areas identified and initiatives introduced** | NA | 5 (100%) | NApp | NApp | NApp | NApp | NApp | NApp | Implementation reports |

[69] *Expected number of refugees in 2020 used to estimate malaria commodities*

[70] *E.g. Seasonal malaria chemoprevention (SMC), mass drug administration (MDA), screening and treatment (MSAT/FSAT)*

## Malaria Surveillance, Monitoring and Evaluation

| Year | | | 2017 | 2020 | 2017 | 2020 | 2017 | 2020 | 2017 | 2020 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | | | National | | Very Low | | Low | | Moderate/ high | | National |
| | | | Baseline | Target | Baseline | Target | Baseline | Target | Baseline | Target | Source |
| **4 Strategic Objective** | **Impact Indicator** | | | | | | | | | | |
| **To provide timely and reliable information to assess progress towards the set global, national and sub-national targets, to trigger responses to the identified needs and to ensure that resources are used timely and in the most cost-effective manner to account for investments made in malaria control** | **Proportion of councils stratified according to the transmission intensity epidemiological class** | very low | 15% | 25% | 15% | 25% | NApp | NApp | NApp | NApp | Stratification |
| | | low | 18% | 25% | NApp | NApp | 18% | 25% | NApp | NApp | |
| | | moderate | 27% | 35% | NApp | NApp | NApp | NApp | 67% | 50% | |
| | | high | 40% | 15% | NApp | NApp | NApp | NApp | | | |
| **4.1 Specific Objective** | **Outcome Indicator** | | | | | | | | | | |
| **Improve quality and timeliness of malaria indicators within the routine health information system** | **Proportion of health facilities reporting monthly OPD data through the HMIS** | | 98% | 100% | 100% | 100% | 96% | 100% | 99% | 100% | DHIS2 NMCP interactive dashbpard |
| **Strategic Interventions/approaches** | **Output indicators** | | | | | | | | | | |
| **4.1.1 Collaborate with HMIS section at the MoH to improve reporting, analysis and use of malaria indicators within DHIS2 platform for planning and monitoring malaria control activities at all levels** | **Proportion of updated annual malaria profile developed at all levels** | | 0% | 100% | NApp | NApp | NApp | NApp | NApp | NApp | DHIS2 |
| **4.1.2 Strengthen quality assurance/control system to provide reliable routine malaria services and data in the health facilities** | **Proportion of health facilities with a quality services and data improvement plan developed** | | 0 | 80% | NApp | NApp | NApp | NApp | NApp | NApp | MSDQI DB |
| **4.2 Specific Objective** | **Outcome Indicator** | | | | | | | | | | |
| **Strengthen malaria framework for collecting, processing and storing essential indicators from periodic service delivery and programmatic surveys** | **Proportion of updated datasets with key indicators for monitoring preventive malaria services, logistics, coverage, quality of service provision, vector and parasite dynamics included in NMCP composite database and available for programmatic decision making[71]** | | 0% | 100% | NApp | NApp | NApp | NApp | NApp | NApp | Composite database |
| **Strategic Interventions/approaches** | **Output indicators** | | | | | | | | | | |
| **4.2.1 Ensure that national and subnational representative population surveys are performed according to SME plan** | **Number of national and subnational representative surveys availed according to SME plan** | | 1 | 1 | NApp | NApp | NApp | NApp | NApp | NApp | |
| **4.2.2 Strengthen countrywide longitudinal vigilance of malaria parasitaemia in sentinel population:** | **Proportion of pregnant women tested for malaria parasite during first ANC visit** | | 89% | 95% | 91% | 95% | 91% | 95% | 88% | 95% | DHIS2 DB |

