

**NATIONAL STRATEGIC PLAN FOR MALARIA ELIMINATION AND  
PREVENTION OF RE-ESTABLISHMENT OF MALARIA TRANSMISSION IN  
BANGLADESH  
2024-2030**

**National Malarial Elimination Programme  
Directorate General of Health Services  
Ministry of Health & Family Welfare  
Government of Bangladesh**

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## **ABBREVIATIONS AND ACRONYMS**

|            |  |
|------------|--|
| ABER       | Annual Blood Examination Rate                            |
| ACD        | Active Case Detection                                    |
| ACPR       | Adequate clinical and parasitological response           |
| ACSM       | Advocacy, Communication and Social Mobilization          |
| ACT        | Artemisinin-based Combination Therapies                  |
| AE         | Adverse event  |
| AFPI       | Assistant Family Planning Inspector                      |
| AFR        | Agency financial report                                  |
| AFS        | Active fever screening                                   |
| AHI        | Assistant Health Inspector                               |
| AIDS       | Acquired immunodeficiency syndrome                       |
| <i>An.</i> | <i>Anopheles</i>   |
| ANC        | Antenatal Care   |
| API        | Annual Parasite Incidence                                |
| APLMA      | Asia Pacific Leaders Malaria Alliance                    |
| APMEN      | Asia-Pacific Malaria Elimination Network                 |
| ATD        | Aedes transmitted disease                                |
| BCC        | Behavior Change Communication                            |
| BCCM       | Bangladesh Country Coordinating Mechanism                |
| BDT        | Bangladesh Taka (Currency of Bangladesh)                 |
| BGB        | Border Guard Bangladesh                                  |
| BITID      | Bangladesh Institute of Tropical and Infectious Diseases |
| BMD        | Bangladesh Meteorological Department                     |
| C19RM      | COVID-19 response mechanism                              |
| C-SUM      | Cumulative sum   |
| CBHC       | Community Based Health Care                              |
| CC         | Community Clinics  |
| CCM        | Country Coordinating Mechanism                           |
| CDC        | Communicable Disease Control (Unit)                      |
| CFR        | Case fatality rate                                       |
| CHCP       | Community Health Care Provider                           |
| CHT        | Chittagong Hill Tracts                                   |
| CMRL       | Central Malaria Reference Laboratory                     |
| CONTASA    | Convertible Taka Special Account                         |
| COVID-19   | Coronavirus disease                                      |
| CQ         | Chloroquine  |
| CRG        | Community, human rights and gender                       |
| CS         | Civil Surgeon  |
| CEO        | Chief Executive Officer                                  |
| DDT        | Dichloro Diphenyl Trichloroethane                        |
| DGDA       | Directorate General of Drug Administration               |
| DGHS       | Directorate General of Health Services                   |
| DGFP       | Directorate General of Family Planning                   |
| DH         | District hospital  |
| DHIS       | District Health Information System                       |
| DOT        | Directly observed treatment                              |
| DPA        | Direct Project Assistance                                |
| DPM        | Deputy Programme manager                                 |
| DQA        | Data quality assurance                                   |
| ECAMM      | External Competence Assessment in Malaria Microscopy     |
| EDPT       | Early Diagnosis and Prompt Treatment                     |

|          |  |
|----------|--|
| EHSP     | Essential health services package                                    |
| FDMN     | Forcefully Displaced Myanmar Nationalities                           |
| FGD      | Focus Group Discussion   |
| FO       | Field Organizer  |
| FP       | Family planning  |
| FPI      | Family Planning Inspector  |
| FWA      | Family Welfare Assistant   |
| FWV      | Family Welfare Visitor   |
| GDP      | Gross Domestic Product   |
| GDI      | Gender Development Index   |
| G6PD     | Glucose-6-Phosphate Dehydrogenase                                    |
| GF       | The Global Fund  |
| GFATM    | The Global Fund to Fight AIDS, TB & Malaria                          |
| GII      | Gender Inequality Index  |
| GIS      | Geographic Information System  |
| GMS      | Greater Mekong Subregion   |
| GoB      | Government of Bangladesh   |
| GPIRM    | Global plan for insecticide resistance management in malaria vectors |
| GTS      | Global Technical strategy  |
| GVCR     | Global Vector Control Response                                       |
| HA       | Health Assistant   |
| HDI      | Human Development Index  |
| HI       | Health Inspector   |
| HIV      | Human immunodeficiency virus   |
| HMIS     | Health Management Information System                                 |
| HPNSP    | Health, Population and Nutrition Sector Program (4th HPNSP)          |
| HR       | Human Resources  |
| HRP2/3   | Histidine rich protein 2/3   |
| HW       | Health Worker  |
| iCCM     | integrated Community Case Management                                 |
| icddr, b | International Center for Diarrhoeal Disease Research, Bangladesh     |
| ICT      | Information and communication technology                             |
| IDA      | International Development Association                                |
| iDES     | Integrated Drug Efficacy Surveillance                                |
| IEC      | Information Education and Communication                              |
| IEDCR    | Institute of Epidemiology, Disease Control and Research              |
| INGO     | International Non-Governmental Organization                          |
| IOM      | International Organization for Migration                             |
| IPC      | Inter-Personal Communication   |
| IPT      | Intermittent Preventive Treatment                                    |
| IR       | Insecticide resistance   |
| IRS      | Indoor Residual Spraying   |
| IVM      | Integrated Vector Management   |
| JMM      | Joint Monitoring Mission   |
| KABP     | Knowledge, Attitude, Belief, Practice                                |
| KAP      | Knowledge, Attitude, Practice  |
| KAP      | Key affected populations   |
| LFA      | Local Fund Agent   |
| LGD      | Local Government Division  |
| LLIHN    | Long Lasting Insecticidal Hammock Net                                |
| LLIN     | Long Lasting Insecticidal Net  |
| LMIS     | Logistics Management Information System                              |
| LSM      | Larval Source Management   |

|                         |  |
|-------------------------|--|
| M&E                     | Monitoring and Evaluation                                |
| MA                      | Medical Assistant  |
| MCWC                    | Mother and Child Welfare Centre                          |
| MEAT                    | Malaria Elimination Audit Tool                           |
| MECP                    | Malaria Elimination Certification Panel                  |
| MEOC                    | Malaria Elimination Oversight Committee                  |
| MHV                     | Multipurpose Health Volunteer                            |
| MIS                     | Malaria Information System/Management Information System |
| MME                     | Mekong Malaria Elimination Programme                     |
| MMIS                    | Malaria Management Information System                    |
| MMW                     | Mobile Malaria Worker                                    |
| MO                      | Medical Officer  |
| MODC                    | Medical Officer Disease Control                          |
| MoHFW                   | Ministry of Health and Family Welfare                    |
| MoU                     | Memorandum of Understanding                              |
| MPAG                    | Malaria Policy Advisory Group                            |
| MPR                     | Malaria Programme Review                                 |
| MT                      | Medical technologist                                     |
| MTC                     | Malaria Technical Committee                              |
| NCAMM                   | National competency assessment in malaria microscopy     |
| NCD                     | Non-communicable disease                                 |
| NGO                     | Non-Government Organization                              |
| NIPSOM                  | National Institute of Preventive and Social Medicine     |
| NMEP                    | National Malaria Elimination Programme                   |
| NMETF                   | National Malaria Elimination Task Force                  |
| NSP                     | National Strategic Plan                                  |
| NTG                     | National treatment guidelines                            |
| OIG                     | Office of the Inspector General                          |
| OP                      | Operational Plan   |
| <i>P. falciparum/Pf</i> | <i>Plasmodium falciparum</i>                             |
| <i>Pk</i>               | <i>P. knowlesi</i>                                       |
| <i>Pm</i>               | <i>P. malariae</i>                                       |
| <i>Po</i>               | <i>P. ovale</i>  |
| <i>P. vivax/Pv</i>      | <i>Plasmodium vivax</i>                                  |
| PA                      | Project Assistant  |
| PACD                    | Proactive Case Detection                                 |
| PCD                     | Passive Case Detection                                   |
| PCR                     | Polymerase Chain Reaction                                |
| PIP                     | Project Implementation Plan                              |
| PLWD                    | People living with the diseases                          |
| PM                      | Programme Manager  |
| PMU                     | Programme Management Unit                                |
| POR                     | Prevention of re-establishment                           |
| PPE                     | Personal protective equipment                            |
| PPM                     | Pooled Procurement Mechanism                             |
| PPP                     | Purchasing Power Parity                                  |
| PPR                     | Public Procurement Rules                                 |
| PQ                      | Primaquine   |
| PSCM                    | Procurement and Supply Chain Management                  |
| PSEAH                   | Prevention of sexual exploitation, abuse and harassment  |
| PU                      | Progress update  |
| PUDR                    | Progress update and Disbursement Request                 |
| QA/QC                   | Quality Assurance/Quality Control                        |

|         |   |
|---------|---|
| RACD    | Reactive Case Detection   |
| RBM     | RBM Partnership to End Malaria (previously Roll Back Malaria)     |
| RDT     | Rapid Diagnostic Test   |
| RMNCAH  | Reproductive, Maternal Neonatal Child and Adolescent Health       |
| RMT     | Residual malaria transmission                                     |
| RPA     | Reimbursable project aid  |
| RRRC    | Refugee Relief and Repatriation Commissioner                      |
| RRT     | Rapid Response Team   |
| RSSH    | Resilient and Sustainable Systems for Health                      |
| SAARC   | South Asian Association for Regional Cooperation                  |
| SACMO   | Sub-Assistant Community Medical Officer                           |
| SBCC    | Social and Behaviour Change Communication                         |
| SDGs    | Sustainable Development Goals                                     |
| SEAR    | South-east Asian Region   |
| SEM     | Socio-ecological model  |
| SK      | Shashthyo Kormi   |
| SMART   | specific, measurable, achievable, realistic, and time bound       |
| SMO     | Surveillance Medical Officer                                      |
| SMS     | Short Message Service   |
| SOP     | Standard Operating Procedure                                      |
| SRCMF   | South-East Asia Regional Coordinating Mechanism Forum             |
| SS      | Shashthyo Shebika   |
| SWAp    | Sector Wide Approach  |
| TA      | Technical Assistance  |
| TAG-MEC | Technical Advisory Group on Malaria Elimination and Certification |
| TB      | Tuberculosis  |
| TDA     | Targeted Drug Administration                                      |
| TES     | Therapeutic Efficacy Study (of antimalarial medicine)             |
| TPR     | Test Positivity Rate  |
| UHC     | Upazila Health Complex  |
| UHC     | Universal health coverage   |
| UH&FPO  | Upazila Health & Family Planning Officer                          |
| UHFWC   | Union Health and Family. Welfare Center                           |
| UN      | United Nations  |
| UNHCR   | United Nations High Commission for Refugees                       |
| UNICEF  | United Nations Children's Fund                                    |
| USC     | Union Sub Centre  |
| USD     | U.S. Dollar (official currency of United States of America)       |
| VBD     | Vector borne disease  |
| YLL     | Years of Life Lost  |
| WASH    | Water, Sanitation and Hygiene                                     |
| WHO     | World Health Organization   |
| WHOPES  | World Health Organization Pesticide Evaluation Scheme             |

## EXECUTIVE SUMMARY

Bangladesh has demonstrated significant progress in reducing the malaria caseload over the years although fluctuations are reported in terms of upsurges in 2014, 2019 and again in the current year 2022 relative to the preceding years. Overall, impressive decline is noted in the number of confirmed malaria cases in 2021 (17,225) relative to 2015 (39,719) [82%]. Even though the focal upsurge in 2022 with caseload at 16,708 indicating 162% increase in cases relative to caseload in 2021 (for the same period) is a huge concern and specific strategies are being designed to address the situation; yet the overall declining trend seems to be maintained relative to 2015 caseload. The country is prioritizing acceleration of interventions to reduce disease burden and progress towards achievement of the vision of nationwide malaria elimination. This is in line with the commitment made at the highest political level by the Honorable Prime Minister of the People's Republic of Bangladesh to achieve Sustainable Development Goals (SDGs) including SDG 3: “Good Health and Well-Being” with specific target 3.3 underscoring “end malaria” by 2030. For Bangladesh, combating and ending malaria are not only commitments for achieving Sustainable Development Goal (SDG) 3 but other SDGs especially SDG 1: “Eradicating Extreme Poverty for All People Everywhere” by 2030.

Apart from the 2014 outbreak and the slight increases in caseload in 2017 and 2019, in most endemic districts overall progress has been made towards malaria control and elimination over the years. However, persistent high burden in three Chittagong Hill Tracts districts (03 CHT districts) suggests that much more efforts are needed for transmission reduction and moving these districts towards elimination. Malaria is now a focal disease in Bangladesh with the 03 CHT districts contributing more than 90% of total cases [94% in 2021 and 95% in 2022 (until October)]. In 2021, The maximum caseload (72%) was contributed by Bandarban district followed by Rangamati district (21%). Only these two districts recorded an Annual Parasite Incidence (API) per 1,000 population greater than 1 (9.24 and 2.16 per 1,000 population, respectively). In 2022 (until October), Bandarban district alone has contributed 77% of cases to the total country caseload so far.

It is estimated that 17.74 million (~10.7% of the 165 million country’s total population) people living in the 13 endemic districts (77 Upazilas) are at risk of contracting malaria infection in 2022. In the rest of the 51 districts (and a few areas within endemic districts) [418 Upazilas] that are considered ‘non-endemic’ & ‘free from indigenous malaria transmission’, determination of the status is being initiated. The impact of malaria takes its toll on the poorest and the marginalized. The most vulnerable and at high risk are those living in the hard-to-reach areas especially in 03 CHT districts. They are ethnic groups, mobile and migrant populations (jhum cultivators, forest-goers, labour), who are also often socio-economically marginalized.

The success so far is anchored on sound strategy and progressive improvements in implementation of effective preventive and curative interventions, surveillance and response and M&E, capacity building and strengthening by the National Malaria Elimination and Aedes Transmitted Diseases Control Programme of the Ministry of Health & Family Welfare (MoHFW) of the Government of Bangladesh (GoB) [malaria component of the national programme is henceforth mentioned as National Malaria Elimination Programme (NMEP) in this National Strategic Plan (NSP) for Malaria Elimination and Prevention of Re-establishment]. At the same time, it is also recognized that intensified interventions and context-specific service delivery mechanisms need to be considered to tackle focal upsurges and high burden settings. Adequate resources are also necessary. Notably, the non-government implementation partner organization [BRAC and its collaborating non-government organizations (NGO) henceforth mentioned as ‘partner NGO’] are complementing the NMEP efforts at community level and contributing to achievement of outcomes and impact. The Malaria Technical Committee and technical partners, viz., World Health Organization (WHO) and various experts/organizations are also providing technical stewardship. The country has also been tackling the COVID-19 pandemic well and malaria services have been more or less maintained, and comprehensive assessment of impact of COVID-19 on malaria service delivery, surveillance, and M&E is envisaged.

Even though the NSP 2021-2025 is still valid, the Malaria Technical Committee of the NMEP, and various individual experts deliberated that the current version will be updated as National Strategic Plan (NSP) for malaria elimination and prevention of re-establishment of malaria transmission and will cover 2024-2030 period in view of recommendations from JMM5 and Malaria Elimination Audit tool (MEAT) and malaria stratification, gap analysis to achieve and sustain malaria elimination status and to prepare for WHO certification of malaria elimination. The JMM5 provided distinct recommendations for 03 CHT districts in burden reduction and control phase, other 10 endemic districts in elimination phase, 51 malaria 'non-endemic' districts and 'non-endemic' urban areas as well as cross-cutting areas. In conclusion, the JMM5 mentioned that the last mile is a difficult mile. It takes considerable political will and detailed technical planning to hold the ship steady and show the way. Though considerable progress has been made there are two major course corrections that are required. One is the Bandarban district, which is still in the control phase and facing great challenges with routine strategies. An additional strategy to address the challenges would ensure that by 2025, if not earlier, this district too is in the elimination phase. The other is the evidencing and sustaining elimination in malaria-free districts that would require sustained efforts and resources. Tailored anti-malaria strategies seamlessly integrated with health systems strengthening would be necessary, which would be opportunity for sustainability in the long term. The efforts for the last mile in malaria elimination could become important milestones for achieving universal health care and improved epidemic preparedness. Furthermore, lessons learned from COVID-19 pandemic, the malaria elimination programme contribute to shaping a resilient health system, where future pandemics could be more effectively managed.

The NSP 2024-2030 has been developed under leadership of the Director, CDC, DGHS and the DPM of NMEP with support from international and national experts, and the WHO and partner NGO. The NMEP held consultative workshops with various stakeholders and individual experts, besides consultation with the GF. The members of the Malaria Technical Committee provided valuable inputs. In addition, a subnational consultation was held with local public health authorities and partner NGO field units in Cox's Bazar district including focus group discussions (FGDs) at Upazila level involving public health care service providers, community health workers as well as various ethnic groups and occupational groups (jhum cultivators, forest goers), who are at high risk of and affected by malaria. The NSP 2024-2030 will provide strategic direction to progress in the pathway towards phased elimination and malaria free Bangladesh by 2030. The NSP 2024-2030 will provide strategic directions to progress in the pathway towards phased elimination and malaria free Bangladesh by 2030. The NSP 2024-2030 will also provide salient steps for prevention of re-establishment phase, subnational elimination verification and overall preparedness for WHO certification.

The NSP 2024-2030 is aligned with the Sustainable Development Goals (SDGs); and Global Technical Strategy for Malaria 2016-2030, WHO, 2021, and Regional Action Plan 2017–2030. Towards 0. Malaria-Free South-East Asia Region, WHO, 2017; as well as draws on findings and recommendation of the JMM5. In addition, several guidance documents from the WHO served as references during the development of the NSP 2024-2030. Strategy and guidance notes from key donor/partner agencies, viz., RBM Partnership to End Malaria (viz., Strategic Plan 2021–2025, 2020 and others); the Global Fund [Fighting Pandemics and Building a Healthier and More Equitable World: Global Fund Strategy (2023-2028), 2022 and others] were also referred to amongst other reference materials.

The NSP 2024-2030 will be a living document and updated with added guidelines and SOPs, as needed, in consultation with the Malaria Technical Committee of the NMEP and individual experts, and the WHO, following updates in international guidance and importantly, drawing on country experience as burden reduction is accelerated in 03 CHT districts; and elimination interventions are rolled out in rest of the country in phased manner and districts/Upazilas progressively reach the prevention of re-establishment stage. Interventions for malaria-free areas for prevention of re-establishment of malaria transmission will follow the WHO guidance and expected to evolve over time and the NSP 2024-2030 will be accordingly revisited and updated.

**Vision:**

A malaria-free Bangladesh by 2030.

**Mission:**

To achieve malaria elimination in phased manner with effective and equitable interventions towards improving quality of life of at-risk populations and contributing to achievement of Sustainable Development Goals (SDGs).

**Goals and Objectives****Goals:**

- By 2030, interrupt local transmission of and eliminate indigenous malaria in phased manner and prevent re-establishment of local transmission
- By 2027, attain zero mortality due to indigenous malaria and maintain status.

**Objectives:**

- Objective-1: Ensure universal coverage by early case detection using quality assured parasitological test and prompt and effective treatment of all confirmed malaria cases according to national treatment guidelines through 2030.
- Objective-2: Ensure universal coverage of population at risk in targeted areas with appropriate preventive interventions through 2030.
- Objective-3: Strengthen context-specific surveillance in all malaria settings and outbreak preparedness and response through 2030.
- Objective-4: Enhance Social and Behaviour Change Communication (SBCC) with special emphasis on community engagement and mobilisation, context-specific communication and advocacy through 2030.
- Objective-5: Ensure strengthened program management, monitoring & evaluation and partnership and coordination through 2030.
- Objective-6: Carry out research to guide strategy and policy to address programme gaps and challenges through 2030.
- Objective-7: Prevent re-establishment of malaria transmission in malaria-free areas.

**Key Strategic Elements:**

- Sustain country ownership with sufficient resources for malaria elimination and prevention of re-establishment in malaria-free areas.
- Prioritize malaria burden reduction in 03 CHT districts with special attention to Bandarban district towards acceleration to achieve elimination.
- Ensure universal and equitable access to early diagnosis and prompt & effective treatment by all at-risk populations including the key and vulnerable populations (mobile and migrant populations, ethnic minority groups, disadvantaged/underserved communities, communities in border and conflict areas, and refugees).
- Ensure targeted and equitable access to appropriate preventive interventions by at-risk populations including the key and vulnerable populations in targeted areas.
- Ensure surveillance as a core intervention (epidemiological and entomological) appropriate for different settings. Strengthen routine surveillance in burden reduction and case-based surveillance in elimination settings.
- Review and refine malaria micro-stratification annually based on data related to transmission risk, receptivity and vulnerability for targeted interventions.
- Design and implement intervention-mix tailored for subnational contexts and drawing on granular data.

- Strengthen M&E including but not limited to, reinforcing regular reviews, supportive supervision and feedback and emphasize data quality.
- Strengthen and update national malaria MIS for real-time data and its use especially at local levels to enable early response.
- Support districts with geo-enabling health information using Geographic Information System (GIS).
- Ensure resilient and sustainable health systems, with health workforce having necessary capacity with requisite skillsets at all levels, and uninterrupted availability of quality-assured commodities.
- Ensure early warning systems, preparedness for upsurge/outbreak and in the event of any upsurge/outbreak timely response.
- Maintain malaria services during upsurges/outbreaks, other emergencies through multiple delivery mechanisms with support from and integrated under the umbrella general health systems drawing on lessons learned during COVID-19 pandemic.
- Identify and apply risks and mitigation measures, including forward planning drawing on the experience related to exigencies like COVID-19 pandemic, and others.
- Strengthen quality service delivery through public health facilities as well as community health workers & volunteers and partner agencies.
- Foster social and behaviour change communication with emphasis on advocacy, targeted communication and community participation and ownership.
- Address human rights and age- & gender-related barriers, inequities and vulnerabilities related to access to and uptake of malaria services especially meeting the needs of key and vulnerable population groups.
- Strengthen private sector engagement to expand coverage of case detection, treatment & referral as per national treatment guidelines, and ensure timely reporting to national programme.
- Foster multi-sector coordination and collaboration with health and non-health sectors, local governments, partner agencies, civil society and communities.
- Gather evidence continually on efficacy of antimalarial drugs for early detection of possible emergence of drug resistant malaria.
- Assess the status of insecticide resistance periodically, as needed.
- Promote research to address programmatic challenges, needs and gaps and revisit strategy, policy, and guidelines periodically.
- Strengthen cross-border collaboration between Bangladesh-India and Bangladesh-Myanmar to tackle malaria transmission potentials through population movement along international borders; and maximize service delivery and surveillance within national boundaries.
- Develop and update plans, guidelines, SOPs, manuals, forms and registers, as appropriate for elimination and prevention of re-establishment.
- Roll out interventions for prevention of re-establishment in malaria-free areas and initiate subnational elimination verification in phased manner and preparations for WHO certification.
- Initiate measures for prevention of re-establishment (POR) of transmission as districts achieve interruption of local transmission and zero indigenous malaria and transitions to malaria-free areas.
- Aim at achieving subnational elimination (Upazila-wise) in phased manner towards country-wide elimination. Subnational elimination verification is to be carried in line with the guidance by the WHO. Mechanisms will need to be developed for such verification towards readiness of nationwide elimination certification.
- Initiate preparedness for the WHO certification of malaria elimination in a country that requires proof that local transmission of all human malaria parasites has been interrupted beyond reasonable doubt, resulting in zero incidence of indigenous cases for at least the past three consecutive years and zero deaths due to indigenous malaria.

### **Programme Prioritization:**

Malaria is a focal disease in Bangladesh exhibiting considerable heterogeneity. It is therefore essential to identify and stratify the areas and populations at risk according to the burden of malaria. Overall, the

country is currently stratified into three strata based on API (with baseline year as 2022) [Table-]. The districts where API is more than or equal to 1 per 1,000 population in 2022 is categorized as high burden and high transmission areas (stratum 3), while districts with API less than 1 per 1,000 population are categorized as low burden and low transmission areas (stratum 2). The districts with API equivalent to zero with receptive/vulnerable areas or areas traditionally considered ‘non-endemic’ with no reported indigenous malaria are categorized as potential transmission areas/transmission status to be determined (stratum 1). Even though Khagrachari district has recorded API less than 1 per 1,000 population in 2022, the district will be clubbed together with Bandarban and Rangamati being inherent part of CHT. Entire CHT has similar eco-epidemiology, receptivity and vulnerability. Besides, Khagrachari shares long national border with endemic Rangamati district of CHT (and Chattogram district). This district also shares long international border with the endemic state of Tripura in India that witnesses population movement.

Going forward (from 2024), criteria for micro-stratification will consider past and current intensity of transmission in an area, receptivity, vulnerability, and selected eco-epidemiological factors. Micro-stratification until village level will be carried out as malaria becomes more and more local and focal. Micro-stratification will facilitate prioritization of interventions through a more targeted approach and effective and efficient utilization of available resources. Prioritized interventions will be packaged for a particular stratum and phase tailored to the local epidemiology.

The NSP 2024-2030 will prioritize progressive transition of high burden areas to low burden and low burden areas to elimination and sustaining it by preventing re-establishment local transmission besides determining ‘non-endemic’ status of rest of the areas. Based on these considerations, the priorities are set as follows:

- Accelerated reduction of malaria burden to  $API \leq 1$  by 2027 and interruption of local transmission in 03 ‘endemic’ CHT districts (viz., Bandarban, Khagrachari and Rangamati) [26 Upazilas] by 2030.
- Elimination of malaria from 04 ‘endemic districts’ of Mymensingh Zone [21 Upazilas] by 2024 and maintaining the status through 2030.
- Elimination of malaria from remaining 06 ‘endemic’ districts [30 Upazilas] by 2026 and maintaining the status through 2030.
- Determination of rest of the 51 ‘non-endemic’ districts (and a few ‘non-endemic’ areas within 13 endemic districts) as ‘malaria-free’ (418 Upazilas) by 2024 and maintaining the status through 2030.

Furthermore, each strategic elements will be prioritised including equity, human rights and gender equality considerations with special attention to key and vulnerable populations who are the most at risk and most affected by malaria.

### **Programme Phasing:**

Drawing from prioritization, programme phasing is envisaged to achieve nationwide elimination status. This entails a burden reduction phase towards elimination, where a combination of interventions is intensified in high burden areas; and an elimination phase, where these measures are targeted to remaining foci where case-based surveillance is intensified followed by appropriate response to rapidly detect and cure every case. As malaria elimination is achieved at subnational levels and nationwide, efforts will be made to prevent re-introduction and re-establishment of malaria transmission in malaria-free areas in terms of appropriate surveillance and response with special attention to receptivity and vulnerability of the area.

Accordingly, the programme phasing is designed through the implementation period of the updated NSP (2024-2030) on the path to malaria elimination and prevention of re-establishment:

- Accelerated Burden Reduction Phase: Aims to reduce malaria incidence to less than 1 case per 1,000 population at risk<sup>1</sup> and transition to elimination phase by 2027 towards interruption of local transmission by 2030 in 03 CHT districts, viz. Bandarban, Khagrachari, and Rangamati. Universal coverage by effective preventive and curative interventions as well as supporting interventions aim to reduce local transmission and have an impact on morbidity and mortality.
- Elimination Phase:
  - Aims to interrupt local transmission and reduce malaria incidence to zero by 2024 in 04 elimination districts of Mymensingh Zone and by 2026 in 06 remaining elimination districts and maintain the status through 2030. Case based surveillance becomes the core intervention – every case is investigated and managed to avoid onward transmission. Based on the investigation, the focus of transmission is identified, appropriate response is deployed to rapidly interrupt transmission.
  - Aims to determine ‘non-endemic’ status of the rest 51 districts (and a few areas within 13 endemic districts) indicating no reported indigenous case (418 Upazilas) by 2024 and maintaining the status through 2030. Appropriate surveillance system, capacity building of general health system, and other relevant interventions will be in place.
- Prevention of Re-establishment Phase: Even after indigenous malaria cases have been reduced to zero starting with 04 districts in Mymensingh zone and 51 ‘non-endemic’ districts and other Upazilas in 2024, the health system and malaria surveillance operations remain capable of preventing re-introduction and re-establishment of local malaria transmission. Through this stage, maintenance of malaria-free status will become the responsibility of the general health services, as part of their normal function in communicable disease control, as well as coordination and collaboration with other relevant sectors.

### **Key strategies:**

STRATEGY 1.1 Early Case Detection

STRATEGY 1.2 Prompt and Effective Treatment

STRATEGY 2.1 Malaria Prevention with Appropriate Vector Control Measures

STRATEGY 3.1 Epidemiological Surveillance

STRATEGY 3.2 Entomological Surveillance

STRATEGY 4.1 Social and Behaviour Change Communication

STRATEGY 5.1 Programme Management, Capacity Building and Strengthening

STRATEGY 5.2 Programme Monitoring and Evaluation (M&E)

STRATEGY 5.3 Partnership and Coordination

STRATEGY 6.1 Research

STRATEGY 7.1 Prevention of re-establishment of malaria transmission

STRATEGY 7.2 Preparedness for subnational elimination verification; WHO certification for malaria elimination

### **Milestone and Targets:**

#### **Year 2024**

- Bangladesh NSP 2024-2030 is officially launched nationwide.
- Local transmission has been interrupted and no indigenous malaria in 04 districts of Mymensingh zone.
- Non-endemic’ status and absence of local transmission in 51 districts (and a few Upazilas within endemic districts) [418 Upazilas] determined.

#### **Year 2025**

- In areas where local transmission is interrupted, interventions relevant for prevention of re-establishment is rolled out including but not limited to, establishing systems for maintaining vigilance, integration of malaria case management within general health care services.

**Year 2026**

- Local transmission has been interrupted and no indigenous malaria case in 04 districts of Sylhet zone; and Chattogram and Cox's Bazar districts.

**Year 2027**

- Annual Parasite Incidence reduced to < 1 per 1,000 population in 03 CHT districts.
- Zero mortality due to indigenous malaria attained nationwide and maintain status.
- Subnational elimination verification launched with Mymensingh zone declared as 'malaria-free' by MoHFW followed by other districts in phased manner.

**Year 2029**

- Subnational elimination verification launched in Sylhet zone; and Chattogram and Cox's Bazar districts and declared as 'malaria-free' by MoHFW followed by other districts in phased manner.

**Year 2030**

- Local transmission has been interrupted and no indigenous malaria nationwide.
- Interventions for prevention of re-establishment of local malaria transmission especially vigilance rolled out nationwide.
- Preparedness for WHO certification for malaria elimination (expected in 2033) initiated.

**Year 2033**

- WHO certification for malaria elimination for Bangladesh.

**Resource requirements for NSP 2024-2030**

The NSP 2024-2030 will be implemented under the MoHFW, GoB, flagship programme HNPSPP through the National Malaria Elimination Programme (NMEP). The resource requirements for NSP 2024-2030 will be USD 265,370,127 (1 USD = 84.47 BDT). Much of the resource needs is expected to be covered under the current GoB HNPSPP OP and upcoming OP for the next period. In addition, support by external partners, especially the GF will be extremely crucial. In addition, technical assistance by the WHO will also be vital. The NMEP/GoB will continue to explore resources from various sectors and partner agencies to fulfil the resource needs for NSP 2024-2030.

## CHAPTER-1 INTRODUCTION

### 1. INTRODUCTION

Bangladesh has demonstrated significant progress in reducing the malaria caseload over the years although intermittent upsurges in 2014, 2019 and even in 2022 are impediments and pose threat in the pathway to malaria elimination. Overall, the decline in the number of confirmed malaria cases is impressive at 82% in 2021 (17,225 cases in 2021 relative to 39,719 cases in 2015). Even though the focal upsurge in 2022 with caseload of 16,708 (until October) indicating 162% increase in cases relative to caseload of 6,379 in 2021 (for the same period), which is a huge case for concern; yet the overall declining trend seems to be maintained relative to 2015 caseload.

Malaria is has become a focal disease in Bangladesh with the Chattogram Hill Tracts districts contributing more than 90% of total cases [94% in 2021 and 95% in 2022 (until October)]. In 2021, The maximum caseload (72%) was contributed by Bandarban district followed by Rangamati district (21%). Only these two districts recorded an Annual Parasite Incidence (API) per 1,000 population greater than 1 (9.24 and 2.16 per 1,000 population, respectively) in that year. In 2022 (until October), Bandarban district alone has contributed 77% of cases to the total country caseload so far. Persistent high burden in 03 CHT districts particularly in Bandarban district suggests that specific strategies and interventions need to be designed to address the situation for transmission reduction and moving these districts towards elimination. Other 10 elimination districts have shown progress in terms of overall downward trend until 2021. However, Chattogram and Cox's Bazar districts particularly showed an increase in 2022 (until October) due to majority of 'locally imported' cases from neighbouring Bandarban district. In the rest of the 51 districts (and a few areas within endemic districts) [418 Upazilas] that are considered 'non-endemic' & 'free from indigenous malaria transmission', determination of the status is being initiated. It is estimated that 17.74 million (~11% of the 165 million country's total population) people living in the 13 Districts (77 Upazilas) are at risk of contracting malaria infection in 2022. The impact of malaria takes its toll on the poorest and the marginalized. The most vulnerable and at high risk are those living in the hard-to-reach areas especially in 03 CHT districts. They are ethnic groups, mobile and migrant populations (jhum cultivators, forest-goers, labour), who are also often socio-economically marginalized. The country is prioritizing acceleration of interventions to reduce disease burden and progress towards achievement of the vision of nationwide malaria elimination.

#### 1.1 Policy and Programme Environment

Malaria elimination is one of the public health priorities and is recognized as a contributor in the pathway to stronger, socio-economically developed Bangladesh. The Honorable Prime Minister of the People's Republic of Bangladesh is committed to achieve Sustainable Development Goals (SDGs) including SDG 3 "Good Health and Well-Being" with specific target 3.3 underlining "ending malaria" by 2030. For Bangladesh, combating and ending malaria are not only commitments for achieving SDG 3 but realizing other SDGs especially SDG 1: "eradicating extreme poverty for all people everywhere" by 2030. The National Health Policy (2011) highlights the critical need for tackling malaria. In 2017, the Honorable Minister, MoHFW, GoB, has signed the Ministerial Declaration on "*Accelerating and Sustaining Malaria Elimination in the South-East Asia Region*", to reaffirm the country commitment for malaria elimination, which has been renewed in 2022. This declaration called for actions on high-level political commitment, adequate financial and human resources, universal access to malaria prevention, quality-assured prompt diagnosis and treatment, robust surveillance, uninterrupted supply of quality assured commodities, as well as multisectoral and inter-country cooperation, amongst others. To fulfil country commitments, the Ministry of Health and Family Welfare (MoHFW) is playing strategic stewardship and governance roles in policy and strategy development, and oversight and advocacy.

Further, the Government of Bangladesh has a mega programme called 4th Health, Nutrition and Population Sector Program (4th HNPS: 2017-2022). The programme is guided by Bangladesh's

Vision 2021 and is in line with the SDGs. The 4th HNPSP incorporates appropriate strategies and activities for focused improvements in increasing access to and utilization of health care. It also aims at improving equity along with financial protection to meaningfully realize the objectives of universal health coverage by 2030. Malaria is one of the priorities under this programme. The 4th HNPSP OP mentions about the commendable success in controlling malaria through reduction of cases and death besides setting targets of achieving 75% reduction of morbidity and mortality by 2025 and zero transmission by 2030. The following activities are expected to be implemented during the 4th HNPSP: updating national strategy and budgeted national action plan; sustenance of the early diagnosis and prompt treatment with universal coverage; supply of drugs, insecticides, spray machine and other logistics; two rounds of integrated vector management in all the endemic focuses of the 13 malaria districts of the country; strengthening of cross-border collaboration with neighbouring countries; promotion of operational research for insecticide resistance monitoring; and community participation through multipurpose health volunteers for the purpose of detection and management. The 4th HPNSP provides special focus on improving health services and strengthening health systems.

## **1.2 Review of Implementation of National Strategic Plan 2021-2025**

The current NSP (2021-2025) provides strategic directions for phased malaria elimination in the country. The mission is to achieve malaria elimination in phased manner with effective interventions in an equitable manner towards improving quality of life of at-risk populations and contributing to achievement of Sustainable Development Goals (SDGs). The goals are: By 2025, reduce malaria annual parasite incidence (API) to less than 1 per 1,000 population at risk in three CHT districts compared to 2019, interrupt local transmission of and eliminate indigenous malaria in phased manner in 10 other endemic districts, determine malaria-free status of remaining 51 districts, and maintain malaria-free status in areas where malaria transmission has been interrupted and prevent re-establishment of local transmission. The objectives are to: achieve and sustain universal coverage by early case detection and prompt treatment of all confirmed and with appropriate preventive interventions; strengthen context-specific surveillance in all malaria settings and outbreak preparedness and response; and strengthen advocacy, communication and social mobilization (ACSM) activities for uptake of preventive and curative interventions, optimal community engagement, programme management, monitoring & evaluation (M&E) and partnership and coordination; and research. Key milestones included: interruption of local transmission and no indigenous case in 04 districts of Mymensingh zone by 2021; determination of 'malaria free' status of 51 districts (and a few areas within 13 endemic districts) by 2023; interruption of local transmission and no indigenous case in 04 districts of Sylhet zone and Chattogram and Cox's Bazar districts as well as reduction of Annual Parasite Incidence reduced to <1 per 1,000 population by 2025.

### **1.2.1 Some lessons learned:**

- Overall, with significant decline (58%) in the number of confirmed malaria cases in 2021 (7,294) relative to 2019 (17,225) [baseline year] despite COVID-19, the country appeared to be on track towards reducing disease burden and elimination. However, the focal upsurge in 2022 (until October) with caseload of 16,708 indicating 162% increase in cases relative to caseload of 6,379 in 2021 (for the same period), is a huge case for concern. Nevertheless, the overall declining trend seems to be maintained relative to 2015 caseload. This is anchored on sound strategy and progressive improvements in programme implementation by NMEP and its partners. A combination of Long Lasting Insecticidal Nets (LLINs) distributed through mass campaign every three years and through periodic continuous distribution to high-risk populations as well as early case detection and effective management with Artemisinin-based Combination Therapies (ACT) [for *Plasmodium falciparum* (*P. falciparum*) malaria] and other antimalarials delivered through the public sector and community health worker network offered the opportunity to achieve success. It is also recognized that persistent high burden in CHT districts particularly in Bandarban district suggests that specific strategies and interventions need to be designed to address the situation for transmission reduction and moving these districts towards elimination. Even though Chattogram and Cox's Bazar districts showed an increase in cases in 2022 (until October) relative to the previous

year, the upward trend is due to majority of ‘locally imported’ cases from neighbouring Bandarban district.

- Progressive improvement in surveillance and M&E, ACSM, PSCM, QA/QC, amongst others.
- Availability of external funding from the Global Fund (GF) and considering the value for money (selection of technically sound and cost-effective and feasible strategies) and targeted approaches contributed to impact.
- Collaboration between NMEP and partner NGO has been effective to achieve results through complementarity on the ground.
- Community-based malaria elimination program has created a stable foundation toward malaria elimination. This has contributed to improving the coverage of malaria interventions, surveillance and response even in hard-to-reach areas.
- Coordination with local stakeholders and community engagement are important routes for distribution of LLINs, early diagnosis and prompt treatment (EDPT) and referral of suspected malaria cases.
- Capacity building through trainings/re-trainings helped improving service delivery and programme management.
- Technical assistance by the WHO facilitated strategy and policy development, reviews, etc.

### **1.2.2 Joint Monitoring Mission (JMM) 2022**

The National Malaria Elimination Program (NMEP) of the GoB commissions a joint monitoring mission [referred as **Joint Monitoring Mission (JMM)**] to assess country’s progress periodically. A JMM of the NSP 2021-2025 (referred as JMM5) was carried out in July 2022. The JMM5 team consisted of international and national experts along with WHO, observers from development partners. The NMEP and BRAC coordinated and facilitated the JMM5. After the terms of reference were charted out, a briefing by NMEP followed by stakeholder consultation were held with participation by district, Upazila and national levels. Thereafter, visits were made to five purposively chosen districts for field assessment of the programme with detailed checklist. The districts chosen for review were: i) Bandarban, which is one of three high endemic districts of 03 CHT districts and which has the highest burden of malaria; ii) Cox’s Bazar, one of two endemic districts nearing elimination reporting low number of cases and where the Rohingya (FDMN) camps are located; iii) Sylhet, one of eight low-endemic districts with almost no cases being reported in last one year; iv) Chapainawabganj, a malaria non-endemic district bordering an endemic district in India, from which no cases are reported ever; and v) Dhaka City and Gazipur, which are urban areas largely governed by City Corporations and perceived to be non-endemic and malaria-free.

The JMM5 was focused on six thematic areas. A detailed check-list guided these field visits.

Theme 1: Overall status of program performance and implementation of JMM4 recommendations;

Theme 2: Malaria epidemiology, determinants of malaria, epidemic preparedness, and response;

Theme 3: Malaria case management (diagnosis, treatment, referral), drug resistance, in public and private sectors;

Theme 4: Malaria entomology and vector control, insecticide resistance;

Theme 5: Malaria Surveillance, Monitoring and Evaluation; and

Theme 6: Relevant health systems issues including financing, programme management, organization of service delivery, logistics/supply chain management, workforce/Human Resource (HR) issues, private sector engagement, partnerships, and Advocacy, Communication and Social Mobilization (ACSM).

The JMM5 report was finalized and disseminated in a meeting with participation by Hon’ble Minister, and other senior officials from MoHFW, key stakeholders, donors and partners.

Overall, the progress towards elimination has been sustained and on track to reach its goals despite the disruptions and difficulties caused by COVID-19. There has been upsurge in some of the high burden districts, which a matter of considerable concern.

*Progress of the implementation of JMM4* had been mixed. Whilst the understanding of epidemiology and transmission dynamics improved significantly, responsive actions to stratified epidemiological information has yet to be optimal. Actions taken regarding JMM4 recommendations were shared during JMM5.

The JMM5 recommended the need for tailored strategies across different epidemiological strata: 03 CHT districts (high burden districts of Bandarban, Khagrachari and Rangamati which are currently in the control phase); 10 endemic districts (low burden districts in the malaria elimination phase); and 51 non-endemic districts (considered ‘non-endemic’ and where the malaria free status is to be ascertained with evidence and maintained). The JMM5 key recommendations are as under:

*A. Key Recommendations for Three High Burden CHT Districts in Control Phase: Bandarban, Khagrachari and Rangamati*

Within high burden districts, additional intensive control interventions are recommended for Bandarban district as well as high burden Upazilas of other two CHT districts. These additional interventions should be considered as supplement and not as substitute to other routine interventions. These interventions should be applied, if adequate communication and cooperation exists and staff, resources can be mobilized. Importantly, the interventions should start as pilot and should be closely monitored and documented before replication.

- Consider intensified approaches for high risk groups, viz., jhum cultivators, forest goers:
  - Antimalarial medicine can be given as chemoprevention through targeted drug administration (TDA) in areas of moderate to high transmission of *P. falciparum* to provide short-term reductions in disease burden in consultation with the Malaria Technical Committee. TDA may quickly reduce clinical malaria incidence in this occupational group, but the effect wanes within 1–3 months. Therefore, if TDA is implemented, it should be one of several components of a robust malaria control programme (including good coverage of effective case management and appropriate prevention tools and strategies).
  - Active case detection should be pursued as a campaign to reach all high-risk occupational and ethnic groups, on a select week pre-transmission and at peak transmission. This can be repeated more often if possible. All detected with fever are tested and those testing positive are treated according to national treatment guidelines. In this context, the increase in proportion of *P. vivax* must be noted and treatment compliance should be followed up. Provision of EDPT should be available for 24 hours if a patient requests a service.
  - Forest pack distribution should be considered [backpacks with communication materials, a treated hammock net or LLIN (as appropriate) and approved insect repellents].
- Strengthen programmatic interventions:
  - Fill up vacancies of all frontline worker positions in the district, as a priority. Introduce special retention strategies including difficult area allowance and local selections.
  - Engage with Mro ethnic groups, including their leaders, and the jhum cultivators for identifying their own malaria volunteers. Train and supply the volunteers with health commodities to detect and treat malaria.
  - Set up “malaria clinics” in strategic areas (places where the high risk groups converge, viz., village store, transit points, waiting sheds, etc.).
  - Improve care pathways and referral transport for timely referral and management of severe cases.
  - With fresh entomological data in hand, review the vector control strategy with detailed technical suggestions of JMM5.
  - Ensure special measures to detect possible drug and insecticide resistance early.
  - Commission an anthropological study on health seeking behavior and formative research for appropriate BCC.

- Carry out quarterly visits by an internal “supportive supervision” team, additional regular local supervisors and an annual external review (like JMM) by an expert team after fresh epidemiological information is in place.
- Improve collaboration with defense forces, traditional private providers, and cross border neighbouring countries.

*B. Key Recommendations for 10 Endemic Districts in Elimination Phase:*

*Sylhet division: Sylhet, Hobiganj, Sunamganj, Moulvibazar; Mymensingh division: Mymensingh, Netrokhona, Sherpur, Kurigram; Chattogram division: Chhattogram and Cox’s Bazar.*

- Emphasize that every single case reported and managed like an epidemic with a 1-3-7-day response. Identify and overcome any barrier for this approach.
- Ensure refresher trainings on case and focus investigation and response for programme managers, medical officers, laboratory technicians, and entomologists.
- Build adequate reserves of RDTs, medicines, LLINs and insecticides to deal with any emergency requirement due to an outbreak/upsurge of malaria cases.
- Promote community access to insecticide treated nets by advocating impregnation of untreated nets with approved pyrethroid treatment kits that are sold through commercial sector, NGOs, and retail outlets at low cost with social marketing support.
- Gradually shift to strategies as recommended below for non-endemic districts, in non-endemic Upazilas of endemic districts.
- Guard against complacency and premature withdrawal of malaria related services and/or surveillance.
- Design a sub-plan for the FDMN (Rohingya population): In addition to all routine measures:
  - Increase cooperation with all NGOs and government service providers working in FDMN camps.
  - Ensure continued dissemination of national treatment guidelines amongst service provider and monitor adherence.
  - Ensure updated SOPs for service delivery, case based surveillance and M&E and timely reporting of cases.
  - Sustain universal LLIN coverage.
  - Keep close watch for any emergence of resistance or new malaria parasite.

*C. 51 Key Recommendations for malaria non-endemic areas [51 ‘non-endemic’ districts and urban areas (under City Corporation/Municipal Corporation/Municipality)]:*

*For 51 malaria non-endemic districts:*

- Find and document evidence to support the malaria-free status of 51 districts and ensure a system to detect and respond to prevent re-establishment of malaria, in a timely manner. The system established should be integrated within the general health systems.
- Adopt and disseminate a strategy document with regard to the objectives and activities in non-endemic districts with sub-plans for urban areas; and ensure political support through advocacy for malaria elimination.
- Case management and surveillance should be integrated with all fever management protocols, diagnostics, referral pathways and surveillance and guidelines should be developed.
- Test cases where malaria is clinically a plausible differential diagnosis and report all negative and positive cases without fail. There is no need to pursue Annual Blood Examination Rate (ABER) like approach for testing.
- Establish sentinel sites where all fever cases are tested especially in districts with higher risk. Establish well-publicized malaria reference centers in each non-endemic district where malaria testing and drugs are available within the hour with 24\*7 access.
- Expand malaria test and capture data for reports including ‘nil’ reports to establish an epidemiological baseline.