[71] *The minimum set of data (and frequency of updates) should include: a) Vector control implementation indicators - LLIN, IRS and LSM (annual); b) insecticide and therapeutic efficacy -TES and IRM (annually); c) vector and parasite dynamics – MVS (quarterly), SMPS (biennially); d) MSDQI (quarterly)*

| Year | | | 2017 | 2020 | 2017 | 2020 | 2017 | 2020 | 2017 | 2020 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | | | National | | Very Low | | Low | | Moderate/ high | | National |
| | | | Baseline | Target | Baseline | Target | Baseline | Target | Baseline | Target | Source |
| | pregnant women at RCH clinics, school-age children | Number and proportion of selected public primary schools conducting assessment of malaria parasitaemia in school age children | 650 100% | 650 100% | NApp | NApp | NApp | NApp | NApp | NApp | Composite database |
| 4.2.3 | Strengthen longitudinal monitoring of mosquito population dynamics and insecticide susceptibility surveillances in the sentinel sites | Number of sentinel districts providing regular longitudinal vector surveillance information | 62 | 62 | NApp | NApp | NApp | NApp | NApp | NApp | Composite database |
| | | Number of sentinel sites providing vector insecticide susceptibility information | 28 | 28 | NApp | NApp | NApp | NApp | NApp | NApp | Composite database |
| 4.2.4 | Carry out standard antimalarial efficacy tests studies (TES) in sentinel sites as per standard protocol | Number of sites conducting antimalarial therapeutic efficacy studies (biennially) | 8 | 8 | NApp | NApp | NApp | NApp | NApp | NApp | Composite database |
| 4.2.5 | Coordinate the collection, use, and interpretation of the programmatic monitoring of vector control initiatives (including LLINs, IRS, and LSM) | Number (and proportion) of annual updated datasets on vector control initiatives available in the NMCP composite database according to standard national set of indicators and SME plan | 100% | 100% | NApp | NApp | NApp | NApp | NApp | NApp | Composite database |
| 4.3 | Specific Objective | Outcome Indicator | | | | | | | | | |
| Maintain a comprehensive malaria knowledge management system to collate, interpret, disseminate, and promote the use of quality malaria data for evidence-based decision making at all level | | Proportion of quarterly and annually malaria epidemiological bulletin developed and disseminated to malaria partners and stakeholders | 4 (100%) | 8 (100%) | NApp | NApp | NApp | NApp | NApp | NApp | |
| | Strategic Interventions/approaches | Output indicators | | | | | | | | | |
| 4.3.1 | Sustain a comprehensive system of stratification of council malaria burden with corresponding stratified interventions | Annual monitoring maps available at council level | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | |
| 4.3.2 | Strengthen the national malaria data management plan and data repository to enable evidence-based decision making at all levels | Availability of updated NMCP composite database and DHIS2 interactive malaria dashboard | 1 | 1 | NApp | NApp | NApp | NApp | NApp | NApp | |
| 4.3.3 | Undertake periodic malaria program reviews and evaluation of the implementation of malaria strategic plan | MPR and midterm reports available (cumulative) | 1 | 2 | NA | NA | NA | NA | NA | NA | MTR/MPR report |
| 4.3.4 | Develop a conducive environment for continuous collaboration with research and acadaemia to translate research into practice and support evidence based and sustainable policy decisions | Number of operational research with NMCP authorship published (cumulative period) | NA | 10 | NApp | NApp | NApp | NApp | NApp | NApp | www.ncbi.nlm.nih.gov/pubmed/ |
| 4.4 | Specific Objective | Outcome Indicator | | | | | | | | | |
| Strengthen malaria epidemic prevention and control in very low and low transmission settings | | Proportion of malaria epidemics detected and responded within two weeks from the onset | NA | 80% | NA | 80% | NA | 80% | NApp | NApp | |
| | Strategic Interventions/approaches | Output indicators | | | | | | | | | |

| Year | | 2017 | 2020 | 2017 | 2020 | 2017 | 2020 | 2017 | 2020 | |
|---|---|---|---|---|---|---|---|---|---|---|
| Level | | National | | Very Low | | Low | | Moderate/ high | | National |
| | | Baseline | Target | Baseline | Target | Baseline | Target | Baseline | Target | Source |
| 4.4.1 Strengthen Malaria Epidemic Early Warning System and Malaria Epidemic Early Detection System | Proportion of epidemics alert investigated within 2 weeks after detection | NA | 80% | NA | 80% | NA | 80% | NApp | NApp | eIDSR |
| 4.4.2 Strengthen capacity for malaria epidemics containment at council and health facility level in epidemic prone areas | Proportion of epidemic prone councils including epidemic preparedness plan in their CCHP[72] | NA | 80% | NA | 80% | NA | 80% | NApp | NApp | |
| 4.4.3 Implement malaria outbreaks response operations when and where necessary | Proportion of epidemic properly responded within 2 weeks from detection | NA | 80% | NA | 80% | NA | 80% | NApp | NApp | |
| **4.5 Specific Objective** | **Outcome Indicator** | | | | | | | | | |
| **Establish appropriate surveillance system in 'very low' transmission settings** | **Number and Proportion of districts within the "very low" transmission stratum that established appropriate surveillance system** | 0 | 26 (100%) | 0 | 26 (100%) | NApp | NApp | NApp | NApp | |
| **Strategic Interventions/approaches** | **Output indicators** | | | | | | | | | |
| 4.5.1 Establish sub district level micro-stratification to identify areas suitable for targeting elimination | Availability of council level malaria epidemiological stratified map (cumulative) | NA | 100% | NA | 100% | NApp | NApp | NApp | NApp | Composite DB |
| 4.5.2 Establish a system for case-based surveillance in selected very low transmission areas | Proportion of councils in the very low transmission stratum with a functional CBS system in place | 0 | 100% | 0 | 100% | NApp | NApp | NApp | NApp | eIDSR and DHIS2 |
| 4.5.3 Establish a system for investigating and classifying malaria transmission foci in selected areas with very low transmission areas | Proportion of identified foci investigated within 14 days | 0 | 100% | 0 | 100% | NApp | NApp | NApp | NApp | MVS component of composite DB |

## SBCC

| Year | | 2017 | 2020 | 2017 | 2020 | 2017 | 2020 | 2017 | 2020 | |
|---|---|---|---|---|---|---|---|---|---|---|
| Level | | National | | Very Low | | Low | | Moderate/ high | | |
| | | Baseline | Target | Baseline | Target | Baseline | Target | Baseline | Target | Source |
| **5 Strategic Objective** | **Impact Indicator** | | | | | | | | | |
| To strengthen an enabling environment where individuals at risk from malaria are empowered to protect themselves and their families from malaria and seek proper and timely malaria-treatment | Proportion of caretakers who are able to take actions to protect their children from malaria | 85% | 90% | 72% | 90% | 87% | 90% | 86% | 90% | MIS 2015/16 |
| | Proportion of caretakers with children under five years old with fever in the last two weeks for whom advice or treatment was sought | 80% | 90% | 69.5% | 90% | 74% | 90% | 78% | 90% | |
| **5.1 Specific Objective** | **Outcome Indicator** | | | | | | | | | |

[72] The denominator of this indicator is the number of councils in very low and low transmission strata