- Map “vulnerability” and “receptivity” to categorize districts by risk of re-establishment and design and implement tailored strategy for surveillance, case management and vector control.
- Consider contracting specific private sector providers, NGO-sector providers with a record of pro-poor services, and these can be promoted as sites where affordable or free care is available, with government support of free malaria related supplies and reimbursement of costs of care.
- Consider online self-certification course, training programs and hotlines for dissemination of strategy and skills to both public and private sector providers.

*For malaria non-endemic urban areas (City Corporation/Municipal Corporation/Municipality):*

- Coordination between city corporations and MoHFW/DGHS structures should be initiated and strengthened.
- Develop and implement specific guidelines for urban areas (city/town) for malaria elimination.
- Publicize the mandatory provision of malaria as a notifiable disease and various private sector registration/regulation that is in place, along with non-threatening approaches like on-line courses on malaria to optimize private sector notification and response. Ensure that every provider knows when to report and how, as well as where to refer or reach out for supplies, when needed.
- Extend publicly financed public provision of urban primary health care as part of health systems strengthening.
- Ensure adequate surveillance and Health Management Information System (HMIS) with considerations for interoperability with other national platforms.
- Strengthen specific health communication activities for urban areas.

*D. Key Recommendations for cross-cutting areas (for national level):*

- Strengthen access to malaria services and health systems:
  - Integrate fever management, laboratory services, and surveillance/ Malaria Information System/Management Information System (MIS) with health systems for long term sustainability.
  - Define minimum standards for public health system both in rural areas and urban areas in terms of infrastructure, human resources, and services, to address the communicable disease and Non-communicable diseases (NCDs).
  - Consider contracting with NGOs that have established own health schemes/programmes to reach the poor.
  - Begin creation of necessary posts in GoB now so that there is no disruption in the number of national level positions in NMEP whilst the transitioning from the Global Fund support is initiated.
  - Undertake the necessary institutional restructuring, and reforms so that more activities currently under GF funding like partner NGO (BRAC) support could be managed with GoB funding.
- Program Management:
  - Appoint one lead officer for each of the three epidemiological strata.
  - Build capacity in entomology using consultancy support, if required. Such capacity building would include creation of a core team of public health epidemiologists, an insectary, training of advanced techniques in vector study, and an integrated vector management plan.
  - Maintain good work on procurement & quality of supplies. Ensure Rapid Diagnostic Tests (RDTs), medicines, LLINs in private sector are WHO pre-qualified quality products.
  - Build greater quality assessment capacity within country.
- Financing:
  - Advocate for increase in public health expenditure from its current <1 percent of Gross Domestic Product (GDP). Both the GoB and the Global Fund have their respective roles to play. Funding for malaria elimination cannot decrease and none of the services or personnel can be withdrawn completely. Rather they should take the form of spending on health systems strengthening.

- Transition from the Global Fund support to GoB resources for malaria elimination:
  - Include malaria indicator in new HNPSF framework to enable the transition to greater self-reliance and integration of NMEP in its elimination phase.
  - Develop an investment case for the Global Fund (and other potential donors) to invest in health systems strengthening for accruing benefits across all disease control programmes. If resources for health systems strengthening are shared between the Global Fund and the GoB, it could lead to transition in financing in a more sustainable way in the long term, where no essential services cease and the requirements for any additional services are included. Priority areas are: human resource development, strengthening/development of diagnostic services, integrated disease surveillance systems, health information systems, and quality assurance systems both for commodities and for services.

### **1.3 Process of Developing the Current Strategic Plan**

Even though the NSP 2021-2025 is still valid, the Malaria Technical Committee of the NMEP, and various individual experts deliberated that the current version will be updated as National Strategic Plan (NSP) for malaria elimination and prevention of re-establishment of malaria transmission and will span over 2024-2030 in view of recommendations from JMM5 and Malaria Elimination Audit (using MEAT) and malaria stratification, gap analysis to achieve and sustain malaria elimination status and to prepare for WHO certification of malaria elimination. The NSP 2024-2030 will provide strategic direction to achieve elimination in phased manner towards malaria free Bangladesh by 2030, prevent re-establishment of malaria transmission and to prepare for WHO certification for malaria elimination.

The NSP 2024-2030 has been developed under leadership of the Director, CDC, DGHS and the DPM of NMEP with support from international and national experts, and the WHO and partner NGO. In addition to consultation with the GF, the NMEP held a consultative workshop with various stakeholders and individual experts. A specific consultation was held with stakeholders from Bandarban district including representatives from local authorities, community and risk groups. In addition, subnational consultation was held with partner NGO field units and local public health authorities in Cox's Bazar. Focus Group Discussions (FGD) were also conducted in at Upazila level involving public health care service providers, community health workers as well as risk groups (viz., ethnic groups, forest goers). The members of the Malaria Technical Committee provided valuable inputs.

The NSP 2024-2030 is aligned with the Sustainable Development Goals (SDGs); and Global Technical Strategy for Malaria 2016-2030, WHO, 2021, and Regional Action Plan 2017-2030. Towards 0. Malaria-Free South-East Asia Region, WHO, 2017; as well as draws on findings and recommendation of the JMM5. In addition, several guidance documents from the WHO served as references during the development of the NSP 2024-2030, viz. A Framework for Malaria Elimination, WHO, 2017; Malaria Surveillance, Monitoring & Evaluation: A Reference Manual, WHO, 2018; Manual for Developing Malaria Strategic Plan, WHO, 2019; Second focused review meeting of the Malaria Elimination Oversight Committee (MEOC), WHO, 2021; Guidelines for malaria, WHO, 2022; Preparing for certification of malaria elimination, second edition, WHO, 2022; World Malaria Report, WHO, 2022, amongst others (Annex-1). Strategy and guidance notes from key donor/partner agencies, viz., RBM Partnership to End Malaria (viz., Strategic Plan 2021-2025, 2020 and others); the Global Fund [Fighting Pandemics and Building a Healthier and More Equitable World: Global Fund Strategy (2023-2028), 2022 and others] were also referred to amongst other reference materials.

The NSP 2024-2030 will be a living document and updated with added guidelines and SOPs, as needed, in consultation with the Malaria Technical Committee of the NMEP and individual experts, and the WHO, following updates in international guidance and importantly, drawing on country experience as burden reduction is accelerated in 03 CHT districts; and elimination interventions are rolled out in rest of the country in phased manner and districts/Upazilas progressively reach the prevention of re-establishment stage. Interventions for malaria-free areas for prevention of re-introduction and re-establishment of malaria transmission will follow the WHO guidance and expected to evolve over time and the NSP 2024-2030 will be accordingly revisited and updated.

#### 1.4 Alignment with National Planning and Budgeting

National strategic plans are implemented by Operational Plan (OP) and Project Implementation Plan (PIP) and in line with the budgeting cycle (July to June) of the GoB. The NSP 2024-2030 will be aligned with the national planning and budgeting cycle and implementation tools such as upcoming HNPS, OP-PIP 2023-2028 and the one for the next five-year period. Current OP (2017-2022) has an allocated budget of BDT 13,432.10 Lacs [GoB resources and reimbursable project aid (RPA)] for malaria elimination in support of the NSP (2017-2021) [Table-1]. This allocation will be reviewed, and the allocation of the next OP will be allocated taking into consideration the needs of the NSP 2024-2030. In addition to the GoB resources, additional grant support from external partners, viz. the GF are received since 2007-2008. So far, a total of USD 118.31 million has been received, in addition to the USD 24.10 million for the period 2021-2023. Besides, the WHO also provides support in terms of technical assistance. It is expected that the GF will continue to support Bangladesh to achieve malaria elimination.

Table-1: The GoB resources 2017-2022 for Malaria & Aedes transmitted disease (ATD) Programme (Figures in BDT in Lacs)

| FY           | GoB            | RPA              | Total            |
|--------------|----------------|------------------|------------------|
| 2016-17      | 391.00         | 387.50           | 778.50           |
| 2017-18      | 566.80         | 1,772.00         | 2,338.80         |
| 2018-19      | 571.00         | 1,782.00         | 2,353.00         |
| 2019-20      | 666.30         | 2,262.00         | 2,928.30         |
| 2020-21      | 644.74         | 2,093.91         | 2,738.65         |
| 2021-22      | 430.70         | 1,864.15         | 2,294.85         |
| <b>Total</b> | <b>3270.54</b> | <b>10,161.56</b> | <b>13,432.10</b> |

Source: Government of Bangladesh (GoB)

## CHAPTER-2 COUNTRY PROFILE

### 2. COUNTRY PROFILE

The People's Republic of Bangladesh is a sovereign state in South Asia. It forms the largest and easternmost portion the ethno-linguistic region of Bengal. The country had been a colony of Great Britain for nearly 200 years, from which it emerged as part of Pakistan in 1947. Bangladesh emerged as an independent nation following a heroic war of liberation from Pakistan, which ended in victory for Bangladesh in December 1971. Located at the northern tip of the Bay of Bengal, the country is bordered by India and Myanmar and is separated from Nepal and Bhutan by the narrow Siliguri Corridor of India. With a population of 165 million in 2022<sup>2</sup>, it is the world's eighth-most populous country and the fifth-most populous in Asia. Bangladesh is also one of the most densely populated countries in the world. The capital Dhaka and the port city of Chattogram (formerly Chittagong) are the most prominent urban centres.

#### 2.1 Demographic Profile

The population statistics are presented in the Table-2 below. A total of 63.37% of the population lives in rural Bangladesh, while 36.63% lives urban areas (2018). The population of Bangladesh comprise Bengalis and various ethnic groups, viz., *Mro, Marma, Tripuri, Chakma, Tangchangya, Kuki, Bhawm, Bangali, Chak, Khumi, Luchai, Pnakuya, Garo (Achik), Khasi, Oraons, Manipuri, Munda, Santhal, Zomi, Bihari*. The particulars are important for planning malaria interventions.

Table-2: Population Statistics in Bangladesh (to be updated)

| Population Variables                              |         |
|---|---------|
| Total population in 2022 (in millions)            | 165     |
| Population, female (% of total population) [2022] | 50      |
| Population, rural (% of total population) [2019]  | 63      |
| Population density per square kilometre (2019)    | 1,253   |
| Population growth rate per annum (2019)           | 1.03    |
| Male/Female sex ratio                             | 102/100 |
| The population household size per family unit     | 5.01    |

Source: Population and Housing Census 2022. Bangladesh Bureau of Statistics. 2022; <https://datacatalog.worldbank.org/dataset/world-development-indicators>; <https://knoema.com/atlas/Bangladesh/topics/Demographics/Population/> Population-density; Population growth rate; Male-to-female-ratio

#### 2.2 Administrative Structures

##### 2.2.1 Administrative structure

For administrative purpose, the country is divided into eight administrative divisions. These divisions are further divided into 64 districts and 495 Upazilas. In rural areas, the administrative governance goes through 4,571 unions and wards. Each union consists of multiple villages. In addition, 316 municipalities and 12 City Corporations were set up in suburban and urban areas, respectively. A ward is the lowest administrative unit of the government structure. Direct elections for chairperson and members are held at the union level, while government officials are appointed at the higher administrative levels. The administrative structure<sup>3</sup> is summarized in the Table-3 below.

Table-3: Administrative structure in Bangladesh (to be updated)

| S. No. | Administrative Statistics | Number | Administrative Head     |
|--------|---------------------------|--------|-------------------------|
| 1.     | Division                  | 8      | Divisional Commissioner |

| S. No. | Administrative Statistics   | Number  | Administrative Head     |
|--------|-----------------------------|---------|-------------------------|
| 2.     | District                    | 64      | Deputy Commissioner     |
| 3.     | Upazila                     | 495     | Upazila Nirbahi Officer |
| 4.     | Union                       | 4,554   | Union Chairman          |
| 5.     | Ward (in rural area)        | 40,977  | Ward Member             |
| 6.     | Village (approx.)           | 87,320  | Village Headman         |
| 7.     | Household/Village (Average) | 250-500 | Household Head          |
| 8.     | City Corporation            | 12      | Mayor                   |
| 9.     | Metropolitan City           | 4       | Mayor                   |
| 10.    | Municipality                | 328     | Mayor                   |

Source: Health Bulletin, MoHFW, GoB, 2019; Bangladesh Bureau of Statistics, 2021.

### 2.2.2 Governance structure

Bangladesh governance structure institutionalizes a matrix, in which individual actors, firms, social groups, civic organizations and policy makers interact with each other to implement and enforce public policies and to improve private sector coordination. Bangladesh governance structure also includes system of politics and their functions in relation to public administration and law. To practice good governance, the Bangladesh Constitution provides elements driving fully to develop good governance and capturing institutional and non-institutional parameters of governance.

### 2.3 Overview of Health System and Linkage of NMEP with MoHFW

The MoHFW is the key ministry responsible for the provision of comprehensive health services and financing in Bangladesh through different directories. The MoHFW has established an organizational structure and built healthcare infrastructure at country's administrative levels (national, divisional, district, Upazila, union, and ward levels) for making policy; organizing, managing, and coordinating implementation; and regulating national health and family planning related activities and programmes. The MoHFW, through the Directorate General of Health Services (DGHS) and the Directorate General of Family Planning (DGFP), manages general health and family planning services through Medical College Hospitals at national level, District Hospitals at district level, Upazila Health Complexes at sub-district level, Union Health and Family Welfare Centres at union level, and Community Clinics (CCs) at ward level. Moreover, the DGHS also operates tertiary level health care services through specialized hospitals and health institutes. In addition, the Ministry of Local Government, Rural Development and Cooperatives through its Local Government Division (LGD) manages the provision of urban primary care services in the City Corporations and municipalities.

The Honorable Health Minister leads, directs, and guides the MoHFW in making policies, acts, strategies, rules, and regulations related to the national healthcare services. The Secretary is the Chief Executive Officer (CEO) of the MoHFW playing a leadership role in developing major policy initiatives; implementing different health acts, policies, and strategies throughout the country; and overseeing the efficient and effective delivery of government policies, services, and programs. Moreover, the Secretary, as a CEO of the ministry, oversees eight different directorates (Figure-1) responsible for the implementation of healthcare services delivery. The DGHS oversees development and execution of health policies and strategies; annual plans; and implementation management of health programmes across the country.

Figure-1: Healthcare service delivery system in Bangladesh (to be updated)

| PUBLIC HEALTHCARE SERVICES DELIVERY SYSTEM   |   |                   |                             |           |
|--|---|-------------------|-----------------------------|-----------|
| RESPONSIBLE MINISTRY: MINISTRY OF HEALTH & FAMILY WELFARE (MoHFW)  |   |                   |                             |           |
| Health Facilities  | DGHS  |                   | DGFP                        |           |
| Medical Colleges: (Public (36) & Private (70); Specialized hospitals with post-graduate medical teaching institutes (39) | Principal, Hospital Director & Institute Director |                   | Director                    |           |
| Division (8)<br>Specialized Hospitals (30)   | Divisional Director-Health                        |                   | Divisional Director-FP      |           |
| District (64)<br>District Hospitals (62); MCWC (97)  | District Civil Surgeon                            |                   | District Deputy Director-FP |           |
| Upazila (492)<br>UHC (490); Hospital (34)  | Upazila UH&FPO                                    |                   | Upazila FP Officer          |           |
| Unions (4,554)<br>UH&FWC (3,863); USC (1,382)  | HI/AHI  | MT-Lab & MA, MO,  | FPI/AFPI                    | FWV/SACMO |
| Wards (40,977)<br>Community Clinic (CC) (13,932)   | HA  | CC – CHCP<br>MHVs | FWA                         |           |
| Source: Health Bulletin (2019), MoHFW, GoB.  |   |                   |                             |           |

The national malaria elimination programme is implemented by Communicable Disease Control (CDC) Unit under the DGHS of MoHFW. At subnational level, malaria services are provided along with other essential and primary healthcare services by District Hospitals in districts, UHC Hospitals (the lowest level of in-patient facilities in Upazilas) and such health facilities as UHFWC, rural dispensaries, and CCs. In addition, there are public medical hospitals located at divisional level for all tertiary services.

At **central level**, the NMEP under the CDC, DGHS, MoHFW, has direct responsibility for planning, implementation and M&E of malaria elimination programme. The NMEP leads development of policy, strategy, guidelines, SOPs, QA/QC, and planning and implementation of interventions, procurement of health products/pharmaceuticals and supply to public sector health system and partner NGOs, besides leading M&E/MIS, oversight as well as partnership and coordination, research. The NMEP has three main sections: Epidemiology; Entomology and Laboratory (Central Malaria Reference Laboratory - CMRL). The NMEP has been receiving support from the GF since 2007. The GF supported Program Management Unit (PMU) is set up at the central level comprising technical and administrative staff at the central and district levels. The concerned experts of the NMEP central PMU and Surveillance Medical Officers (SMOs) positioned at district level, headed by the Deputy Programme Manager (DPM) are responsible personnel under the overall leadership of the Director, Disease Control & Line Director, CDC, DGHS, MoHFW, GoB. A surveillance and monitoring and evaluation system is in place for assessing program performance periodically.

At the **district level** and downwards, implementation of malaria elimination activities in the public sector are managed by the District Health Office led by the Civil Surgeon (CS) supported by Medical Officers (MO - Disease Control & others), Medical Technologists – Laboratory (MTs), Pharmacists, Nurses and

Paramedics (Medical Assistants), and procurement and supply chain staff (including store/warehouse officials) and support staff.

At **Upazila level**, the Upazila Health Complex is led by Upazila Health and Family Planning Officer (UHFPO) supported by MOs, Statistician, MTs, Pharmacists, Nurses and Paramedics, and procurement and supply chain staff (including store/warehouse officials) and support staff. In addition, every UHC has supervisory cadres, viz., Health Inspectors (HIs), Assistant Health Inspectors (AHIs), and field level cadres (community health workers) like Health Assistants (HAs). The UHFPO and rural dispensaries have non-medical assistants for health and family welfare as well as referral services.

At **ward/community level**, there are ~13,000 CCs for average 6,000 population, which are one-stop centre for healthcare services at the community level. The CC has one trained community healthcare provider (CHCP). The HA from respective UHC and a Family Welfare Assistant (FWA) from UHFPO visits CC on designated days in a week. A scheme of multi-purpose health volunteers (MHVs) has been launched to support community-based malaria services at the doorstep of people starting with the CHT and Cox's Bazar districts, which will be expanded in phased manner.

The malaria elimination programme is being implemented in partnership and coordination with the partner NGOs, the WHO, the GF and other donor and partner agencies, research and academic institutions, and various stakeholders including the community. The NMEP partnership with NGO partners (BRAC and its collaborating partners) with the GF support has achieved credible results. From 2021, partner NGOs are providing strong complementary support in 03 CHT districts and Chattogram and Cox's Bazar districts. Key functions include diagnosis and treatment, and surveillance and M&E at community level, LLIN distribution and advocacy, communication and community engagement activities, amongst others. They proactively coordinate with the NMEP as well as district/Upazila authorities and below levels for timely and quality implementation and reporting. The partner NGO Shashthyo Kormis (SK) [female community health workers] and Shashthyo Shebikas (SS) [female community health volunteers], project assistants (PAs) and Field Organizers (FOs) are front-line cadres (LTs) for malaria services at community level. The trained community health workers/volunteers are responsible for case detection/referral and promoting community participation thereby fully complementing and supporting the government healthcare service delivery. In addition, partner NGO laboratory technicians/assistants also conduct parasitological tests (microscopy) in selected areas. The supervisory staff at Upazila level includes Project Officers and Upazila Managers. Very limited implementation and coordination support are being provided by partner NGO in eight elimination districts with a small team at Upazila level, as an integral part of the UHC team, according to the transitioning process of strengthening of service delivery through the public health system. The partner NGO District Managers and support staff and the regional and central teams comprising officers, specialists led by the project head are responsible for programme implementation and M&E. The partner NGO senior executives play overall stewardship as well as oversight roles.

The Armed Forces, Border Guard Bangladesh (BGB) and other law enforcement/security agencies are also providing malaria services and contributing to malaria surveillance in their designated areas. Besides few INGOs, International Organization for Migration (IOM) are also involved in malaria case diagnosis and treatment in Rohingya [Forcibly Displaced Myanmar Nationals (FDMN)] camps in Cox's Bazar district.

In addition, there are few research and academic institutions, which support the NMEP from time to time in conducting research/evaluation (besides partner NGO), viz., Bangladesh Institute of Tropical and Infectious Diseases (BITID); and NIPSOM, IEDCR, and few universities/private sector institutions (like icddr, b). Private sector (formal, informal) involvement in case management, referral and reporting is initiated in a few Upazilas. This is expected to be progressively strengthened. According to an upcoming private sector engagement strategy. Furthermore, involvement of selected development partners is envisaged for case detection, referral and reporting as well as enhancing community awareness and mobilization, as applicable.

## 2.4 Community Systems in Service Delivery

The Government of Bangladesh introduced CCs in the 1990s with an aim to deliver primary health care, family planning and nutrition services to rural people at the grassroots level. As mentioned earlier, the CCs are conceived to improve access to healthcare services at the community level. The CC has one trained Community Healthcare Provider (CHCP) as its main staff. A Health Assistant from Upazila and a FWA from Union health facility visits CC on designated days in a week. Besides, the GoB is planning to expand CCs as well as recruit MHVs nationwide to facilitate community-based services at the doorstep. They will be trained to support the CCs and HAs to enhance prevention measures, referral of suspected malaria cases and community awareness and mobilisation. They also refer the patient to the nearest health facility if there are any signs of severe malaria, without any delay.

Trained female frontline community health care providers (with partner NGOs), viz., female health volunteers (*Shasthya Shebikas*) and health workers (*Shasthya Kormis*) play a pivotal role in malaria interventions at the community level by bridging the community and the public health system and enhancing community participation in 03 CHT districts as well as Chattogram and Cox's Bazar. Malaria awareness messages are disseminated through community based and led sessions (referred as courtyard meetings), apart from health forums and group meetings at marketplaces, thereby making attempts to involve more of the community. BCC/Information, Education and Communication (IEC) materials are used regularly during such sessions besides inter-personal communication. This community health workforce is hired locally to cover specified areas including hard-to-reach pockets in remote hilly, forest and border areas to maximize the outreach of malaria services. Originating from the same community and verbalizing in the same language helps in overcoming the accessibility, communication barriers. In addition, additional field level cadres (under partner NGO) are envisaged in this NSP 2024-2030 in selected Upazilas of Bandarban district to support the CCs, public sector and partner NGO peripheral health workers/volunteers (mentioned under 'strategic framework').

Orientation on malaria prevention and control are organized periodically at the union level gathering influential people from the community/community leaders to make them aware of malaria symptoms, diagnosis and treatment services and prevention methods. Formal meetings are held with the local community/village leaders (Headman, Karbari), religious leaders etc., where the objectives of the programme are shared; gaps in service provision are discussed and the different suggestions from the participants are considered for improving service delivery and raising awareness. Private sector particularly the informal health care service providers is an important part of the community level health systems (mentioned in the next section). Involvement of schools at community level through engagement with students and teachers in selected endemic areas are also initiated so that they can disseminate the messages to their family and local community about the disease and available services.

Orientation on malaria prevention and availability of diagnostic and treatment facilities among high-risk groups has also been initiated like *jhum* cultivators, forest goers, and other mobile and migrant populations, etc. In addition to providing supplementary LLINs, health camps are conducted at transit points near forest, *jhum* land, and border areas for screening of malaria.

## 2.5 Private Sector in Service Delivery

Public sector health care delivery system of Bangladesh reaches up to community level. Private medical colleges as well as clinics, diagnostic centres supplement the public health system. At community level, besides community health workers/volunteers of partner NGOs, private sector health care service providers are also involved in malaria case management especially in hard-to-reach areas. Thus, the private sector plays a significant but ill-defined role in malaria case management. Efforts have been initiated in few districts to map, orient and seek report from the private sector to ensure prompt referral and appropriate malaria diagnosis and treatment, which will be strengthened. Malaria is a notifiable disease in Bangladesh under the Infectious Disease Act 2018. However, reporting from non-government/private sector is yet to be optimal and will be pursued.

In 2019, the NMEP led a process of assessing private sector role, readiness and performance relating to malaria elimination in four selected Upazilas with technical assistance by the WHO. Both quantitative and qualitative data were collected from different categories of health facilities (private hospitals, private clinics, diagnostic centres, pathology laboratory and NGO clinics, etc.) and health care providers (graduate doctors, medicine shopkeepers and informal practitioners, etc.). Approximately, 60% of private sector health facilities were able to carry out parasitological examination with both RDT and microscopy. However, the assessment reported that majority of private sector health care providers did not use pre-qualified diagnostic products. Additionally, it was reported that more than 50% of private sector health care providers provided a combination of antimalarials, which are not in line with the approved national treatment guidelines. The assessment indicated that awareness on malaria control and elimination especially knowledge on malaria treatment guidelines remained variable among the private sector providers. Moreover, the number of cases diagnosed and treated were not fully reported to the NMEP. Nevertheless, many private sector health care providers expressed interest for collaboration with the NMEP. The assessment recommended an expanded survey with larger representative samples from different malaria endemicity areas using the existing survey tools. Furthermore, mapping of potential private stakeholders in high-risk areas was highly recommended.<sup>4</sup> Private sector engagement will be pursued through the new NSP 2024-2030 period.

## **2.6 Health Sector Policies and Strategies and Synergies with NMEP**

The National Development Plan of Bangladesh has captured all 17 SDGs. The 4<sup>th</sup> HNPSP vision aspires for people to be healthier, happier, and more economically productive and for Bangladesh to be a middle-income country. The GoB intends to establish a ‘people-oriented’ responsive health care system, which emphasizes the needs of women, children, adolescents, the elderly, the poor, and the marginalized segments of the population through developing an effective, efficient, and sustainable health service delivery system. Scaling up of health services and expanding access aim at accelerating progress to achieve SDGs in 2030. These components add increased attention to maternal, neonatal, child, reproductive and adolescent health; communicable and non-communicable diseases; climate change and health protection; disease surveillance; and behavior change communication (BCC) related programmes.

Strengthening of primary healthcare and emergency care for all is crucial in the health system in terms of maximizing access and coverage. The number of healthcare providers in the public sector is low [Physician density (per 1,000 population) is 0.58 (2018); Nursing and midwifery personnel (per 1,000 population) is 0.41 (2018) and Hospital beds per 1,000 population is 0.79 (2016)].<sup>5</sup> Most of these health workers are concentrated in urban areas. There is a need for adequate supply of health professionals and sufficient hospital beds in public facilities. In order to ensure quality of healthcare services, MoHFW being a regulatory authority will address some critical problems such as: regulating of unauthorized clinic and hospitals, identifying and taking punitive actions against fake, quack and unlicensed doctors, restricting the function of below standard medical colleges and controlling the counterfeit medicine producing pharmaceutical companies.<sup>6,7</sup> Current systems of geographic resource allocation need strong improvement to contribute to the improvement of health status of the most vulnerable groups as the poor, women, and children. Resources are currently allocated to District Hospitals and Upazila Health Complexes largely according to the size of the inpatient-outpatient facilities and numbers of staff in post. This leads to wide different in district per capita allocations in both the Revenue Budget and Development Budget.<sup>8</sup> Improvement regarding the issues is one of the objectives of the HNPSP.

At the community level, revitalizing CCs as part of a functional Upazila Health System has been underscored. Strengthening overall health system governance, a sound M&E System and health equity for the poor and for marginalized populations are given due consideration. To increase coverage and quality of services, the GoB has also been encouraging inter-sectoral coordination, with emphasis on NGO and private sector service providers.

The MoHFW works in collaboration with the Ministry of Social Welfare, Ministry of Chittagong Hill Tract Affairs, the CHT Board, NGOs, and the private sector, amongst others. The ‘Essential Services Package (ESP)’ is provided in hard-to-reach areas through appropriate arrangements with NGOs and community-based organizations (CBOs) to overcome the shortage of public sector human resources based on comparative advantages.

**Linkage between NSP 2024-2030 and Sector Strategies:** The 4th HNPSOP Operational Plan (OP) for Communicable Disease Control 2017 – 2022 goal is to ensure quality and equitable health care for all citizens by improving access to and utilization of health, population and nutrition services. The development objective is to improve both access and utilization of such services particularly for the poor. The general objective is to control/eliminate specific communicable diseases from Bangladesh. The component-1 of the HNPSOP OP includes malaria elimination as a priority towards malaria-free Bangladesh by 2030.

All CDC programmes are implemented through the integrated primary healthcare system at district, Upazila and below, and malaria service delivery is one of the priorities. Malaria programme finds synergies within the primary healthcare systems of the CDC and activities are delivered through public sector health facilities and health workers, volunteers maximizing opportunities for integration.

## 2.7 Socio-Economic Determinants

### 2.7.1 Political stability

Bangladesh is a democratic country practicing parliamentary form of government with multi-party system. Executive power is exercised by the government headed by the Honorable Prime Minister while the legislative power is vested in both the government and parliament. The President is the constitutional head of state and is elected for a five-year term by the parliament.

The Gross Domestic Product (GDP) growth rate of Bangladesh was 8.15% 2019, reflecting good political stability. The growth rate in Bangladesh was one of the highest in the South-East Asian countries.<sup>9</sup>

### 2.7.2 Development indicators

Human Development Index (HDI) and key SDG indicators are given in Table-4. The 2020 HDI value has put the country in the medium human development category, positioning it at 133 out of 189 countries and territories. Between 1990 and 2019, Bangladesh's HDI value increased from 0.394 to 0.632, an increase of 60.4 percent. According to the SDG profile report, key SDG indicators values and are improving.<sup>10</sup>

Table-4: Human Development Report, 2020: Selected Indicators (to be updated)

| Indicators (based on UNDP report)  | Value       |
|--|-------------|
| Human Development Index (HDI) [2019]   | 0.632       |
| Life expectancy at birth (years) [2019]  | 72.6        |
| Life expectancy at birth male/female (years, 2019)                                     | 70.88/74.60 |
| Probability of dying between 15- and 60-years male/female (per 1,000 population, 2019) | 149/113     |
| Mortality rate, under 5 (per 1000 live birth) [2018]                                   | 30.2        |
| Mortality rate, infant (per 1,000 live births) [2018]                                  | 25.1        |

Source: Human Development Report, 2020 - <http://www.hdr.undp.org/en/countries/profiles/BGD>; World Health Organization Global Health Expenditure database<sup>11</sup>; <https://www.macrotrends.net/countries/BGD/bangladesh/healthcare-spending>; <https://datacatalog.worldbank.org/dataset/world-development-indicators>.

### 2.7.3 Socio-economic indicators

An overview of socio-economic variables of Bangladesh is presented in Table-5.

Table-5: Socio-economic Variables of Bangladesh (to be updated)

| <b>Socio-economic variables</b>   | <b>Value</b> |
|---|--------------|
| GDP (billion current USD) [2019]  | 302.56       |
| GDP growth (annual %) [2019]  | 8.15         |
| GDP per capita ((billion current USD) [2020]  | 1968.79      |
| Current health expenditure (% of GDP) [2018]  | 2.34         |
| Current health expenditure per capita in 2018 (current USD) [2018]                              | 41.91        |
| Domestic General Government Health Expenditure (% of GDP) [2018]                                | 0.38         |
| Domestic General Government Health Expenditure Per Capita (current USD) [2018]                  | 7.12         |
| Domestic general government health expenditure per capita, PPP (current international \$)       | 18.62        |
| Domestic General Government Health Expenditure (% of current expenditure) [2018]                | 16.98        |
| Domestic Private Health Expenditure (% of current expenditure) [2018]                           | 76.50        |
| GNI (current USD) [2019]  | 3.17         |
| GNI growth (annual %) [2019]  | 8.29         |
| GNI per capita [Purchasing Power Parity (PPP) Current International \$] [2019]                  | 5190         |
| Out-of-pocket Expenditure (% of current health expenditure) [2018]                              | 73.87        |
| Out-of-pocket expenditure per capita (current US\$)   | 30.96        |
| Employment to population ratio, 15+, female (%) (30modelled ILO estimate)                       | 33.99        |
| Employment to population ratio, 15+, male (%) (m30odelled ILO estimate)                         | 78.90        |
| Female labor force participation rate (% of female population ages 15+) (modelled ILO estimate) | 36.37        |
| Literacy of population (of 7+ years) [Male/Female]  | 75.2/71.2    |
| Literacy rate, adult (% ages 15 and older) [  | 73.9         |
| Expected years of schooling (years) [2019]  | 11.6         |
| Mean years of schooling (years) [2019]  | 6.2          |
| Youth Gender Parity Index*  | 1.02         |

Source: <https://datacatalog.worldbank.org/dataset/world-development-indicators>;  
<https://data.worldbank.org/indicator/SP.DYN.AMRT.FE>;  
<https://knoema.com/atlas/Bangladesh/topics/Health/Health-Expenditure/General-government-expenditure-on-health-as-a-share-of-current-health-expenditure>;  
<https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?locations=BD>;  
<https://datacatalog.worldbank.org/dataset/world-development-indicators>; Health Bulletin, MoHFW, GoB, 2019; Human Development Report, 2020 (<http://www.hdr.undp.org/en/countries/profiles/BGD>);  
<https://data.worldbank.org/indicator/SE.ADT.1524.LT.FM.ZS?locations=BD>.

\*: The gender parity index (GPI) of the youth literacy rate is the ratio of the female to male literacy rates of the population aged 15 to 24 years. A GPI value between 0.97 and 1.03 is usually interpreted to indicate gender parity.

With regard to poverty elimination, Bangladesh has achieved a commendable result by reducing poverty rate to 20.5% in 2019 from 24.3% in 2016 as measured by the percentage of people living below the national poverty line.<sup>12</sup> Based on the current rate of poverty reduction, Bangladesh is projected to eliminate extreme poverty by 2021, the first nation in South Asia to do so.<sup>13</sup> Many people live in remote rural areas that lack adequate services such as education, health clinics, and adequate roads, particularly road links to markets. An estimated 35 percent of the population in rural areas lives below the poverty line. An estimated 21 percent of the population in urban areas lives below the poverty line.<sup>14</sup>

Gini index measures the extent to which the distribution of income or consumption expenditure among individuals or households within an economy deviates from a perfectly equal distribution. In 2018, Gini index in Bangladesh was 39.5%,<sup>15</sup> which was found to influence the risk factors on the socioeconomic and environmental models. Socio-economic factors remain main drivers of higher transmission of malaria, amongst others.

Many economic activities and livelihoods are found to associated with malaria transmission especially in Chattogram, Cox's Bazar and 03 CHT districts, and other endemic bordering Upazilas of Bangladesh. Major economic activities in which a considerable number of people are engaged in, especially in malaria endemic hilly, forest areas are:

- agriculture and irrigation (people engaged in Jhum cultivation in the hilly areas are at high risk of getting malaria);
- trade (labors engaged in wood/bamboo cutting from deep hilly forest and labors engaged in trading in the hilly border areas are at high risk of getting malaria);
- mining (labors living at border areas and engaged in coal mining in neighboring country are at high risk of getting malaria);
- fishing (fishermen catching fish from lake and large-medium-small ponds are also exposed to biting of mosquito and hence at high risk of getting malaria); and
- other development works (such as labor engaged in brick kilns, road/culvert/bridge construction is at high risk of getting malaria); and
- women engaged in collecting fruits, banana, other resources from deep forest are also at high risk of getting malaria.

Additional determinants influencing malaria control and elimination are:

- Legal status: In the case of illegal migrants and individuals involved in illegal activities, fear of punishment often prevents any contact with health system or groups that are perceived to be official. Therefore, even information on them is difficult to obtain.
- Language: Only a small proportion of people from ethnic minority groups speak the national language making communication of health messages problematic.
- Urban setting: In cities, towns, the urban slum population and possible mobile populations that may tend to live in such settlements are a socio-economically disadvantaged group. Although they are likely to have access to healthcare facilities, treatment delays due to malaria being a “forgotten disease” and healthcare workers not being aware of availability of testing facilities and treatment of malaria make such populations vulnerable to severe malaria. At present there are no guidelines regarding test, treat or report in urban setting.

#### **2.7.4 Housing and infrastructure**

Housing conditions, settlement patterns: In malaria endemic rural and CHT areas, housing conditions influence deployment/use of prevention interventions. Traditional elevated ‘Machang’ houses made of bamboo, wild grass, and straw, are mainly a popular housing choice among many ethnic minority groups of the CHT. The space underneath the Machang is used for various purposes such as keeping livestock, storing fuel wood, etc. The rifted flooring of these houses makes an easy way for the movement of mosquitoes at night unless a mattress and mosquito nets (Long Lasting Insecticidal Net) is used. Besides residing in hilly forest areas, such easy access to vectors boosts the malaria transmission further. Furthermore, whilst some ethnic minority groups live within paras (hamlets) with clustered households, some prefer to stay in scattered manner where houses are located far from each other with a fair distance. Some even stay in the jhum fields (inside forests/on top of hills) for long duration spanning over months. This poses challenges regarding treatment seeking by the community as well as household visits by community health workers/volunteers within a limited time particularly during monsoon/post-monsoon season.

Infrastructure, communication: Infrastructure and communication affect accessibility and deployment of logistics and uptake of malaria interventions. The geographical complexity of hard-to-reach areas adds up to further challenges for health workers, where they can visit only once/twice a month for

interventions. The climatic conditions in remote, hard-to-reach areas pose huge challenges for transportation/communication thereby slowing/hampering the intervention processes. In many areas, monsoon makes the movement via land/river hard and very limited compared to dry season. Further, access to telecommunication, mobile networks are still very poor in remote areas. It becomes difficult for the staff/health worker to connect via phone at times of need.

## **2.8 Health Seeking Behaviour; Cultural Practices**

In general, public sector health care services are availed in rural areas as well as private practitioners (both formal and informal). Due to literacy rate, lack of awareness related to availability of healthcare services, socio-cultural beliefs, many community people in endemic districts particularly 03 CHT districts prefer to avail services from village doctors (Kobiraj and Hekims), ayurvedic and homeopathic doctors, and other traditional healers, unless the condition worsens and or the illness persists. Such traditional healers or pharmacy shops/drug sellers sometimes refer them to go to the public sector health facilities/partner NGO providers but often not at the initial stages. Their trust in non-traditional health care service providers is low and acts a barrier to seeking care. Besides, livelihood pursuits of most of the ethnic groups (forest related activities, jhum cultivation, labour) and choice of lifestyle usually make them vulnerable. Even traditional clothing of certain ethnic minority groups renders them vulnerable to mosquito bites. The tribal groups usually are hardworking and active people, who maintain a hard livelihood. In urban areas, access both public and private sector healthcare services dependent on ease of access, expenses, quality of services, yet services may not be availed readily by the socio-economically disadvantaged sections.

## **2.9 Human Rights related Barriers and Inequities**

Human Inequality Coefficient for Bangladesh is 23.7% in 2019.<sup>16</sup> Underserved populations are facing healthcare service deprivation due to barriers and inequities such as poverty, social exclusion, cultural and traditional norms, financial constraints, and distance to health facilities. Underserved populations are likely to experience higher risk of morbidity and mortality related to malaria, due to the barriers and inequities that they face to access to basic quality healthcare services. The number of CCs needs to be increased to reduce those barriers and inequities, because malaria prevention and treatment services (amongst other healthcare services) besides complementary community systems in terms of partner NGO service provision. For forest goers and jhum cultivators to seek treatment in the village from health worker/volunteers or at health facility located in the nearby town consumes a lot of time and money. This situation is exacerbated when travel becomes even more difficult during monsoon season. It is for this reason many forest workers/goers take medicines with them and indulge in self-treatment, which may be useless or even dangerous or seek services from available informal private sector. Furthermore, ethnic minority groups and migrants are amongst the most marginalized groups, with little voice and representation in decision making structures. It is crucial to protect patient dignity, privacy, and confidentiality in respect to medical ethics for all.

The NMEP commissioned technical assistance in 2020 to obtain understanding of the human rights and gender-related barriers to access in the context of malaria.<sup>17</sup> Key recommendations include:

- Increase the coverage by community health workers/volunteers to cater for the needs of mobile and migrant populations and consider extended working hours of the CCs.
- Introduce ‘know-your rights’ in BCC and community outreach activities as well as integrate ‘basic rights literacy’ in malaria trainings and sensitization sessions with public sector service providers, law enforcement agencies, since women, children, and workers in border areas face challenges in accessing services due to their socio-economic or legal status.
- Mobilise and orient women champions among the FDMN and host communities towards their empowered participation.
- Ensure LLINs for key and vulnerable populations in endemic districts with prioritisation of the special needs for cross border/forest workers and other mobile and migrant populations.

- Consider identifying and orienting a man and a woman amongst mobile and migrant population groups on first aid, malaria diagnosis and treatment with RDT and antimalarials with provision of requisite supplies besides essential medicines for body aches and pains, fever, malaria, diarrhoea and first aid.
- Consider feasibility of providing ‘Forest Packs’ for mobile and migrant populations in forest/border areas. These packs may include RDT, ACT and other antimalarials, LLINs (hammock nets) and repellents following sensitization on use. Appropriate dressing like wearing long-sleeved clothes, etc. needs to be emphasised.
- Ensure awareness generation activities and sensitisation/orientation sessions in local dialects/languages. Community consultations should inform Social Behavioural Change Communication (SBCC) strategies and tools towards enhancing knowledge, shifting attitudes and cultural norms and produce positive change in a wide variety of behaviours and inculcate community’s sense of ownership.
- Ensure LLIN distribution to pregnant women and consider chemoprophylaxis, use of LLINs and antimalarial drugs are essential. Carry out targeted communication campaigns, to change the perception that antimalarials are harmful for pregnant women. Strengthen integration of malaria prevention and treatment within antenatal care.
- Consider establishing CCs along international border areas for rigorous malaria surveillance, case detection and treatment services to prevent possible cross border transmission of drug resistant malaria parasite (*P. falciparum*).

**Forcibly Displaced Myanmar Nationals (FDMN) [Rohingya refugees]:** More than one million FDMN are residing mostly in refugee camps in Bangladesh. They are also exposed to malaria risk. Anecdotal evidence mentions about their movement in forest areas of Bandarban district outside the camps, rendering them at risk. At the same time, they also pose risk regarding possible emergence of Artemisinin resistance already evident in their country of origin – Myanmar. Under the leadership of the GoB, UN agencies and NGO network (local and international including partner NGO) are providing health services to FDMN. Prevention and case management services for malaria are being provided through these networks. Additionally, the NMEP provided LLINs to FDMN and envisages continuation of universal coverage of this high-risk group with support from the development partners with necessary coordination with the Office of the Refugee Relief and Repatriation Commissioner (RRRC) of the GoB and various partner agencies, including WHO, UNHCR.

## 2.10 Gender and Age-related Barriers and Inequities

In Bangladesh, economic and social position of women has gradually improved in line with education, income-generating activities, access to microfinance and employment in the garment industry. Women constitute a substantive part of workforce in the country today. However, gender equality remains an issue. The 2019, female HDI value for Bangladesh is 0.596 in contrast with 0.660 for males, resulting in a GDI value of 0.904, placing it into Group 4 countries with medium to low equality in HDI achievements between women and men. Furthermore, Gender Inequality Index (GII) reflects gender-based inequalities in three dimensions – reproductive health, empowerment, and economic activity. Bangladesh has a GII value of 0.537, ranking it 133 out of 162 countries in the 2019 index.<sup>18</sup>

Pregnant women are at greater risk of developing severe malaria in most endemic areas due to decreased immunity, although available evidence suggests that in the event of equal exposure, adult men and women are equally vulnerable to malaria infection. Moreover, cultural or gender norms may dictate certain limitations on mobility of pregnant women or their ability to frequent public places, possibly impeding their ability to utilize health services. Gender inequalities that sometimes hinder effective responses to malaria and health vulnerabilities for women (especially pregnant women) and girls are addressed by strengthening/orienting the programme to ensure right to health amongst them. At the same time, health vulnerabilities for men (forest goers, jhum cultivators, migrant and mobile populations) are also being addressed by focusing on interventions for men and boys. The GoB is improving access to health care services by strengthening the public health system at the grassroots.

Thus, gender inequalities are being addressed through progressive expansion of universal coverage by health care services at all levels. Involvement of both women and men service providers at all levels including district levels and below are improving equal access to case management and community level surveillance even in hard-to-reach areas. Notably, village-based multi-purpose health volunteers have recently been introduced, many of whom are young women/girls. Women are able to access LLIN, receive antenatal care, or take their malaria-stricken children to health services without relatively less inhibition. Continuous LLIN distribution to pregnant and under-5 children, key and vulnerable populations complemented by BCC, community engagement campaigns especially in high burden areas are absolute priority of the NMEP. Furthermore, in high endemic CHT areas especially, there is matrilineal system and women are the head of family structures among some ethnic minority groups. However, challenges remain.

The NMEP is committed to minimize barriers and inequities related to human rights and gender and strengthens malaria prevention and treatment services at all levels of community. NMEP coordinates these activities among partners such as the WHO, partner NGOs, and other partner agencies, such as, UNHCR, IOM. The following activities will be conducted to protect human rights and gender equality through the NSP period and in policies and policy-making processes:

- Invest and scale up programs to support women and girls, including programs to diagnosis, treatment, preventive services, and IEC activities to promote equity for accessing malaria services including gender- and age-related disparities.
- Support the meaningful engagement of key and vulnerable populations and networks.
- Include and analyse indicators disaggregated by gender and high-risk groups.

Trained female health volunteers/health workers of partner NGOs have played and will continue to play pivotal role in improving access to malaria interventions at community level. Likewise, there are many instances of social mobilization groups, self-help groups who are also playing important role in social mobilization and community-based interventions. Additionally, the partner NGO has initiated development of a module titled as "Know-Your Rights" along other BCC/IEC materials, which will promote early treatment seeking behaviour and encourage taking preventive measures amongst key and vulnerable populations, thereby complementing various efforts to address barriers related to gender & human rights.

The NSP 2024-2030 draws from the community consultations related to CRG barriers to access held in 2020 as well as aligns with the upcoming updated version of the GTS 2016-2030, the GF strategy 2023-2028, RBM Partnership to End Malaria and Malaria No More “Achieving a Double Dividend: The Case for Investing in a Gendered Approach to the Fight Against Malaria” (2021), with a key focus on focus on equity, human rights and gender, most vulnerable populations to improve health outcomes. A ‘Malaria Matchbox’ tool designed by the GF and RBM Partnership will be applied periodically to update understanding of community, rights and gender issues and address those through specific activities.

## **2.11 Climate: Meteorological Variables**

Bangladesh's climate is tropical with a mild winter from October to March, and a hot, humid summer from March to June. A warm and humid monsoon season lasts from June to October and supplies most of the country's rainfall. The country is flat and occupied by the huge Ganges-Brahmaputra Delta and therefore, highly prone to floods, as well as to storm surges when cyclones hit the Bay of Bengal. Bangladesh Meteorological Department (BMD) calculates the monthly and seasonal variation (minimum, maximum and dry bulb) of climate parameters to understand the temporal and spatial distribution of temperature, surface wind, rainfall, relative humidity. Understanding of relationship of meteorological variables to malaria distribution and transmission besides possible effect of climate change is initiated.