| Year | | 2017 | 2020 | 2017 | 2020 | 2017 | 2020 | 2017 | 2020 | |
|---|---|---|---|---|---|---|---|---|---|---|
| Level | | National | | Very Low | | Low | | Moderate/ high | | |
| | | Baseline | Target | Baseline | Target | Baseline | Target | Baseline | Target | Source |
| **Reinforce and update knowledge and practiceamongst all community members about appropriate malaria prevention, testing and treatment, promote and influence social norms about desired healthy behaviours** | **Proportion of population (disaggregated by sex M/F) with knowledge of ways to avoid malaria** | 92/89 % | 95/95 % | 94/87 % | 95/95 % | 92/90 % | 95/95 % | 91.4/89 % | 95/95 % | MIS 2015/16 |
| | **Proportion of population (disaggregated by sex M/F) with knowledge on where malaria test and treatment is obtained** | 79/92 % | 95/95 % | 80/87 % | 95/95 % | 82/89 % | 95/95 % | 77/93% | 95/95 % | |
| **Strategic Interventions/approaches** | **Output indicators** | | | | | | | | | |
| **5.1.1 Improve capacity of healthcare workers to effectively provide accurate and relevant information to patients on desired behaviours for malaria prevention and treatment** | **Proportion of health facilities with health staff providing relevant malaria SBCC information to patients [73]** | 16% | 80% | NA | 80% | NA | 80% | 20% | 80% | MSDQI |
| **5.1.2 Improve capacity of ward- and village-level health staff, extension workers and community health workers to effectively provide accurate and relevant malaria information in their interaction with community members** | **Proportion of wards with health worker(s) or volunteers reporting their activity** | NA | 70% | NApp | NApp | NApp | NApp | NApp | NApp | Composite database |
| **5.1.3 Develop and implement mass campaign with key stakeholders at different levels using different communication channels to spark actions** | **Proportion of people (disaggregated by sex M/F) reached with appropriate malaria messages through mass media (TV, radio, printed materials)[74]** | 91/85 % | 95/95 % | NApp | NApp | NApp | NApp | NApp | NApp | MIS |
| | **Proportion of people (disaggregated by sex M/F) reached with appropriate malaria messages through interpersonal communication channels (healthcare workers, community events, friend/neighbour/family member)[75]** | 7/11% x | 20/20 % | NApp | NApp | NApp | NApp | NApp | NApp | MIS |
| **5.2 Specific Objective** | **Outcome Indicator** | | | | | | | | | |
| **Maintain high knowledge and improve good practices amongst vulnerable groups - or their care takers - with elevated risk of malaria infection about their specific risk and the prevention and treatment options available to them** | **Proportion of women 15-49 years who know pregnant women are at higher risk of getting malaria** | 93% | 95% | 95% | 95% | 87.2% | 95% | 93.2% | 95% | MIS 2015/16 |
| **Strategic Interventions/approaches** | **Output indicators** | | | | | | | | | |
| **5.2.1 Improve capacity of healthcare workers to provide accurate and relevant information on specific malaria risks and appropriate action to biologically vulnerable groups during health visits** | **Proportion of health facilities with health staff providing relevant malaria SBCC information to pregnant women during their ANC attendance [76]** | NA% | 90% | NA% | 90% | NA | 90% | NA | 90% | MSDQI |
| **5.2.2 Develop and implement outreach programme for socioeconomically vulnerable groups, hard-to-reach and mobile populations in high-transmission areas** | **Number of outreach interventions for target populations implemented in high-transmission areas[77]** | NA | 60% | NApp | NApp | NApp | NApp | NApp | NApp | Implementation report |
| **5.3 Specific Objective** | **Outcome Indicator** | | | | | | | | | |

[73] *Proportion of health facilities in the public sector assessed by MSDQI with a score higher than 75% in providing correct patient counseling, data representative of regions in lake zone*
[74] highest score among mass media
[75] highest score among mass inter personal communication channels
[76] *Proportion of health facilities assessed by MSDQI with a score higher than 75% in providing correct malaria information during ANC attendance, data representative of lake zone*
[77] *Outreachactivities implemented and reported by CHWs*

| Year | | 2017 | 2020 | 2017 | 2020 | 2017 | 2020 | 2017 | 2020 | |
|---|---|---|---|---|---|---|---|---|---|---|
| Level | | National | | Very Low | | Low | | Moderate/ high | | |
| | | Baseline | Target | Baseline | Target | Baseline | Target | Baseline | Target | Source |
| **Encourage communities to initiate and implement community-based malaria control initiatives** | **% of women (and men) who state that malaria is the most serious health risk in the community** | 57% | 80% | 48% | 80% | 48% | 80% | 61.5% | 80% | MIS 2015/16 |
| **Strategic Interventions/approaches** | **Output indicators** | | | | | | | | | |
| **5.3.1 Develop and implement specific community based malaria intervention packages including health promotion, local vector control initiatives[78] and test and treatment services[79] in suitable operational areas** | **Number and proportion of districts targeted for implementing promotional, vector control or case management community based malaria initiatives** | NApp | 45/ 184 | NApp | 10/28 | NApp | 10/34 | NApp | 25/ 121 | Implementation reports |
| **5.4 Specific Objective** | **Outcome Indicator** | | | | | | | | | |
| **Create strong SBCC public private partnership to maximize efforts and ensure consistency in the fight against malaria** | **Number (and proportion) of private sector companies that contribute programmatically or financially to prevent and control malaria for their workforce and broader community** | 12/100 (12%) | 80/ 100 (80%) | NApp | NApp | NApp | NApp | NApp | NApp | Malaria safe initiative reports |
| **Strategic Interventions/approaches** | **Output indicators** | | | | | | | | | |
| **5.4.1 Strengthen existing fora and implement strategic frameworks for SBCC partners to ensure coordinated and harmonized implementation of the SBCC strategy at all levels** | **Technical working groups meeting conducted** | 100% | 100% | Napp | Napp | Napp | Napp | Napp | Napp | |
| **5.4.2 Create a platform for private sector companies to provide malaria control services to their workforce and the communities in which they work** | **Number of private companies participating in the Malaria Safe Programme** | 12 | 100 | Napp | Napp | Napp | Napp | Napp | Napp | |

[78] Vector control at community level should target larval source management either using bio-larviciding and environmental management
[79] Malaria test and treatment services at community level are advocated for hard to reach and under served areas

## Programme Management

| Year | | 2017 | 2020 | 2017 | 2020 | 2017 | 2020 | 2017 | 2020 | |
|---|---|---|---|---|---|---|---|---|---|---|
| Level | | National | | Very Low | | Low | | Moderate/ high | | |
| | | Baseline | Target | Baseline | Target | Baseline | Target | Baseline | Target | Source |
| **6 Strategic Objective** | **Impact Indicator** | | | | | | | | | |
| **Efficient programmatic and financial management of malaria control interventions at all levels, implemented through effective and accountable partnerships to assure adequate and sustainable resources** | **Proportion of malaria control budget funded through domestic financing** | 13% | 50% | Napp | Napp | Napp | Napp | Napp | Napp | Financial report |
| **6.1 Specific Objective** | **Outcome Indicator** | | | | | | | | | |
| **Improve the effectiveness and accountability of malaria control implementation by strengthening partnerships and cooperation with malaria control stakeholders at all levels** | **Programme performance as rated over time through semi-annual independent evaluation** | **'A'** | **'A'/'1** | **Napp** | **Napp** | **Napp** | **Napp** | **Napp** | **Napp** | GF PUDR |
| **Strategic Interventions/approaches** | **Output indicators** | | | | | | | | | |
| **6.1.1 Improve coordination and governance structures at all levels to strengthen coordination, communication, governance and close follow up of all malaria related interventions** | **Proportion of planned meetings of the NMCP steering committee and sub- committees held and recommendations implemented** | 80% | 80% | Napp | Napp | Napp | Napp | Napp | Napp | Meeting minutes and matters arising |
| | **Proportion of planned Primary Health Care committee meetings at different LGA levels with malaria control agenda held and recommendations implemented [80]** | NA | 80% | Napp | Napp | Napp | Napp | Napp | Napp | |
| **6.1.2 Develop and disseminate malaria control strategy and updated technical guidelines** | **Number and proportion of LGA participating to malaria control zonal/regional coordination meetings per year** | 80% | 100% | Napp | Napp | Napp | Napp | Napp | Napp | Zonal/regional meeting report |
| **6.1.3 Strengthen human resources capacity for effective strategic plan implementation at national and LGA levels** | **Proportion of NMCP vacancies filled by government employed staff as indicated in NMCP organogram [81]** | 50% | 80% | Napp | Napp | Napp | Napp | Napp | Napp | NMCP annual report |
| | **Proportion of malaria focal persons according to respective LGA level oriented on MSP and guidelines** | NA | 100% | Napp | Napp | Napp | Napp | Napp | Napp | |
| **6.1.4 Enhance well structured, coordinated and harmonized supervision and verification system involving implementing entities at various levels** | **Proportion of councils and partners supervised by national and regional teams at least once in a year [82]** | NA | 100% | NA | 100% | NA | 100% | NA | 100% | MSDQI 8a and 8b |
| **6.2 Specific Objective** | **Outcome Indicator** | | | | | | | | | |
| **Raise the profile of malaria amongst policy and decision makers at all levels so that national, regional and district plans include appropriate interventions and sufficient budget to implement the malaria strategy** | **Proportion of the strategic plan interventions budget funded** | 80% | 90% | Napp | Napp | Napp | Napp | Napp | Napp | NMCP business plan |
| | **Proportion of MoHCDGEC and PORALG budgets dedicated to malaria interventions** | NA | 10% | Napp | Napp | Napp | Napp | Napp | Napp | |
| **Strategic Interventions/approaches** | **Output indicators** | | | | | | | | | |