## **2.12 COVID-19 and Malaria Services**

In Bangladesh, more than 0.2 million cases and more than 29,000 deaths due to COVID-19 have been reported so far (until 23 December 2022) and a total of 341,188,113 vaccine doses have been administered (until 19 December 2022).<sup>19</sup> Extension of health services, and several other measures, like financial stimulus package, food security especially to the vulnerable population, amongst others, have been and continue to be taken by the GoB to tackle the situation. In the beginning of the pandemic, malaria services slowed down; however, the situation improved as the NMEP/MoHFW/GoB issued guidelines for COVID-19 as well as for maintaining essential services of different health programmes including malaria programme. Supply chain for drugs and diagnostics was/is not interrupted because of provision of buffer stock. Health workers and volunteers with the support of village head supported implementation of malaria interventions in most endemic areas. Innovative methods were adopted, viz. organizing virtual training and meetings, physical meetings with strict public health measures and combining messages for COVID-19, malaria and dengue. Mass LLIN distribution was done before the peak transmission season for malaria with improvised distribution mechanism like door-to-door distribution. Furthermore, there was reduction in the mobility of forest goers and jhum (shifting) cultivators, which might have helped in reduction of case incidence as well. The GF approved reprogramming of fund for COVID-19 response helped to procure PPE and supplies for health workers and laboratory staff. In addition, the GF supported the GoB by awarding an amount of US\$ 55,552,377 for strengthening COVID-19 Response Mechanism. Several agencies, viz., technical and development partners, partner NGOs, local stakeholders and even community came together to tackle the pandemic.

## CHAPTER-3 MALARIA SITUATION

### 3. MALARIA SITUATION

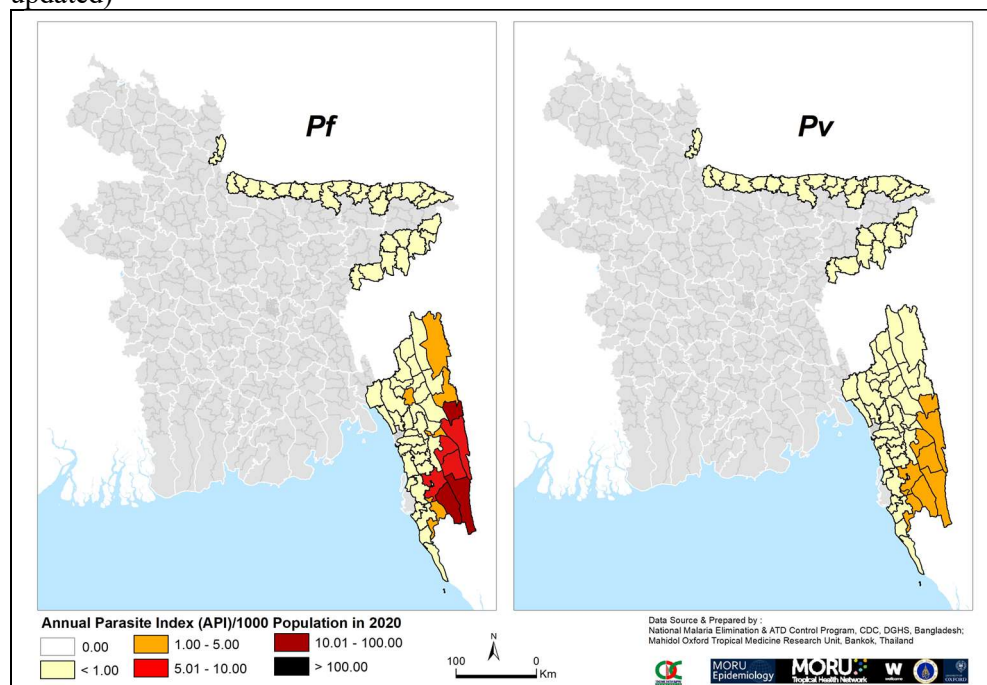
Malaria has been an age-old disease in Bangladesh. However, before 1971, malaria in Bangladesh was almost under control due mainly to the frequent use of Dichloro Diphenyl Trichloroethane (DDT) by then Malaria Eradication Program of the country. After the independence of Bangladesh in 1971, the number of cases started increasing. The key reasons were disruption of health system and overall infrastructure system due to long war, banning DDT in 1981, lack of significant commitment and funding for malaria control. In 1990, the GoB declared malaria as a public health problem due to high morbidity and mortality. The estimated malaria disease burden on a scale of Years of Life Lost (YLLs) ranked top 18 in 1990 causing 771,000 years of life lost. However later, due to effective malaria interventions, status improved significantly with rank of malaria on a scale of YLLs moving down to 44 in 2010 indicating that the incidence, prevalence, morbidity, and mortality have improved.<sup>20</sup> Since then, overall reduction in disease burden has been significant.

#### 3.1 Malaria Epidemiology

##### 3.1.1 Malaria parasites

The epidemiology of malaria in Bangladesh is highly complex. All four species of human plasmodia (*falciparum*, *vivax*, *malariae*, *ovale*) are present. However, majority of malaria cases are caused by *Plasmodium falciparum* (*P. falciparum*) [plus mixed infections], which represented 93% of all malaria cases in 2015 and 68% in 2022 versus 7% and 32% to *Plasmodium vivax* (*P. vivax*), respectively. In recent years, proportion of *P. vivax* cases are increasing. The geographical distribution of *P. falciparum* and *P. vivax* malaria is broadly similar (Figure-2).

Figure-2: Annual parasite incidence per 1,000 population (*P. falciparum* and *P. vivax*), 2020 (to be updated)



Till date, any case of *P. knowlesi* has not been reported. Studies are needed for detection of suspected *P. knowlesi* cases with PCR among risk populations with proximity to monkeys (macaques).

##### 3.1.2 Malaria vectors

The most efficient vectors, members of the *An. (Anopheles) dirus* species complex such as *An. baimaii*, cannot survive without dense shade and high humidity. Deforestation therefore generally leads to substantially reduced malaria transmission. The next most efficient vector is *An. minimus (senso lato)*. This species is also primarily forest-based but can survive in less densely shaded forest, forest fringes and in the patchy bamboo thickets that commonly persist post-deforestation. This relatively anthropophilic and relatively endophilic vector is highly susceptible to the effects of indoor residual spraying (IRS) and its numbers seem to have diminished very significantly since the eradication era when IRS was widespread. Primary vectors such as *An. philippinensis* and *An. dirus*, and secondary vectors such as *An. vagus* and *An. annularis* occur in areas of irrigated open farmland and in flooded rice fields and sporadic secondary transmission can take place in these areas because of the introduction of malaria by infected people arriving from endemic areas. *An. maculatus* and *An. willmori* have also been implicated as vectors of limited capacity. *An. sondaicus* has supported significant transmission in coastal areas in the past, particularly in areas where aquaculture projects have been abandoned resulting in accumulations of brackish water. As with *An. minimus*, this vector is highly susceptible to the effects of IRS and its numbers have also diminished very significantly since the eradication era.

The behaviour of malaria vectors in Bangladesh varies depending on climatic and other environmental factors. Both indoor and outdoor biting takes place, but primary vectors are characterized, at least seasonally, by their early outdoor biting habit. This is a key feature of the epidemiology of malaria in Bangladesh, which limits to some extent the effectiveness of key interventions for vector control and personal protection.

An entomological study by the NMEP in malaria endemic areas of Bangladesh (2016-2017) showed that the primary and most virulent vector of malaria *An. baimaii* has changed their biting behavior. The suspected vector *An. willmori* indicated that the species might be playing role in malaria transmission besides slight change in biting time to evening hours. The highly anthropophilic *An. minimus* seemed to convert to feed blood from human to animal. The density of *An. vagus* was found higher in all three sentinel sites. *An. culicifacies*, the principal vector of West Bengal (India) is re-emerging in the border Upazila Kolmakanda and others in Netrokona district. More entomological evidence (intensity of transmission, behaviors, etc.) and vector distribution atlas per district and even per Upazila are needed to better measure the level of transmission. Another recent study by the NMEP (2019) entomological aspects in some malaria free areas (non-endemic) of central, western and border districts to malaria endemic and malaria prone districts, revealed only one primary vector, *An. philippinensis*. The secondary vector *An. vagus* was more abundant although another secondary vector *An. annularis* density was very low. There was no *An. culicifacies*, the principal vector of West Bengal, although the Upazila has border with India.

### 3.2 Major Malaria Ecotypes

Malaria distribution and transmission vary from location to location and from one population group or individual, or from one situation to another and can be broadly divided into five ecotypes (Table-6). The geographical characteristics such as forest, coastal zones, rivers, lakes, swamps, dams, lowlands, wetlands, and altitude have relationships to malaria distribution and transmission. These characteristics are linked to risk groups, vector behaviour, status of local infrastructure and health services coverage. The risk factors also associated to malaria transmission include changing ecologies, marked deforestation and population movement associated with seasonal labour, development projects, refugee crisis and climate change. Intense malaria transmission is largely restricted to hilly, forested and forest fringe areas of the Chattogram Hill Tracts (CHT) especially in Bandarban district.

Table-6: Malaria ecotypes in Bangladesh

| S. No. | Ecotypes Features | Location | Transmission | Vectors | Population Affected |
|--------|-------------------|----------|--------------|---------|---------------------|
|--------|-------------------|----------|--------------|---------|---------------------|

|    |                           |   |  |  |   |
|----|---------------------------|---|--|--|---|
| 1. | Forest Hills              | South-east border with India & Myanmar, primarily located in the 03 CHT districts | Perennial but highly seasonal transmission and epidemic prone                                  | <i>An. baimai (dirus)</i><br><i>An. minimus</i>  | Ethnic minority, Jhum cultivators, Forest goers, Pilgrims & tourists                            |
| 2. | Forest Fringe             | Areas where the foothills stretch towards the plains                              | Perennial low-level seasonal transmission, Outbreaks occur but are generally focal             | <i>An. baimai (dirus)</i><br><i>An. minimus</i><br><i>An. philippinensis</i>   | New shelters; Labour for development work; Seasonal, agricultural laborers & plantation workers |
| 3. | Plains: Border-belt areas | The belt of land within 10 km of the country's international border               | Unstable transmission; Outbreaks occur but are generally focal                                 | <i>An. philippinensis</i><br><i>An. aconitus</i><br><i>An. annularis</i><br><i>An. vagus</i>                         | Settled population, Returnees from endemic areas  |
| 4. | Plains areas              | The vast parts of the country   | Free from indigenous transmission; but cases are imported, and sporadic transmission may occur | <i>An. philippinensis</i><br><i>An. aconitus</i><br><i>An. annularis</i><br><i>An. vagus</i><br><i>An. subpictus</i> | Returnees from endemic areas  |
| 5. | Urban areas               | Cities and towns  | No malaria transmission but cases may be imported.   | Not known  | Returnees from endemic areas  |

### 3.3 Populations at Risk

It is estimated that 17.74 million (10.7% of the 165 million country's total population) people living in the 13 Districts (77 Upazilas) are at risk of contracting malaria infection. In the rest of the 51 districts (and a few areas within endemic districts) [418 Upazilas] that are considered 'non-endemic', determination of the status is being initiated.

The wide variety of population groups at risk of malaria in endemic areas of Bangladesh is categorized broadly into static & mobile and migrant populations (Table-7) [key and vulnerable populations]. The level of malaria risk for each of these groups is dependent on several location-specific factors including degree of endemicity, accessibility to and strength of health system services besides socio-economic factors. Providing a comprehensive package of services to the population at risk, both static and mobile and migrant populations will be crucial as Bangladesh moves towards elimination.

#### Static populations

- *Traditional farming communities* (see also mobile and migrant populations below). Traditional farming communities belong to different ethnic groups. Most have their own distinct language and

often only a small proportion of group members speak the national language, making communication of health messages extremely problematic. Poverty in these communities is often extreme. Ethnic minority groups tend to be concentrated in remote areas (including border areas) where access to healthcare services is relatively limited. All age groups tend to be exposed seasonally to periods of transmission, which can be intense. Adults are usually partially immune but children and pregnant women are extremely vulnerable.

- *Forest fringe communities.* Many ethnic majority groups live in rice growing areas close to the forest. Villagers, predominantly men, also make frequent overnight visits to the forest to hunt and to collect construction wood and other products. These visits frequently result in malaria infection. People returning to the village carrying malaria parasites can infect anopheles mosquitoes breeding in and around the village and although these species are less efficient vectors than the ones found in the forest, and limited local transmission can occur. All age groups are therefore at risk, but most cases are found in adult men.
- *Workers in development/construction projects.* Private companies [and at times government sector] involved in large-scale construction programmes (dams, bridges, roads, culverts) & other commercial projects (example, large-scale logging) employ large numbers of staff/labour and house them (or expect them to house themselves), often together with their families, in highly endemic areas where public sector health care services are often limited. Some of these companies do provide quality health care for their employees & dependents, but many do not.
- *Tea garden workers.* Tea gardens are common in the foothill areas of Moulvibazar, Sylhet and Chattogram. Tea garden workers are amongst the most vulnerable populations. They are largely illiterate and socially excluded. Women employed for plucking tea leaves make up about 75% of the labour force. Malaria burden in tea gardens is relatively high, particularly amongst women suggesting that transmission takes place amongst the tea bushes immediately after sunset as the women return home from their day's work. [Many tea garden workers are migrants as well].
- *Urban slum population.* This group is a socio-economically disadvantaged group in slums in urban areas considered as 'non-endemic', with a large chunk comprising mobile and migrant populations living in settlements with poor living conditions and inadequate basic amenities including regular water. Although they are likely to have access to healthcare facilities, treatment delays due to malaria being a "forgotten disease" and healthcare facilities/workers not being aware of availability of testing facilities and treatment of malaria make such populations vulnerable to severe malaria.

### **Mobile and migrant populations**

- *Traditional farming communities.* Many ethnic minority groups have large communal villages that are left all but empty for much of the year as families spend months away tending their crops in small farms scattered through the nearby forest/hills. In addition, individuals (usually young men) also spend short periods away from their homes or forest farms, hunting or collecting forest products. Access to healthcare is often more difficult in such settings. Many of these groups are known as 'Jhum' cultivators (traditional slash-and-burn).
- *Forest workers/goers and seasonal workers.* People involved in forest-based activities in both the formal and informal sectors are at high-risk of contracting malaria. Key risk groups include workers/labour involved in timber extraction (including illegal loggers and sandal wood collectors and groups digging out timber stumps to produce carved ornaments), plantation (rubber). Seasonal workers harvesting fruit from orchards and rice close to the forest are also at high-risk. While the forest workers/goers described above are mostly men, the seasonal workers include many women and even children aged 10-14 years. The workers may come from villages near the forest, but many also come from other districts when seasonal demand for labour is low. Often, they have little or no immunity to malaria.
- *Defence services/security forces.* The Defence services/security forces, forest/wildlife protection services, form a sizable and particularly mobile high-risk group. They are often deployed in hard-to-reach areas, based in camps located in the forest or forest fringes. While on night patrol duties they are at particularly high-risk of contracting malaria. The fact that they are often redeployed long distances to new malaria endemic areas, including in Africa during UN peace-keeping missions, means that they have the potential to introduce and spread new parasite strains.

- *Rohingya refugees* (referred as Forcibly Displaced Myanmar Nationals - FDMN). Due to on-going clashes between the Myanmar Army and the Rohingya population in neighbouring Rakhine State, refugees remain a significant problem in Bangladesh, especially in Cox's Bazar district. Access to health services including malaria services is being provided but they remain highly vulnerable. There is also particular concern given the possibility of multi-ACT resistant *P. falciparum* being introduced to receptive areas of Bangladesh from Myanmar by refugees.
- *Cross-border workers*. These are a diverse mobile population who cross the border for work, both legal and illegal. Some are long term or permanent migrants, while others cross the border often or even daily. While many of these spend their time abroad in urban or other non-endemic areas, others, particularly seasonal agricultural workers, and coal miners in the case of Netrokona, are based in areas where transmission does occur. There is a possibility that cross-border workers getting infected in endemic districts of India/Myanmar. There is also particular concern regarding multi-ACT resistant *P. falciparum* being introduced to receptive areas of Bangladesh from Myanmar by cross-border workers/migrants.
- *Migrants*. Migrants may be found in most of the situations described above, working for large private companies, living in unauthorized housing developments, working as seasonal agricultural labourers or as informal forest workers. Migrants, both national and international, are a particular concern in that they could potentially contribute to the spread of multi-ACT resistant *P. falciparum*.
- *Tourists*. Increasingly, tourists from other parts of country including non-endemic areas are visiting areas reporting indigenous malaria, especially in 03 CHT districts. This poses a huge threat of re-establishment of malaria to non-endemic areas, as well as susceptibility of tourists to the disease.
- *Staff/workers of national/international organizations*. Increasing number of international organizations/NGOs from different parts of the country/world are also visiting/staying in Cox's Bazar district including in FDMN camps, who are at risk.

Table-7. Key population groups at risk of malaria

|   |
|---|
| <p><i>Static populations</i></p> <ul style="list-style-type: none"> <li>• Ethnic minority groups [EMGs] and ethnic majority including forest fringe communities (traditional farming communities).</li> <li>• Population in new settlements.</li> <li>• Labour/staff in tea gardens.</li> <li>• Labour/staff in development projects [including those in camps associated with large-scale construction projects (dams, bridges, mines, etc.).</li> <li>• Labour/staff - private sector/government sector.</li> </ul> <p><i>Mobile and migrant populations</i></p> <ul style="list-style-type: none"> <li>• 'Jhum' (traditional slash-and-burn) and paddy field farming communities visiting their forest farms (commonly EMGs).</li> <li>• Seasonal agricultural labourers.</li> <li>• Forest workers in the formal sector (police, border guards, forest/wildlife protection services).</li> <li>• Forest workers/goers in the informal sector (hunters, people gathering forest products such as precious timber, construction timber, rattan, bamboo).</li> <li>• Other economic migrants.</li> <li>• Labour/staff in rubber plantations (in tea gardens).</li> <li>• Formal and informal cross-border migrant workers (legal and illegal).</li> <li>• Defence services.</li> <li>• Rohingya refugees (FDMN).</li> <li>• Pilgrims (religious individuals/groups spending extended periods at mosques and temples in endemic areas).</li> <li>• Tourists travelling from urban areas to endemic forest, foothill areas.</li> <li>• Staff/workers of national/international organizations.</li> </ul> |
|---|

All populations at risk, except those in permanent settlements close to a health care provider/facility, can be considered to have disproportionately low access to malaria services. Key factors contributing to this inequality include: language (often only a small proportion of people from ethnic minority groups speak the national language making communication of health messages problematic); remoteness (malaria transmission tends to be most intense in remote areas, commonly along borders, where access to both public and private sector healthcare services is relatively limited); poverty (the populations living in or passing through these remote areas are generally some of the poorest in the country); marginalization (ethnic minority groups and migrants are amongst the most marginalized groups in the country); and mobility (the high mobility of some individuals means that they may have moved to non-endemic areas, where health workers are less likely to be familiar with malaria, when symptoms first appear).

Providing malaria services to high-risk static populations is relatively straightforward. The location of settlements, construction sites and development projects can be mapped, populations can be quantified and plans for delivering interventions can be formulated (at times however, migrant labour may also be employed in these sites). Furthermore, post-delivery checks can be made to validate coverage. So far, generally the 'established villages' have been well served by routine prevention operations. A comprehensive package of services for the remaining static population groups is deemed crucial as Bangladesh moves towards elimination.

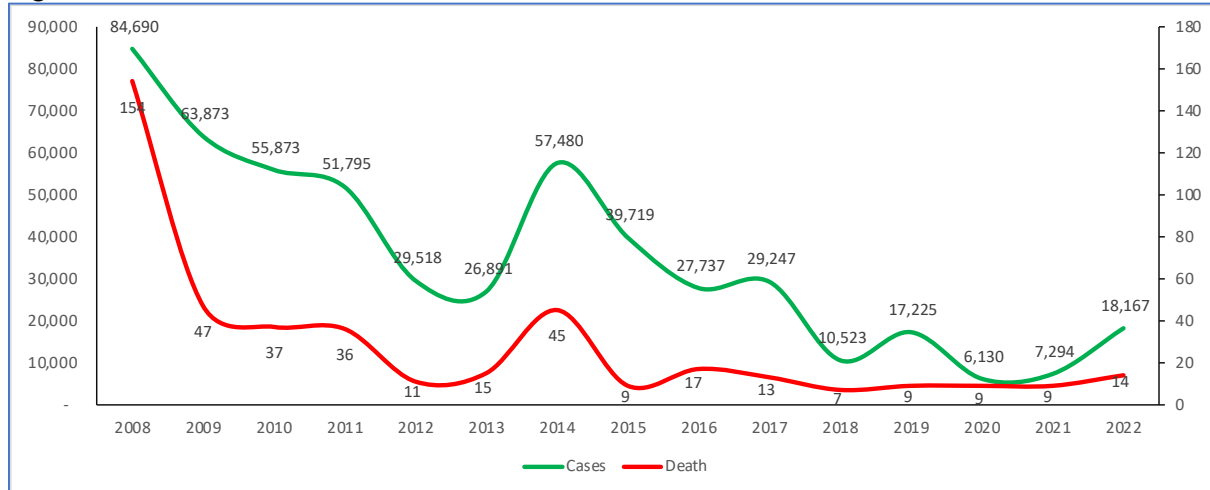
The challenges to service delivery among mobile and migrant populations are more complex. Mapping is often not possible; and there may not be any actual houses or other structures in which to suspend an LLIN. The population size may vary from day to day, making quantification of the needs difficult. In the case of illegal migrants and individuals involved in illegal activities, fear of punishment often prevents any contact with official groups or groups that are perceived to be official. Therefore, getting accurate information for health action from them is a sensitive and complex multi-sector task. While forest goers in the formal sector, such as police, border guards and forest/wildlife protection services, may receive some level of protection in the form of LLINs and access to treatment, informal forest workers are often unprotected. When ill, most of the seasonal workers attend health facilities close to the forest where they work, but many also seek treatment when they return to their homes which are at times located in non-endemic areas where malaria may not immediately be suspected. In this way, these individuals also effectively have disproportionately low access to treatment services. Reaching mobile and migrant populations with appropriate prevention and case management services is crucial to the success of malaria elimination efforts.

### **3.4 Malaria Situation**

In the past decade, Bangladesh made significant progress in reducing malaria morbidity and mortality. Since 2008, malaria burden had been declining in each year, although in 2014 there was an upsurge in the CHT recording an increase of 114% compared with 2013. In 2019, another malaria upsurge hit the country with an increase of 64% compared to 2018 (Figure-3), although a decline of 57% was recorded in 2019 relative to 2015. Whilst in 2020, the number of malaria cases was 6,130, recording a decline of 85% and 64% in caseload in 2020 relative to 2015 and 2019, respectively; yet another upsurge occurred in 2022 with malaria cases increasing to 18,167, recording an increase of 149% compared with 2021. Despite this fluctuation, the number of malaria cases in 2022 however, still recorded a reduction of 54% compared with 2015. Such overall progress is noteworthy, especially at a time when the country has attempted to maintain healthcare services amongst others, with many improvisations through COVID-19 pandemic during 2020-2021 to minimize its adverse impact on malaria service delivery, surveillance and M&E.

In recent years (2018-2021), the number of deaths also came down to single digit level of 2015 although slight increases were recorded in 2016 (17) and 2017 (13). The number of deaths in 2022 has again increased to double digit figure (14) [Figure-3].

Figure-3: Malaria cases and deaths: 2008 – 2022



From 2008 to 2022, Annual Parasite Incidence (API) have reduced from ... to 0.922 per 1,000 population; and the Test Positivity Rate (TPR) has also declined from ...% to 1.15% during that period. With such success, the country is aiming at achieving malaria elimination by 2030 in phased manner.

Whilst the overall progressive declining trend of malaria caseload from 2008 level is impressive, malaria remains an important public health concern in Bangladesh with persistent high transmission in CHT districts in general and Bandarban and Rangamati districts in particular, besides periodic upsurges posing threat to reverse the gains achieved so far. According to World Malaria Report 2022, malaria in Bangladesh is still endemic and contributed to 1.3% of reported malaria cases and 6.0% of reported malaria deaths in the South-East Asia Region in 2021.