[80] *These are high level, policy and decision making meetings. These fora involving key stakeholders, community leaders, influential peoples and community and should be focused on respective malaria burden levels and goal (malaria elimination or burden reduction). The denominator of this strategic plan output indicator is at least one meeting with malaria control agenda per year per region (26). Verification is done by availability of minutes sent to NMCP by respective MFP*

[81] *The indicator denominator is the number of staff indicated in the NMCP organogram*

[82] *All Councils should be supervised to monitor implementation of malaria interventions. Integrated tools are available within the MSDQI framework*

| Year | | | 2017 | 2020 | 2017 | 2020 | 2017 | 2020 | 2017 | 2020 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Level | | | National | | Very Low | | Low | | Moderate/ high | | |
| | | | Baseline | Target | Baseline | Target | Baseline | Target | Baseline | Target | Source |
| 6.2.1 | Update comprehensive resource mobilisation plan to attract adequate funding to support malaria implementation from domestic and development partners sources | Number and proportion of comprehensive proposals developed and funded | 4 | 2 | Napp | Napp | Napp | Napp | Napp | Napp | MOP, GF funding request |
| 6.2.2 | Develop and update comprehensive business and operational plans for malaria control | Business plan updated and annual operational plan developed | 3 | 3 | Napp | Napp | Napp | Napp | Napp | Napp | NMCP business and annual plan |
| 6.2.3 | Improve NMCP capacity to successfully implement planned malaria interventions | Proportion of activities within the annual implementation plan with a completed status | 25% | 50% | Napp | Napp | Napp | Napp | Napp | Napp | NMCP annual report |
| 6.2.4 | Engage politicians, policy and decision-makers and non-health sector debate on malaria control | Number of meetings with policy and decision makers and non- health sector conducted and recommendations implemented | 2 | 4 | Napp | Napp | Napp | Napp | Napp | Napp | Minutes and matter arising |
| 6.2.5 | Advocate RHMTs /CHMTs to budget for malaria interventions according to respective level and target (malaria elimination or burden reduction) | Proportion of Councils including malaria interventions budget in their CCHP in line with strategic plan [83] | 100% | 100% | Napp | Napp | Napp | Napp | Napp | Napp | CCHP budget summary |
| 6.3 Specific Objective | | Outcome Indicator | | | | | | | | | |
| Promote a harmonized regional and inter-sectoral approach to malaria control so at least two action plans will be developed respectively | | Regional/cross-border and multi-sectoral malaria initiatives action plans developed | 0 | 3 | Napp | Napp | Napp | Napp | Napp | Napp | Implementation reports |
| Strategic Interventions/approaches | | Output indicators | | | | | | | | | |
| 6.3.1 | Develop a strategic framework for regional/cross border collaboration on malaria control | Number of cross border regional malaria control initiatives promoted | 2 | 2 | Napp | Napp | Napp | Napp | Napp | Napp | Implementation reports |
| 6.3.2 | Develop action plans with relevant ministries outlining inter-sectoral malaria control intervention and targets | Multi-sectoral initiatives promoted | 1 | 1 | Napp | Napp | Napp | Napp | Napp | Napp | Implementation reports |

[83] *All Councils need to budget for malaria control activities (there is a scoring level 3%) to be approved;*