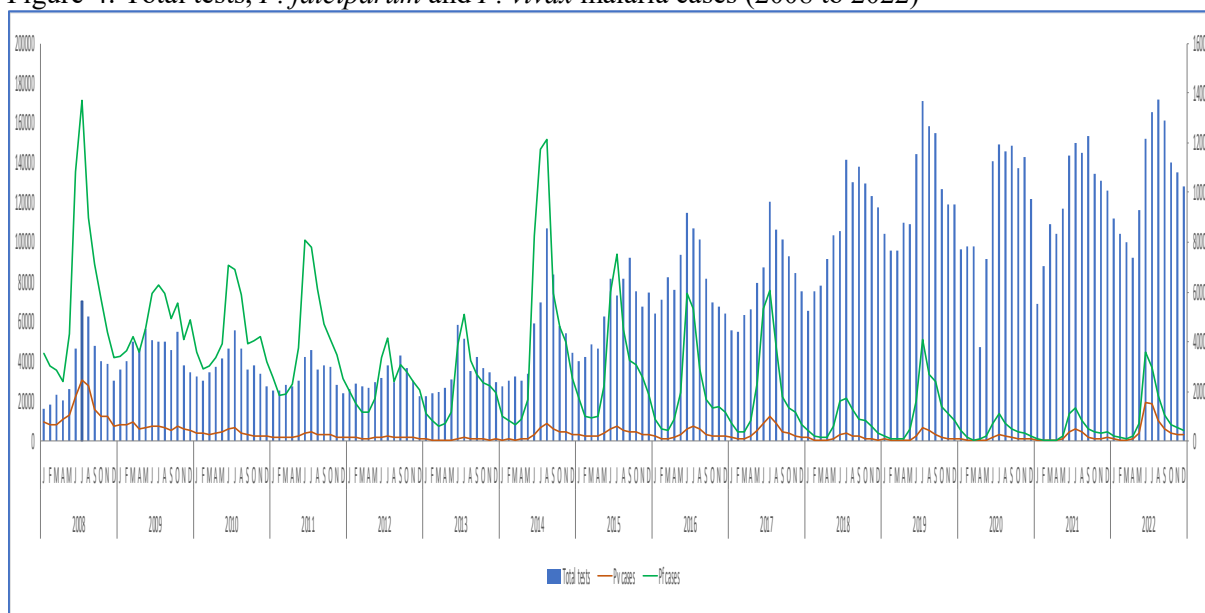
The malaria caseload reported by NMEP is based on data generated from public sector health care services and community level service delivery points with partner NGOs in 13 endemic districts. Private sector figures are usually not part of the malaria caseload, although reporting is initiated. A private sector strategy will be developed, and orientation will be carried out to streamline and expand case management and reporting according to national guidelines nationwide including reporting from 51 ‘non-endemic’ districts (and a few ‘non-endemic’ areas within endemic districts) [418 Upazilas].

From 2008, when 84,690 malaria cases were reported, malaria burden (*P. falciparum* and *P. vivax*) declined each year until 2013 when 26,891 cases were reported. As seen in Figure-3, in 2014 there was an outbreak, which saw *P. falciparum* caseload increase by 109% relative to the previous year (up from 25,908 to 54,132 cases). There was also a real but more modest increase in *P. vivax* malaria incidence in 2014, with caseload up by 33% relative to 2013. This outbreak primarily affected settled populations in remote forested areas of 03 CHT districts and unusual rainfall patterns, sub-optimal EDPT exacerbated the situation.<sup>21</sup>

Since the 2014 outbreak, annual malaria caseload declined, however, in 2017, a 5% increase in caseload in 03 CHT districts and a 7% increase in other 10 endemic districts relative to the previous year were noted. The cause of this was unclear. In 2018 however, caseload fell very significantly in both the CHT and in other endemic districts (down by 65% and 51% respectively relative to the previous year) and only 10,523 cases were reported. However, the number of cases again increased considerably to 17,225 in 2019 (64% increase compared to 2018). Maximum increase in cases is noted in 03 CHT districts (72%). The number of deaths also slightly increased from 07 in 2018 to 09 in 2019 (29%).

Considerable reduction in malaria cases and deaths were noted during 2020-21 COVID-19 period, when population movement was very restricted and improvisations in malaria interventions were applied. However, the number of cases again more than doubled to 18,167 in 2022 compared with 7,294 cases in 2021 (Figure-4).

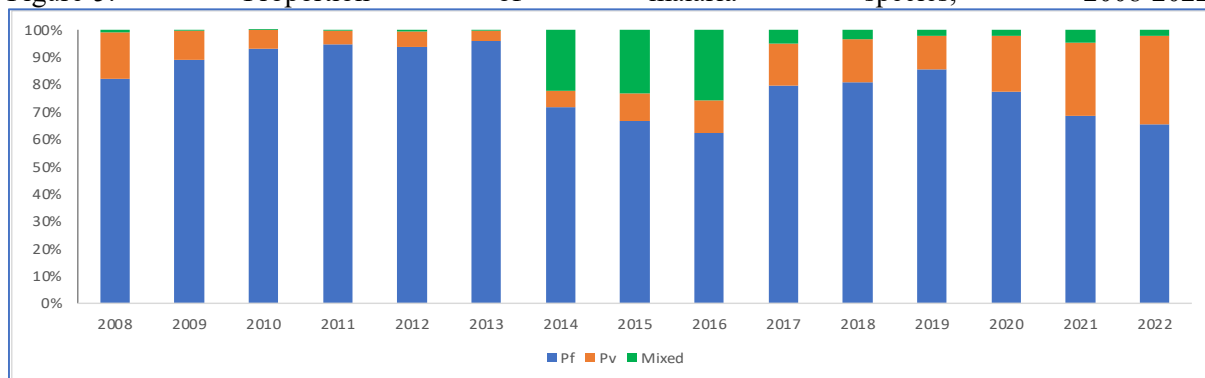
Figure-4: Total tests, *P. falciparum* and *P. vivax* malaria cases (2008 to 2022)



An assessment of the upsurge was carried out, which noted that the cases mainly increased in Bandarban district in CHT in general and Lama, Alikadam and Thanchi Upazilas in particular. Overall, community level challenges particularly in hard-to-reach areas including inadequate community level follow up regarding regular use of prevention interventions were noted as salient reasons besides possible delays in early information sharing/analysis regarding build-up of cases in areas where the intensity of transmission was high. More than 95% cases were found amongst the occupational groups of jhum cultivators and/or forest goers, most of whom were from Mro ethnic group. Besides, students in residential schools were also affected. Low socio-economic status; language barrier; lifestyle, dress pattern and housing pattern that exposed them to mosquito bite; less awareness about malaria and less adoption of prevention measures and LLINs; delayed treatment seeking behaviour and often approaching the traditional medicine men as first port of call; sub-optimal treatment compliance, were noted as contributing factors. In addition, numerous mosquito breeding sites were found. Previous mass distribution of LLINs happened in 2017 and therefore, possible issues related to physical integrity and residual bio-efficacy of LLINs might have adversely impacted effective personal protection. The assessment report with recommendations is appended as Annex-2.

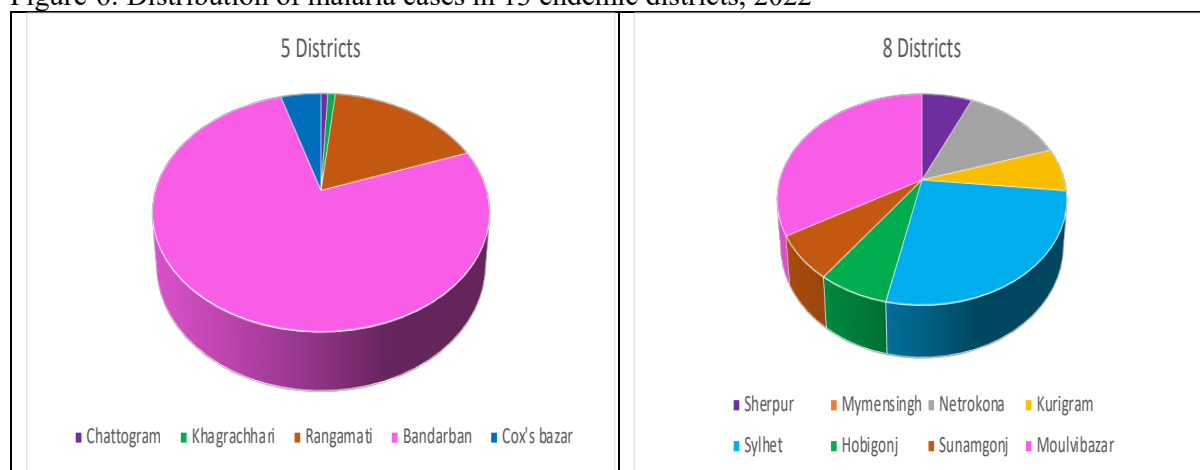
Historically, the vast majority of malaria cases, reported in the country, are caused by *P. falciparum*. However, a steady increase in *P. vivax* cases has been observed in last few years. Out of total 18,167 malaria cases reported in 2022, falciparum malaria accounted for 68% (including mixed cases). Figure-5 illustrates species wise case proportion during the period of 2008 – 2022.

Figure-5: Proportion of malaria species, 2008-2022



Further, a review of the district wise data reveals that, apart from the 2014 outbreak and periodic fluctuations, all districts made overall progress towards malaria control and elimination over the years. While the overall reduction in malaria burden has been noteworthy, the persistent high transmission in 03 CHT districts will need much more intensive and accelerator measures for transmission reduction and moving these districts particularly Bandarban district towards elimination. As mentioned earlier, malaria has become a local and focal disease in Bangladesh with 03 CHT districts contributing 95% of total cases in 2022. In 2022, maximum caseloads of 76% and 18% are contributed by Bandarban (13,791) and Rangamati (3,219), respectively, out of the 13 endemic districts (Figure-6).

Figure-6: Distribution of malaria cases in 13 endemic districts, 2022



The species-wise distribution also shows higher burden in 03 CHT districts, with Bandarban district recording the highest proportion of cases of *P. falciparum* (and mixed cases) [76%] and *P. vivax* (77%) in 2022 [Table-8a, Table-8b]. Notably, 03 CHT districts as well as Cox's Bazar and Chattogram districts have recorded increase in number of *P. vivax* cases in 2022 compared with 2021.

Table-8a, 8b: Annual fluctuations in *P. falciparum* (and mixed) and *P. vivax* caseload by district 2008-2022

a) *P. falciparum* and mixed cases

|                   | 2008  | 2009  | 2010  | 2011  | 2012  | 2013  | 2014  | 2015  | 2016  | 2017  | 2018 | 2019  | 2020 | 2021 | 2022  | Sparkline |
|-------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|-------|------|------|-------|-----------|
| Sherpur           | 370   | 276   | 50    | 47    | 46    | 31    | 31    | 12    | 15    | 5     | 2    | 0     | 0    | 0    | 1     |           |
| Mymensingh        | 532   | 1041  | 400   | 236   | 167   | 72    | 23    | 30    | 14    | 9     | 3    | 1     | 1    | 0    | 0     |           |
| Netrokona         | 342   | 806   | 350   | 236   | 266   | 192   | 184   | 127   | 92    | 20    | 36   | 4     | 4    | 1    | 2     |           |
| Kurigram          | 337   | 231   | 84    | 49    | 38    | 12    | 5     | 3     | 3     | 2     | 2    | 1     | 0    | 1    | 1     |           |
| Sylhet            | 643   | 803   | 620   | 352   | 364   | 332   | 75    | 32    | 8     | 7     | 9    | 9     | 4    | 0    | 2     |           |
| Hobigonj          | 405   | 265   | 111   | 62    | 60    | 33    | 48    | 21    | 14    | 18    | 8    | 1     | 5    | 2    | 0     |           |
| Sunamgonj         | 972   | 851   | 754   | 420   | 499   | 477   | 138   | 47    | 16    | 9     | 6    | 0     | 3    | 0    | 1     |           |
| Moulvibazar       | 1382  | 1236  | 685   | 325   | 284   | 160   | 126   | 42    | 24    | 14    | 14   | 3     | 3    | 3    | 2     |           |
| Chattogram        | 2272  | 2609  | 1333  | 1261  | 996   | 603   | 739   | 384   | 227   | 203   | 98   | 108   | 28   | 35   | 84    |           |
| Khagrachhari      | 17907 | 15106 | 12017 | 12679 | 5772  | 4031  | 9667  | 3692  | 1963  | 1382  | 400  | 692   | 124  | 93   | 118   |           |
| Rangamati         | 23735 | 12420 | 12902 | 12977 | 7722  | 7882  | 16648 | 13228 | 8860  | 7407  | 2765 | 5815  | 1277 | 1391 | 2432  |           |
| Bandarban         | 16395 | 14931 | 16738 | 15577 | 8116  | 9174  | 22649 | 15853 | 12169 | 14496 | 4994 | 8058  | 3207 | 3617 | 9306  |           |
| Cox's Bazar       | 4989  | 6445  | 6005  | 4973  | 3489  | 2909  | 3799  | 2237  | 1025  | 1230  | 506  | 404   | 229  | 197  | 383   |           |
| Total             | 70281 | 57020 | 52049 | 49194 | 27819 | 25908 | 54132 | 35708 | 24430 | 24802 | 8843 | 15096 | 4885 | 5340 | 12332 |           |
| % of cases in CHT | 83%   | 74%   | 80%   | 84%   | 78%   | 81%   | 90%   | 92%   | 94%   | 94%   | 92%  | 96%   | 94%  | 96%  | 96%   |           |

b)

|                   | <i>P. vivax</i> cases |      |      |      |      |      |      |      |      |      |      |      |      |      |      | Sparkline |
|-------------------|-----------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------|
|                   | 2008                  | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |           |
| Sherpur           | 524                   | 194  | 22   | 21   | 27   | 12   | 3    | 5    | 1    | 2    | 0    | 1    | 0    | 0    | 0    |           |
| Mymensingh        | 263                   | 40   | 18   | 8    | 1    | 2    | 3    | 3    | 3    | 2    | 0    | 0    | 0    | 0    | 0    |           |
| Netrokona         | 118                   | 32   | 25   | 34   | 19   | 7    | 24   | 13   | 10   | 4    | 4    | 0    | 0    | 0    | 0    |           |
| Kurigram          | 346                   | 335  | 253  | 119  | 63   | 52   | 4    | 0    | 0    | 0    | 0    | 1    | 0    | 0    | 0    |           |
| Sylhet            | 198                   | 147  | 262  | 92   | 72   | 28   | 33   | 12   | 3    | 16   | 4    | 0    | 0    | 0    | 2    |           |
| Hobigonj          | 139                   | 26   | 9    | 3    | 12   | 1    | 4    | 1    | 1    | 7    | 0    | 1    | 3    | 0    | 1    |           |
| Sunamganj         | 836                   | 800  | 380  | 41   | 41   | 11   | 16   | 12   | 7    | 7    | 1    | 2    | 1    | 0    | 0    |           |
| Moulvibazar       | 1622                  | 379  | 259  | 123  | 137  | 38   | 19   | 8    | 2    | 4    | 0    | 1    | 0    | 3    | 3    |           |
| Chattogram        | 1096                  | 624  | 288  | 154  | 99   | 45   | 93   | 76   | 44   | 41   | 18   | 33   | 9    | 9    | 58   |           |
| Khagrachhari      | 1766                  | 705  | 331  | 273  | 225  | 65   | 229  | 182  | 75   | 61   | 21   | 33   | 9    | 10   | 39   |           |
| Rangamati         | 4636                  | 2162 | 1047 | 692  | 259  | 94   | 518  | 604  | 764  | 880  | 249  | 251  | 113  | 163  | 787  |           |
| Bandarban         | 1387                  | 803  | 521  | 520  | 345  | 285  | 1769 | 2409 | 2017 | 2996 | 1110 | 1565 | 959  | 1611 | 4485 |           |
| Cox's Bazar       | 1478                  | 606  | 409  | 499  | 399  | 343  | 633  | 686  | 379  | 424  | 267  | 231  | 150  | 157  | 454  |           |
| Total             | 14409                 | 6853 | 3824 | 2579 | 1699 | 983  | 3348 | 4011 | 3306 | 4444 | 1674 | 2119 | 1244 | 1953 | 5829 |           |
| % of cases in CHT | 54%                   | 54%  | 50%  | 58%  | 49%  | 45%  | 75%  | 80%  | 86%  | 89%  | 82%  | 87%  | 87%  | 91%  | 91%  |           |

**Seasonality of malaria transmission:** The seasonality of falciparum malaria transmission shows rapid rise in June and peaks between June and August (Figure-7a). For vivax malaria the picture is broadly similar (Figure-7b), although relapses might result in a number of cases being reported after transmission has fallen in September to December.

Figure-7a: Seasonal trends in falciparum malaria, 2008-2022

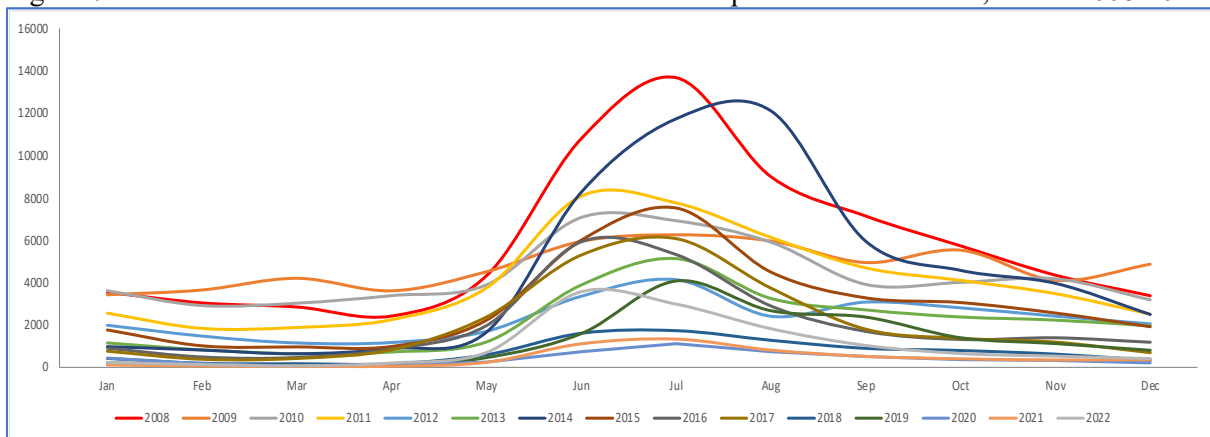
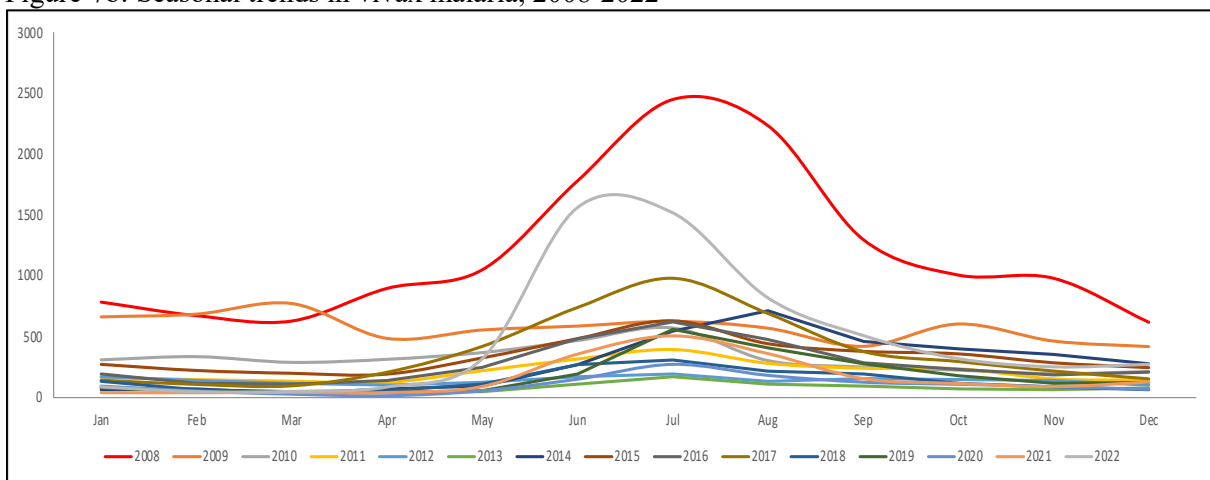


Figure-7b: Seasonal trends in vivax malaria, 2008-2022



**Incidence of malaria by age and gender:** Malaria incidence by age and gender demonstrates the heterogeneous nature of malaria transmission. Malaria incidence appears to be slightly higher amongst

males (1.18 per 1000 male population) than females (0.68 per 1000 female population) in 2022. Age-wise incidence indicated that malaria incidence is the highest among 5-14 years (1.09 per 1000 population in the age group) followed by incidence among adult males (15+ years) [0.94 per 1000 population in the age group). This may be the result of the tendency of boys spending more time spending outdoors in the evening and occupational malaria associated with male forest goers/jhum cultivators. Malaria seems to be an “occupational disease” associated with adult men working in endemic settings within the country.

Furthermore, with case-based surveillance being progressively strengthened in elimination districts, case investigations are being carried out. The number of imported malaria cases (from outside country) was 111 in 2016, while it was only 6 and 8 in 2021 and in 2022, respectively, with most of those having travel history to India. Comprehensive case investigation and classification regarding countrywide scenario will be pursued.

**Annual blood examination rate (ABER):** Malaria elimination programme aims at optimizing achievement of ABER in populations at risk to ensure that surveillance is adequate to detect transmission. The data presented in Table-9 demonstrates that over the years, Bangladesh has made progress in this regard in endemic districts. ABER has exceeded 10% since 2014 in 03 CHT districts and even in other endemic districts ABER has increased steadily. Going forward, different standards of ABER for high burden and elimination settings are being envisaged.

Table-9: District level annual blood examination rate (ABER), 2008-2022

|              | 2008 | 2009 | 2010 | 2011 | 2012 | 2013  | 2014  | 2015  | 2016  | 2017  | 2018  | 2019  | 2020  | 2021  | 2022  | Sparkline |
|--------------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----------|
| Sherpur      | 1.63 | 1.87 | 1.57 | 1.77 | 1.92 | 1.56  | 1.95  | 2.29  | 3.07  | 3.26  | 5.80  | 7.26  | 6.58  | 4.82  | 6.55  |           |
| Mymensingh   | 3.16 | 3.89 | 2.57 | 1.85 | 1.91 | 1.49  | 1.56  | 2.06  | 2.84  | 4.16  | 5.89  | 7.04  | 6.23  | 3.54  | 5.56  |           |
| Netrokona    | 2.39 | 2.87 | 1.1  | 0.95 | 1.38 | 1.83  | 2.66  | 3.92  | 5.24  | 5.39  | 6.78  | 7.64  | 7.28  | 4.44  | 5.87  |           |
| Kurigram     | 1.99 | 2.85 | 1.59 | 1.01 | 1.21 | 1.61  | 1.96  | 3.42  | 3.90  | 4.50  | 6.00  | 6.75  | 6.24  | 3.99  | 5.65  |           |
| Sylhet       | 0.98 | 2.29 | 1.69 | 0.98 | 1.13 | 1.17  | 1.72  | 2.61  | 2.89  | 3.28  | 5.12  | 5.16  | 5.42  | 2.37  | 4.75  |           |
| Hobigonj     | 1.74 | 1.45 | 1.23 | 0.62 | 0.75 | 0.72  | 0.80  | 1.75  | 2.26  | 2.65  | 5.19  | 4.75  | 5.29  | 3.07  | 4.05  |           |
| Sunamgonj    | 0.91 | 1.46 | 1.23 | 0.97 | 1.06 | 1.15  | 1.67  | 2.66  | 3.14  | 3.40  | 4.91  | 5.26  | 5.59  | 2.20  | 3.54  |           |
| Moulvibazar  | 1.75 | 2.77 | 2.24 | 1.09 | 1.2  | 0.99  | 1.35  | 2.18  | 3.11  | 3.50  | 5.79  | 5.89  | 6.05  | 2.39  | 3.54  |           |
| Chattogram   | 1.91 | 2.67 | 1.41 | 1.08 | 1.18 | 0.83  | 1.65  | 2.36  | 3.06  | 3.13  | 4.45  | 5.32  | 4.26  | 7.41  | 7.56  |           |
| Khagrachhari | 15.6 | 18.8 | 17.2 | 2.6  | 11.3 | 9.73  | 14.60 | 15.28 | 18.39 | 14.83 | 16.11 | 21.99 | 19.92 | 17.28 | 12.72 |           |
| Rangamati    | 17.8 | 18.6 | 19.7 | 15.3 | 12.9 | 14.59 | 19.10 | 18.75 | 24.09 | 20.66 | 20.68 | 23.38 | 24.11 | 22.37 | 19.87 |           |
| Bandarban    | 22.3 | 27   | 28.3 | 20.2 | 18.2 | 15.64 | 23.57 | 25.13 | 29.22 | 26.71 | 24.70 | 31.38 | 30.18 | 29.51 | 28.56 |           |
| Cox's Bazar  | 3.53 | 4.68 | 3.03 | 2    | 2.01 | 1.70  | 2.57  | 3.80  | 4.53  | 4.84  | 7.65  | 6.68  | 5.36  | 9.85  | 10.23 |           |
| Nationwide   | 4.04 | 5.05 | 4.21 | 2.94 | 2.81 | 2.51  | 3.72  | 4.56  | 5.67  | 5.54  | 7.19  | 8.03  | 7.43  | 7.59  | 8.01  |           |

**Malaria related mortality:** Malaria case fatality rate (CFR) was 0.02% in 2015. However, an increase is noted in 2020 (0.15%) and 2021 (0.12%). Whilst the CFR slightly dropped to 0.08% in 2022, yet there is a need for improvement in access to early diagnosis and appropriate treatment, referral and management of severe malaria. (Figure-8).

Figure-8: Changes in the number of reported malaria cases and case fatality rates (CFR) during 2008-2022 (number of deaths are presented alongside CFR data points)

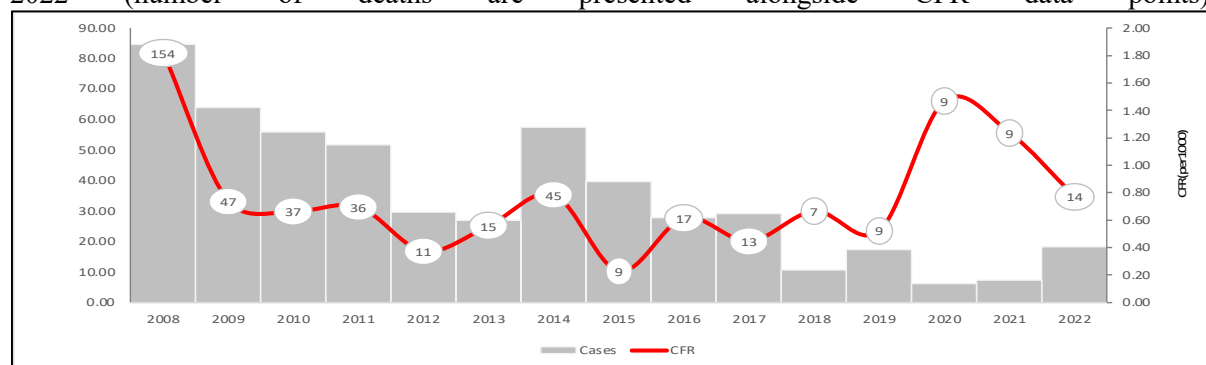


Table-10 presents percentage of cases classified as severe malaria. Overall, there has generally been a progressive if somewhat erratic reduction in the proportion of severe cases during recent period. However, the high rate seen in Chattogram district resulted from the fact that most of these severe malaria cases were referred from elsewhere (mainly from the CHT) to the Chattogram Medical College and Hospital. The same is true in Cox's Bazar, although to a lesser extent. Khagrachari district, with the least disease burden amongst the 03 CHT districts has relatively high proportion of cases classified as severe during the last few years (2018 onwards except in 2020). Maintenance of malaria awareness amongst doctors and field cadres in districts where caseload has fallen or is falling to low levels is being emphasized, besides EDPT.

Table-10: Caseload and % of cases classified as severe by select districts and by year (2008-22)

|                                | 2008   | 2009  | 2010  | 2011  | 2012  | 2013  | 2014  | 2015  | 2016  | 2017  | 2018  | 2019  | 2020  | 2021  | 2022  | Sparkline |
|--------------------------------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----------|
| <b>Khagrachari</b>             |        |       |       |       |       |       |       |       |       |       |       |       |       |       |       |           |
| Reported cases                 | 19673  | 15811 | 12348 | 12952 | 5997  | 4096  | 9896  | 3874  | 2038  | 1443  | 421   | 725   | 133   | 103   | 157   |           |
| % severe                       | 5.13   | 4.05  | 7.15  | 6.86  | 5.49  | 3.98  | 4.59  | 3.28  | 3.19  | 2.77  | 5.46  | 11.03 | 1.5   | 9.71  | 12.10 |           |
| <b>Rangamati</b>               |        |       |       |       |       |       |       |       |       |       |       |       |       |       |       |           |
| Reported cases                 | 28,371 | 14582 | 13949 | 13669 | 7981  | 7976  | 17166 | 13832 | 9624  | 8287  | 3014  | 6066  | 1390  | 1554  | 3219  |           |
| % severe                       | 1.45   | 2.04  | 1.80  | 1.81  | 0.90  | 0.84  | 0.72  | 0.93  | 0.71  | 0.42  | 0.60  | 0.38  | 0.22  | 0.45  | 0.19  |           |
| <b>Bandarban</b>               |        |       |       |       |       |       |       |       |       |       |       |       |       |       |       |           |
| Reported cases                 | 17782  | 15734 | 17259 | 16097 | 8461  | 9459  | 24418 | 18262 | 14186 | 17492 | 6104  | 9623  | 4166  | 5228  | 13791 |           |
| % severe                       | 4.31   | 10.49 | 4.99  | 8.82  | 5.40  | 5.58  | 3.70  | 2.75  | 2.90  | 2.33  | 2.05  | 2.55  | 1.37  | 1.87  | 1.27  |           |
| <b>8 elimination districts</b> |        |       |       |       |       |       |       |       |       |       |       |       |       |       |       |           |
| Reported cases                 | 9029   | 7462  | 4282  | 2170  | 2096  | 1460  | 736   | 368   | 213   | 126   | 89    | 25    | 24    | 10    | 15    |           |
| % severe                       | 1.62   | 1.37  | 1.10  | 2.17  | 3.96  | 1.23  | 1.09  | 2.72  | 0.94  | 2.38  | 0.00  | 8.00  | 4.17  | 0.00  | 0.00  |           |
| <b>Chattogram</b>              |        |       |       |       |       |       |       |       |       |       |       |       |       |       |       |           |
| Reported cases                 | 3368   | 3233  | 1621  | 1415  | 1095  | 648   | 832   | 460   | 271   | 244   | 116   | 141   | 37    | 44    | 142   |           |
| % severe                       | 8.73   | 3.50  | 1.85  | 2.61  | 0.46  | 8.80  | 18.27 | 12.61 | 13.65 | 20.49 | 25.86 | 19.15 | 27.03 | 25.00 | 23.94 |           |
| <b>Cox'sbazar</b>              |        |       |       |       |       |       |       |       |       |       |       |       |       |       |       |           |
| Reported cases                 | 6467   | 7051  | 6414  | 5472  | 3888  | 3252  | 4432  | 2923  | 1404  | 1654  | 773   | 635   | 379   | 354   | 837   |           |
| % severe                       | 6.43   | 6.85  | 10.20 | 8.32  | 13.14 | 9.90  | 9.52  | 6.77  | 6.13  | 8.04  | 5.17  | 10.39 | 5.01  | 7.63  | 9.68  |           |
| <b>Nationwide</b>              |        |       |       |       |       |       |       |       |       |       |       |       |       |       |       |           |
| Reported cases                 | 84690  | 63873 | 55873 | 51775 | 29518 | 26891 | 57480 | 39719 | 27737 | 29247 | 10523 | 27225 | 6130  | 7294  | 18167 |           |
| % severe                       | 3.59   | 5.15  | 4.88  | 5.98  | 4.94  | 4.30  | 3.59  | 2.58  | 2.42  | 2.29  | 2.27  | 2.58  | 1.50  | 2.10  | 1.73  |           |

Furthermore, annual fluctuations in severe case fatality rates (deaths amongst severe cases) by district, again showed high rate in Chattogram (Table-11), again due to unusual data recording practices. As mentioned earlier, most severe cases from CHT and surrounding non-CHT districts are referred to Chattogram Medical College and Hospital, many of these cases reach quite late after initial treatment by the local and/or private sector providers when recovery is challenging. Such deaths are linked to the district of the tertiary hospital where cases are admitted for treatment rather than the district from where the patient has come or is resident. The recording/reporting mechanism will be revised during this strategy period under the updated malaria MIS. Progressive improvement in management of severe cases in tertiary and secondary facilities are being and will be emphasised, especially in CHT districts.

Table-11: Annual fluctuations in severe case fatality rates in districts reporting severe cases 2008-2022

| Reporting Unit  | 2008        | 2009        | 2010        | 2011        | 2012        | 2013        | 2014        | 2015        | 2016        | 2017        | 2018        | 2019          | 2020        | 2021        | 2022         | Total severe cases |
|-----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|-------------|-------------|--------------|--------------------|
| Sherpur         | 0.0%        | 6.7%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%          | 0.0%        | 0.0%        | 0.0%         | 43                 |
| Mymensingh      | 10.0%       | 42.9%       | 50.0%       | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 100.0%      | 0.0%        | 100.0%        | 0.0%        | 0.0%        | 0.0%         | 56                 |
| Netrokona       | 0.0%        | 75.0%       | 5.0%        | 12.5%       | 0.0%        | 50.0%       | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%          | 100.0%      | 0.0%        | 0.0%         | 59                 |
| Kurigram        | 10.0%       | 12.5%       | 100.0%      | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%          | 0.0%        | 0.0%        | 0.0%         | 21                 |
| Sylhet          | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 100.0%      | 0.0%        | 0.0%          | 0.0%        | 0.0%        | 0.0%         | 51                 |
| Hobigonj        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%          | 0.0%        | 0.0%        | 0.0%         | 4                  |
| Sunamganj       | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 100.0%      | 0.0%        | 0.0%          | 0.0%        | 0.0%        | 0.0%         | 47                 |
| Moulvibazar     | 1.4%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%          | 0.0%        | 0.0%        | 0.0%         | 188                |
| Chattogram      | 0.3%        | 0.0%        | 3.3%        | 0.0%        | 0.0%        | 3.5%        | 16.4%       | 10.3%       | 24.3%       | 14.0%       | 13.3%       | 11.1%         | 60.0%       | 25.0%       | 14.71%       | 945                |
| Khagrachari     | 5.3%        | 1.9%        | 1.5%        | 1.7%        | 1.8%        | 4.3%        | 1.8%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 1.3%          | 0.0%        | 9.7%        | 0.00%        | 4733               |
| Rangamati       | 5.8%        | 4.0%        | 4.0%        | 2.0%        | 1.4%        | 3.0%        | 0.0%        | 0.0%        | 1.5%        | 0.0%        | 0.0%        | 0.0%          | 0.0%        | 0.5%        | 16.67%       | 1757               |
| Bandarban       | 1.4%        | 0.2%        | 0.8%        | 0.8%        | 0.7%        | 0.6%        | 1.3%        | 0.6%        | 1.2%        | 0.2%        | 0.0%        | 0.8%          | 3.5%        | 1.9%        | 1.14%        | 8,607              |
| Cox's Bazar     | 14.4%       | 0.8%        | 0.2%        | 0.7%        | 0.2%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 1.5%        | 2.5%        | 1.5%          | 0.0%        | 7.6%        | 7.41%        | 3,913              |
| Other districts | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 0.0%        | 100.0%      | 100.0%      | 66.7%       | 100.0%        | 0.0%        | 2.1%        | 0.00%        | 6                  |
| <b>Total</b>    | <b>4.0%</b> | <b>1.4%</b> | <b>1.4%</b> | <b>1.2%</b> | <b>0.8%</b> | <b>1.3%</b> | <b>2.2%</b> | <b>0.9%</b> | <b>2.5%</b> | <b>1.9%</b> | <b>2.9%</b> | <b>214.7%</b> | <b>9.8%</b> | <b>2.1%</b> | <b>4.44%</b> | <b>20430</b>       |

The programme has initiated investigation of severe malaria cases in addition to death investigation to identify challenges, gaps and roll out corrective measures. Patient's place of origin, likely place of infection (with travel history), place of diagnosis, places of treatment (and place of death, if applicable), amongst other socio-demographic data are being collected and analyzed. Such approach is expected to help identifying and addressing the causes of severe malaria.

*Success in malaria control towards elimination in Bangladesh is influenced by the following elements that deserve to be maintained or enhanced:*

- *Increasing investment in interventions leading to improved and more targeted coverage with LLINs and community-based case management), expansion of RDT-based diagnosis and use of artemisinin-based combination therapy (ACT) through combination of public and NGO sectors, intensifying surveillance and M&E, advocacy, communication and community engagement, strengthening capacities and systems, fostering partnerships and coordination, and others, complemented by advances in overall socio-economic status.*
- *Progress towards the Global Technical Strategy (GTS) milestone, Bangladesh is on track to reduce the malaria case incidence by more than 40% in 2021 and 2022 compared with 2015. Bangladesh reported a substantial decline (85%) in total reported cases between 2015 (39,719) and 2020 (6,130). Although an increase in noted in 2022, yet declining trend is still maintained (54%) compared with 2015.*
- *The decline in severe malaria cases from 1,023 (2015) to 287 (2022) indicating 72% decline in 2022 relative to 2015 and proving that the uncomplicated case referral and management is on track, although need to be further strengthened.*

*Despite the progress, the disease is unstable and epidemic prone. Even in non-epidemic years, malaria remains a key health problem in forest and forest fringe communities, particularly in hard-to-reach and remote border areas. Further accelerated endeavours with adequate resources will be needed to address the challenges and bottlenecks and hard to control 'residual malaria transmission' (RMT), which occurs because of vector and/or human behaviours that increase human-vector contact and undermine the effectiveness of control measures.*

*Furthermore, achievement of phased subnational malaria elimination towards countrywide elimination and prevention of re-establishment of malaria transmission will require sustained commitments and sufficient resources from the highest political level, tailored and technically sound strategies, micro-planning and equitable targeting of interventions through combination of public, NGO, private sectors and others, robust surveillance and response and M&E, resilient systems and requisite capacities, inclusive community engagement, multi-sector participation, cross-border initiatives, research; besides readiness to counter any future pandemic like COVID-19 pandemic. Seamless integration of malaria programme within progressively strengthened health systems will be necessary for sustainability in the long term. Strengthening of coordination with various partner agencies for designing and implementation intervention mix for FDMN who are at risk and vulnerable as well as pose risk to host communities, as continued humanitarian response. Such efforts could become important opportunities for achieving universal health care. Elimination of malaria will be beneficial to the country in terms of overall health and well-being and contribute to socio-economic development in Bangladesh.*

## **CHAPTER-4 STRATEGIC FRAMEWORK**

### **4. STRATEGIC FRAMEWORK**

#### **4.1 Vision**

A malaria-free Bangladesh by 2030.

#### **4.2 Mission**

To achieve malaria elimination in phased manner with effective and equitable interventions towards improving quality of life of at-risk populations and contributing to achievement of Sustainable Development Goals (SDGs).

#### **4.3 Goals and Objectives**

##### **4.3.1 Goals**

- By 2030, interrupt local transmission of and eliminate indigenous malaria in phased manner and prevent re-establishment of local transmission
- By 2027, attain zero mortality due to indigenous malaria and maintain status.

##### **4.3.2 Objectives**

- Objective-1: Ensure universal coverage by early case detection using quality assured parasitological test and prompt and effective treatment of all confirmed malaria cases according to national treatment guidelines through 2030.
- Objective-2: Ensure universal coverage of population at risk in targeted areas with appropriate preventive interventions through 2030.
- Objective-3: Strengthen context-specific surveillance in all malaria settings and outbreak preparedness and response through 2030.
- Objective-4: Enhance Social and Behaviour Change Communication (SBCC) with special emphasis on community engagement and mobilisation, context-specific communication and advocacy through 2030.
- Objective-5: Ensure strengthened program management, monitoring & evaluation and partnership and coordination through 2030.
- Objective-6: Carry out research to guide strategy and policy to address programme gaps and challenges through 2030.
- Objective-7: Prevent re-establishment of malaria transmission in malaria-free areas.

#### **4.4 Key Strategic Elements**

- Sustain country ownership with sufficient resources for malaria elimination and prevention of re-establishment in malaria-free areas.
- Prioritize malaria burden reduction in 03 CHT districts with special attention to Bandarban district towards acceleration to achieve elimination.
- Ensure universal and equitable access to early diagnosis and prompt & effective treatment by all at-risk populations including the key and vulnerable populations (mobile and migrant populations, ethnic minority groups, disadvantaged/underserved communities, communities in border and conflict areas, and refugees).
- Ensure targeted and equitable access to appropriate preventive interventions by at-risk populations including the key and vulnerable populations in targeted areas.
- Ensure surveillance as a core intervention (epidemiological and entomological) appropriate for different settings. Strengthen routine surveillance in burden reduction and case-based surveillance in elimination settings.

- Review and refine malaria micro-stratification annually based on data related to transmission risk, receptivity and vulnerability for targeted interventions.
- Design and implement intervention-mix tailored for subnational contexts and drawing on granular data.
- Strengthen M&E including but not limited to, reinforcing regular reviews, supportive supervision and feedback and emphasize data quality.
- Strengthen and update national malaria MIS for real-time data and its use especially at local levels to enable early response.
- Support districts with geo-enabling health information using Geographic Information System (GIS).
- Ensure resilient and sustainable health systems, with health workforce having necessary capacity with requisite skillsets at all levels, and uninterrupted availability of quality-assured commodities.
- Ensure early warning systems, preparedness for upsurge/outbreak and in the event of any upsurge/outbreak timely response.
- Maintain malaria services during upsurges/outbreaks, other emergencies through multiple delivery mechanisms with support from and integrated under the umbrella general health systems drawing on lessons learned during COVID-19 pandemic.
- Identify and apply risks and mitigation measures, including forward planning drawing on the experience related to exigencies like COVID-19 pandemic, and others.
- Strengthen quality service delivery through public health facilities as well as community health workers & volunteers and partner agencies.
- Foster social and behaviour change communication with emphasis on advocacy, targeted communication and community participation and ownership.
- Address human rights and age- & gender-related barriers, inequities and vulnerabilities related to access to and uptake of malaria services especially meeting the needs of key and vulnerable population groups.
- Strengthen private sector engagement to expand coverage of case detection, treatment & referral as per national treatment guidelines, and ensure timely reporting to national programme.
- Foster multi-sector coordination and collaboration with health and non-health sectors, local governments, partner agencies, civil society and communities.
- Gather evidence continually on efficacy of antimalarial drugs for early detection of possible emergence of drug resistant malaria.
- Assess the status of insecticide resistance periodically, as needed.
- Promote research to address programmatic challenges, needs and gaps and revisit strategy, policy, and guidelines periodically.
- Strengthen cross-border collaboration between Bangladesh-India and Bangladesh-Myanmar to tackle malaria transmission potentials through population movement along international borders; and maximize service delivery and surveillance within national boundaries.
- Develop and update plans, guidelines, SOPs, manuals, forms and registers, as appropriate for elimination and prevention of re-establishment.
- Roll out interventions for prevention of re-establishment in malaria-free areas and initiate subnational elimination verification in phased manner and preparations for WHO certification.
- Initiate measures for prevention of re-establishment (POR) of transmission as districts achieve interruption of local transmission and zero indigenous malaria and transitions to malaria-free areas.
- Aim at achieving subnational elimination (Upazila-wise) in phased manner towards country-wide elimination. Subnational elimination verification is to be carried in line with the guidance by the WHO. Mechanisms will need to be developed for such verification towards readiness of nationwide elimination certification.
- Initiate preparedness for the WHO certification of malaria elimination in a country that requires proof that local transmission of all human malaria parasites has been interrupted beyond reasonable doubt, resulting in zero incidence of indigenous cases for at least the past three consecutive years and zero deaths due to indigenous malaria.

#### **4.5 Programme Prioritization**

Malaria is a focal disease in Bangladesh exhibiting considerable heterogeneity. It is therefore essential to identify and stratify the areas and populations at risk according to the burden of malaria. Overall, the country is currently stratified into three strata based on API (with baseline year as 2022) [Table-12, 13]. The districts where API is more than or equal to 1 per 1,000 population in 2022 is categorized as high burden and high transmission areas (stratum 3), while districts with API less than 1 per 1,000 population are categorized as low burden and low transmission areas (stratum 2). The districts with API equivalent to zero with receptive/vulnerable areas or areas traditionally considered 'non-endemic' with no reported indigenous malaria are categorized as potential transmission areas/transmission status to be determined (stratum 1). Even though Khagrachari district has recorded API less than 1 per 1,000 population in 2022, the district will be clubbed together with Bandarban and Rangamati being inherent part of CHT. Entire CHT has similar eco-epidemiology, receptivity and vulnerability. Besides, Khagrachari shares long national border with endemic Rangamati district of CHT (and Chattogram district). This district also shares long international border with the endemic state of Tripura in India that witnesses population movement.

Going forward (from 2024), criteria for micro-stratification will consider past and current intensity of transmission in an area, receptivity, vulnerability, and selected eco-epidemiological factors. Micro-stratification until village level will be carried out as malaria becomes more and more local and focal. Micro-stratification will facilitate prioritization of interventions through a more targeted approach and effective and efficient utilization of available resources. Prioritized interventions will be packaged for a particular stratum and phase tailored to the local epidemiology.

The NSP 2024-2030 will prioritize progressive transition of high burden areas to low burden and low burden areas to elimination and sustaining it by preventing re-establishment local transmission besides determining 'non-endemic' status of rest of the areas. Based on these considerations, the priorities are set as follows:

- Accelerated reduction of malaria burden to  $API \leq 1$  by 2027 and interruption of local transmission in 03 'endemic' CHT districts (viz., Bandarban, Khagrachari and Rangamati) [26 Upazilas] by 2030.
- Elimination of malaria from 04 'endemic districts' of Mymensingh Zone [21 Upazilas] by 2024 and maintaining the status through 2030.
- Elimination of malaria from remaining 06 'endemic' districts [30 Upazilas] by 2026 and maintaining the status through 2030.
- Determination of rest of the 51 'non-endemic' districts (and a few 'non-endemic' areas within 13 endemic districts) as 'malaria-free' (418 Upazilas) by 2024 and maintaining the status through 2030.

Special attention will be given to hard-to-reach areas particularly in high burden Bandarban district. The key criterion for identifying hard-to-reach areas (villages) will be distance of village from health provider (place of posting) [ $>2$  Kms]. In addition, one or more of the following criteria will be considered.

- Geographical barrier: river/hill/deep forest
- Travel time from health provider (place of posting): At least 2 hours
- Mode of transportation: On foot/boat
- Security concern: Yes
- Seasonal accessibility issue: Yes

In exceptional circumstances, other criteria will be considered since the above-mentioned ones may not cover 100% hard-to-reach areas.

Furthermore, each strategic elements will be prioritised including equity, human rights and gender equality considerations with special attention to key and vulnerable populations who are the most at risk and most affected by malaria.

## 4.6 Programme Phasing

Drawing from prioritization, programme phasing is envisaged to achieve nationwide elimination status. This entails a burden reduction phase towards elimination, where a combination of interventions is intensified in high burden areas; and an elimination phase, where these measures are targeted to remaining foci where case-based surveillance is intensified followed by appropriate response to rapidly detect and cure every case. As malaria elimination is achieved at subnational levels and nationwide, efforts will be made to prevent re-introduction and re-establishment of malaria transmission in malaria-free areas in terms of appropriate surveillance and response with special attention to receptivity and vulnerability of the area.

Accordingly, the programme phasing is designed through the implementation period of the updated NSP (2024-2030) on the path to malaria elimination and prevention of re-establishment (Figure-10):

- Accelerated Burden Reduction Phase: Aims to reduce malaria incidence to less than 1 case per 1,000 population at risk<sup>22</sup> and transition to elimination phase by 2027 towards interruption of local transmission by 2030 in 03 CHT districts, viz. Bandarban, Khagrachari, and Rangamati. Universal coverage by effective preventive and curative interventions as well as supporting interventions aim to reduce local transmission and have an impact on morbidity and mortality.
- Elimination Phase:
  - Aims to interrupt local transmission and reduce malaria incidence to zero by 2024 in 04 elimination districts of Mymensingh Zone and by 2026 in 06 remaining elimination districts and maintain the status through 2030. Case based surveillance becomes the core intervention – every case is investigated and managed to avoid onward transmission. Based on the investigation, the focus of transmission is identified, appropriate response is deployed to rapidly interrupt transmission.
  - Aims to determine ‘non-endemic’ status of the rest 51 districts (and a few areas within 13 endemic districts) indicating no reported indigenous case (418 Upazilas) by 2024 and maintaining the status through 2030. Appropriate surveillance system, capacity building of general health system, and other relevant interventions will be in place.
- Prevention of Re-establishment Phase: Even after indigenous malaria cases have been reduced to zero starting with 04 districts in Mymensingh zone and 51 ‘non-endemic’ districts and other Upazilas in 2024, the health system and malaria surveillance operations remain capable of preventing re-introduction and re-establishment of local malaria transmission. Through this stage, maintenance of malaria-free status will become the responsibility of the general health services, as part of their normal function in communicable disease control, as well as coordination and collaboration with other relevant sectors.

Table-12: Stratification and programme phasing

| Stratum | Malaria incidence (current)                                      | Transmission status | Programme Phase   | Zone; Number of Districts and Upazilas; Population at risk   | Expected milestone   |
|---------|--|---------------------|---|--|--|
| 3       | API $\geq$ 1/1,000 population                                    | High                | Accelerated burden reduction towards transitioning to elimination | CHT (03 CHT districts) [26 Upazilas] [Population: 18,42,815 (1.12% of total population of country)]  | Reduction of API < 1 by 2027 and local transmission interruption by 2030 |
| 2       | API < 1/1,000 population   | Low                 | Elimination   | a) Mymensingh (04 districts) [08 Upazilas] [Population: 18,11,113 (1.10% of total population of country)]  | Local transmission interruption by 2024                                  |
|         |  |                     |   | b) Sylhet (04 districts) [21 Upazilas] [Population: 57,90,067 (3.51% of total population of country)]  | Local transmission interruption by 2026                                  |
|         |  |                     |   | c) Chattogram and Cox's Bazar (02 districts) [22 Upazilas] [Population: 82,91,026 (5.02% of total population of country)]                                    | Local transmission interruption by 2026                                  |
| 1       | API=0/1,000 population (no local transmission/ to be determined) | Potential           | Elimination (status to be determined)                             | 'Non-endemic' [51 districts (and a few Upazilas within endemic districts)] [418 Upazilas] [Population: 14,74,23,595 (89.26% of total population of country)] | 'Non-endemic' status determined by 2024                                  |

Note: Baseline API: 2022; Total population of Bangladesh: 16,51,58,616 (2022) in 64 districts and 495 Upazilas; Population at risk: 1,77,35,021 (2022) [10.74% of country population]. The strategy will consider Upazila as operational unit.

Table-13: Programme Phasing: NSP 2024-2030

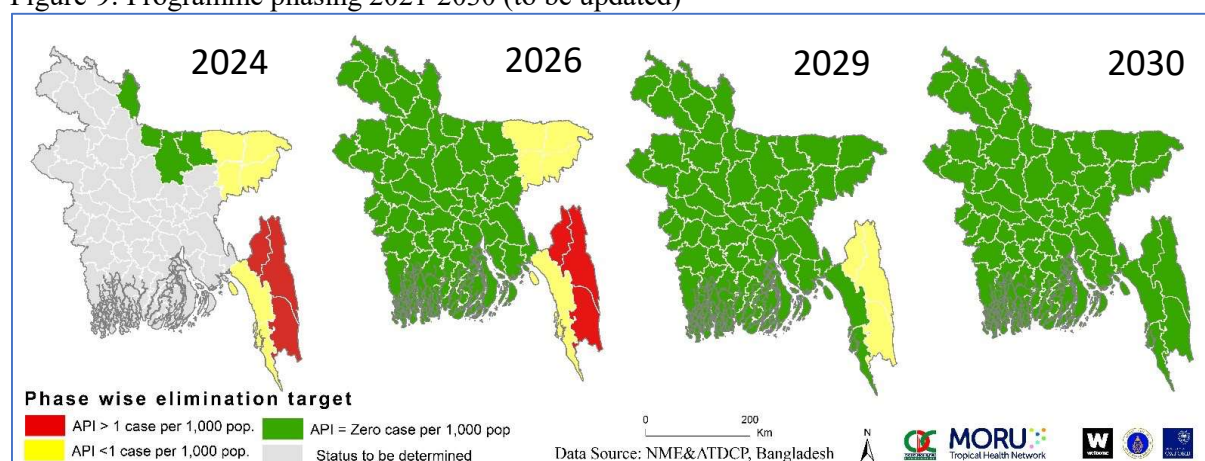
| Zones/<br>(Upazilas) districts  | 2022<br>(baseline) | 2023   | 2024   | 2025   | 2026  | 2027   | 2028   | 2029   | 2030  |
|---|--------------------|--------|--------|--------|-------|--------|--------|--------|-------|
| 03 CHT districts (26 Upazilas)  | Red                | Red    | Red    | Red    | Red   | Yellow | Yellow | Yellow | Green |
| Mymensingh (04 districts) [08 Upazilas]   | Yellow             | Yellow | Green  | Green  | Green | Green  | Green  | Green  | Green |
| Sylhet (04 districts); and Cox's Bazar and Chattogram districts (43 Upazilas)                   | Yellow             | Yellow | Yellow | Yellow | Green | Green  | Green  | Green  | Green |
| 51 'non-endemic' districts (and 'non endemic' Upazilas within endemic districts) [418 Upazilas] | White              | White  | Green  | Green  | Green | Green  | Green  | Green  | Green |

Note: 03 CHT districts is shown here as a cluster; although Khagrachari and Rangamati districts will reach elimination phase earlier than Bandarban district.

Programme Phasing Key:

|  |
|--|
| High burden and high transmission<br>API ≥ 1 case per 1,000 pop.     |
| Low burden and low transmission<br>API < 1 case per 1,000 pop.       |
| Status to be determined  |
| Interruption of local transmission<br>API = Zero case per 1,000 pop. |

Figure-9: Programme phasing 2021-2030 (to be updated)



#### 4.7 Milestone and Targets

##### Year 2024

- Bangladesh NSP 2024-2030 is officially launched nationwide.
- Local transmission has been interrupted and no indigenous malaria in 04 districts of Mymensingh zone.
- Non-endemic' status and absence of local transmission in 51 districts (and a few Upazilas within endemic districts) [418 Upazilas] determined.

#### **Year 2025**

- In areas where local transmission is interrupted, interventions relevant for prevention of re-establishment is rolled out including but not limited to, establishing systems for maintaining vigilance, integration of malaria case management within general health care services.

#### **Year 2026**

- Local transmission has been interrupted and no indigenous malaria case in 04 districts of Sylhet zone; and Chattogram and Cox's Bazar districts.

#### **Year 2027**

- Annual Parasite Incidence reduced to < 1 per 1,000 population in 03 CHT districts.
- Zero mortality due to indigenous malaria attained nationwide and maintain status.
- Subnational elimination verification launched with Mymensingh zone declared as 'malaria-free' by MoHFW followed by other districts in phased manner.

#### **Year 2029**

- Subnational elimination verification launched in Sylhet zone; and Chattogram and Cox's Bazar districts and declared as 'malaria-free' by MoHFW followed by other districts in phased manner.

#### **Year 2030**

- Local transmission has been interrupted and no indigenous malaria nationwide.
- Interventions for prevention of re-establishment of local malaria transmission especially vigilance rolled out nationwide.
- Preparedness for WHO certification for malaria elimination (expected in 2033) initiated.

#### **Year 2033**

- WHO certification for malaria elimination for Bangladesh.

### **4.8 Objectives, Strategies, Interventions and Activities**

In this section, objective-wise strategies, interventions and activities are described.

***Objective-1: Ensure universal coverage by early case detection using quality assured parasitological test and prompt and effective treatment of all confirmed malaria cases according to national treatment guidelines through 2030.***

Bangladesh is committed to universal coverage by quality-assured prompt diagnosis and treatment for all at-risk populations including the key and vulnerable populations (mobile and migrant populations, ethnic minority groups, disadvantaged communities, communities in border and conflict areas, and refugees). Universal coverage with early detection and effective case management will entail following channels of service delivery: public, community based and private and others (viz., Armed Forces and other law enforcement agencies, Municipal Corporation/Municipality, INGOs, partner agencies). Diagnosis and treatment are provided free of cost by public sector and partner NGOs.

Early case detection is essential component and the first stage in knowing the number of infected people in a given community. Universal coverage by early case detection based primarily on blood examination by RDTs or microscopy will be ensured for routine detection of malaria infections. Treatment for all confirmed falciparum and non-falciparum malaria will be based on national treatment guidelines developed in line with the WHO guidelines. QA of microscopy, RDT and antimalarials nationwide will be ensured. All cadres at facility and community levels will be trained in addition to orientation of private sector and others. Timely supply of quality assured RDT/microscopy and antimalarials at all service delivery points (public and community-based), will be ensured. Private sector engagement will address largely unregulated case management and episodic reporting.

## Strategy 1.1 Early Case Detection

### 1.1.1 Intervention: Diagnosis with RDT/Microscopy in public, NGO, private sectors and others; and QA

#### Activities:

#### 1.1.1.1 Strengthen RDT based diagnostic services:

**Stratum 3:** Early diagnosis (within 48 hours of onset of fever) and prompt treatment (EDPT) remains a key intervention. Bangladesh has well-established free community-based malaria case management delivered by CHCPs in CCs in malaria endemic areas. The CCs are the lowest level public sector service delivery points at community level. The Health Assistants support the CHCPs in community based EDPT. In addition, partner NGOs are providing support through a team of community-based workers ('Shasthya kormi'-SK) and volunteers ('Shasthya shebika'-SS). These field level cadres substantially complement and extend the outreach of malaria services, particularly in 03 CHT districts and selected elimination districts, where health infrastructure is yet to be optimal.

For optimal case detection, full strength of the field level staff/volunteers will be in place with necessary skills and at all locations. Currently, the coverage of health services is based mostly on population, which remains a huge problem in 03 CHT districts. Therefore, malaria services are still sub-optimal particularly in hard-to-reach areas. Although consideration of distance in health service coverage has started, yet in some hilly hard-to-reach in complex geographies, adequate number of CCs is required. The GoB has introduced multipurpose health volunteers (MHVs)<sup>23</sup> connected with CCs in selected districts under the Community Based Health Care (CBHC) of the Department of the MoHFW. The MHVs have recently started supporting the CHCPs in malaria service delivery especially referral of suspected cases and is expected to progressively get more involved in awareness generation, and community engagement. The MHVs will be trained for such malaria services at community level. In the CHT, villages are small clusters of households widely scattered across hilltops and islands (in the case of Rangamati). Therefore, the NMEP will advocate with the MoHFW (in coordination with concerned district health authority) for critical need for additional CCs as well as expansion of MHVs besides retaining partner NGO services towards universal coverage by community-based malaria case management. Efforts will be made to position one health worker (GoB or partner NGO) for each village/para (depending on geographical accessibility). Currently, health camps are held by the GoB and partner NGO in selected sites periodically which will continue to strengthen outreach operations during peak transmission season, especially where populations are relatively underserved. Provision of RDTs will be made for case diagnosis.

Furthermore, it is expected that advocacy will continue for involvement of other available field level cadres under local government and/or various health development programmes of other partners (viz., UNICEF). Building capacities of Para Kendras (under local governments) and any other health worker/volunteer with other agencies will be emphasized for referral of suspected malaria cases to CCs/HAs/SK/SS, and enhancing community awareness and responsive behaviour).

It is envisaged that approximately 20% of the total tests will be conducted in public sector health facilities and the majority (80%) will be contributed by testing at community level by strategic positioning of the SK and SS in village/para (with considerations for geographical accessibility) and additional support, such as, MHVs, Para workers and MMWs (in Bandarban). This ratio is expected to change from 2027 with progressive improvement in malaria situation to API < 1 per 1,000 population in 03 CHT districts as well as strengthening of public sector health system. The partner NGO contribution is expected to be progressively rationalized in 03 CHT districts and Cox's Bazar and Chattogram districts as the epidemiological setting transitions from burden reduction to elimination to malaria-free phases. Whilst partner NGO contribution will be 60% by 2030, in Bandarban, such support is expected to remain prioritized @80% until 2030 in view of various complexities, challenges).

RDT based diagnostic services for suspected cases (for detection of Pf/Pv) will be used at community level. Microscopy will be available in public sector health facilities and in partner NGO laboratories that are located strategically in selected areas. In health facility, RDTs will only be used when microscopy is temporarily unavailable (example, outside office hours, emergencies, vacant positions, etc.). Specified quantities of RDTs will be maintained in all health facility for use during off-duty and/or emergency hours.

Of total tests to be conducted by public sector and partner NGO, it is expected that 90% of tests will be done by RDTs (by CCs as well as partner NGO SK, SS and other additional support) and the rest by microscopy (at public sector health facilities and partner NGO laboratory), to emphasise EDPT within 48 hours of onset of fever. Other entities (Armed Forces and other law enforcement agencies, INGOs, selected institutions, etc.) will continue to do RDT (or microscopy). Efforts will be made to sensitize all entities regarding use of quality assured RDTs. Identified health facilities of Municipal Corporations/Municipality in urban areas as well as private sector will also provide RDT based diagnostic services (besides microscopy services, according to their own plan). [Case diagnosis in private sector is mentioned below as a separate sub-section].

Case management training and refresher training will be organized for all public sector health facility staff including doctors, nurses at Upazila, districts, and tertiary hospitals nationwide covering differential diagnosis and management of uncomplicated malaria (as well as management of severe and complicated malaria). The staff in the Rural Dispensary/Union Sub-centers/Union Health & Family Welfare Centres (UH&FWCs) will also be trained/re-trained (MOs, SACMOs) [who are also expected to support in referral of suspected cases]. This will be followed-up with supportive supervision and on-the-job mentoring by Upazila, district and central levels.

The community-based service providers will meet regularly with supervisors for data cross-checking, reporting and replenishing stock of supplies. Performance-based incentive (for number of fever cases tested by RDTs and referral) will be provided to retain and motivate the MHVs as well as health workers/volunteers with the partner NGOs.

Quality-assured RDTs will be made available (free of cost) at all service delivery points with public sector and partner NGOs (at all levels). Timely procurement of quality assured RDTs (with 25% buffer) through the GF PPM mechanism and/or GoB will be priority. Deployment reserve (minimum stock of RDTs, antimalarials) with CC, HA, SK, SS, Mobile Malaria Worker (MMW) and Health posts will be considered especially in hard-to-reach areas/border areas facing constraints related to timely replenishment for uninterrupted services especially during monsoon period (coinciding with peak transmission season). In addition, certain critical quantities of stock will be kept at central/district stores for contingencies and unforeseen circumstances.

Regarding evidence of *P. falciparum* parasites with gene deletions in the most common RDT target, histidine rich protein 2/3 (HRP2/3) noted in few countries outside Bangladesh, evidence generation will be initiated, when negative results for *P. falciparum* with bivalent RDT is found positive under microscopy (mentioned under ‘research’). Based on research and evidence from ongoing surveillance, adoption and access to RDTs that detect *P. falciparum* with pfhrp2/3 gene deletions will be discussed with technical guidance from the WHO and Malaria Technical Committee.

**Stratum 2 and 1:** In Cox's Bazar and Chattogram, same activities and provisions as mentioned above will continue through public sector health facilities (CCs, UHCs, DHs and others) as well as community health workers (HAs) and volunteers (MHVs), partner NGO, private sector and others, until 2026. From 2027, the services will be provided through public sector providers integrated under general health services.

In other 08 elimination districts RDT based diagnostic services will be provided through CCs and community level health workers (HAs). In all public sector health facilities in these districts as well as in 418 Upazilas of 51 'non-endemic' districts (and a few 'non endemic' areas within endemic districts), microscopy will be the mainstay of malaria diagnosis integrated under general health services in UHC/DH/Medical College Hospital. RDTs however, will be used only when microscopy is temporarily unavailable. Provision of RDTs will be ensured for public sector health facilities. Private sector will also be mapped, oriented and quality assured EDPT services with RDT (according to their own plan/resources) [and reporting] will be coordinated by public sector health cadres.

#### **1.1.1.2 Strengthen microscopy-based diagnostic services:**

**All strata:** Microscopy has advantages regarding detection of gametocytes and determination of parasite density as well as detection of other species, viz., *P. malariae* (*Pm*) and *P. ovale* (*Po*). Quality-assured microscopy-based diagnosis will be strengthened at Upazila and district level public sector health facilities. Microscopy-based diagnostic services will be provided by laboratory technicians of partner NGO facilities in selected areas. Identified laboratories of Municipal Corporations/Municipality in urban areas as well as private sector will also provide microscopy services (besides providing RDT based diagnostic services) according to their own plan. These facilities will be under the purview of GoB supportive supervision and cross-checking.

Capacity of laboratory technicians/Medical Technologists across GoB, and partner NGO will be strengthened through trainings/refresher trainings. New laboratory technicians/Medical Technologists will be provided induction training and existing microscopists will receive need-based refresher training. Bench aids, SOPs and QA manuals will be updated both in Bangla and English languages for nationwide dissemination, which will be reviewed periodically in consultation with the WHO, individual experts/key stakeholders. Timely supplies of quality equipment and reagents, besides necessary maintenance will be ensured. Periodic need assessment will guide further strengthening of microscopy-based diagnosis. Training of technicians from private sector and others will also be organized.

#### **1.1.1.3 Ensure diagnostic services for mobile and migrant populations:**

**Stratum 3:** Early case detection amongst mobile and migrant populations especially in Bandarban district remains challenging due to remoteness, terrain, socio-economic characteristics, and even undocumented status of some. Burden reduction and elimination will not be achieved unless these population groups (ethnic groups in such settings) have access to free EDPT. Providing early diagnosis (and prompt treatment) services for mobile and migrant populations going to & coming from jhum fields and forest areas will continue through community-based service providers. Provision of diagnostic services with RDT through malaria health posts (under partner NGO) in inter-district and international transit points is envisaged. Health posts will also be established in the landing points of jhum cultivators/forest workers/other mobile and migrant populations, viz., bus terminal, boat ghat, specific markets, etc. [Case diagnosis at health posts in border areas is mentioned below as a separate sub-section].

In Bandarban district, EDPT will be further augmented through a mobile malaria worker (MMW) [with incentive and travel support] in strategic locations. Such additional support is envisaged to boost testing, treating and tracking jhum cultivators, forest goers and any other mobile and migrant populations. The MMW will be recruited locally (with partner NGO) and expected to be conversant with local terrain, and socio-cultural context. The MMWs will be positioned in villages, where more than 50% population are jhum cultivator/forest goers/mobile groups and migrants (for whom access to EDPT remains challenging), and where any partner NGO service provider (SK, SS, health post) is located beyond 2 Kms (with considerations for geographical accessibility). It is also envisaged that if the jhum cultivators/forest goers/migrant/mobile population belong to a large/organized group, the leader of the group or an individual will be considered as MMW. The MMWs will be trained on EDPT and reporting and will be under supervision of Program/Field Organizers and Upazila level cadres.

Support will be requested from the Armed forces, BGB, Police and other law enforcement agencies to facilitate service delivery by health post/MMW and other health worker/volunteer in hard-to-reach and border areas. In addition, coordination with Armed forces (other security agencies), relevant ministries/partner agencies (example, UN agencies, INGOs) and selected private sector/corporate sector will be augmented to maximize coverage for all mobile and migrant populations including informal or even illegal labour, who often prefer to avoid any contact with public services/health personnel. Coordination with TB and HIV/AIDS control programmes will also be initiated for targeting these risk groups with malaria services. Multi-sectoral coordination will be key element prior to initiation of service delivery for systematic collection of information on mobile and migrant populations, and other risk groups in hard-to-reach areas.

Research will be done to map and understand the mobile and migrant populations and other risk groups for tailored interventions (mentioned under ‘research’).

#### **1.1.1.4 Ensure diagnostic services at identified district border-crossing points:**

**Stratum 3 and 2:** Drawing on the WHO guidelines, diagnostic services (and case management) of identified group(s) [example, organized forest goers, jhum cultivators, labour group, tourist groups, pilgrim groups] will be initiated through malaria health posts (under partner NGO) at formal and other locally recognized transit points (within national boundaries). In addition, such health posts will also be established along international border with India and Myanmar. Following training, these health posts will conduct RDTs followed by treatment besides BCC through inter-personal communication and distribution of communication materials. This will facilitate detection of malaria cases from other districts as well as those coming from neighbouring countries. These health posts will have one locally recruited health worker with necessary stock and equipment. These health posts will also support COVID-19 testing as well as others, as necessary. Linkage will be established with the nearest CC and/or other GoB facilities. Provision of training and supply of RDTs (and antimalarials) will be ensured.

#### **1.1.1.5 Ensure diagnostic services for pregnant women through ANC programme and all possible channels:**

**Stratum 3 and 2:** Screening of suspected cases amongst pregnant women by RDT (and treatment if found malaria positive) will be introduced when they access antenatal care (ANC) services in identified centres in coordination with the concerned Department under MoHFW and all other possible channels. In addition, health worker/volunteer (during ACD) will carry out test in the community when they are suspected as malaria case.

#### **1.1.1.6 Ensure diagnostic services for and by Armed forces, BGB, Police and other law enforcement agencies:**

**All strata:** Microscopy/RDT-based screening of members of the uniformed service personnel will continue according to the national guidelines. PCR-based screening will be utilized pre- and post-deployment to other malaria endemic countries at their own facilities or in coordination with facilities/institutions (GoB/non-government) where such provision is available. Medical/nursing staff of the Armed forces and other security/law enforcement agencies will be trained to use RDT (and treat cases) while in deployment to provide services to their cadres as well as civilian population when the latter approach them/their facilities/camps.

#### **1.1.1.7 Coordinate with private sector:**

**All strata:** Private sector service providers, viz., private medical colleges as well as clinics, diagnostic centres provide malaria diagnosis services at all levels. At community level, private sector health care service providers (both formal and informal service providers) are often the primary contact for many

communities. Efforts have been initiated in few districts to map, orient, and seek report from private sector providers. Informal private providers mapping and orientation are initiated at local level for village doctors, traditional healers and medicine sellers, sensitizing them on malaria signs and symptoms so that they refer the suspected malaria cases to appropriate malaria service providers (GoB or partner NGO). This will be intensified with systematic engagement process in coordination with district and Upazila health authorities, who will oversee this activity as part of their overall responsibility.

Considering the recommendations of the assessment related to the role of the private sector conducted in 2019, an expanded assessment to gather more evidence is ongoing including but not limited to understanding the knowledge and practices amongst them and estimating the number of malaria cases being detected and treated by them. Drawing from this assessment, a private sector engagement strategy will be developed followed by mapping and maintaining database of private laboratories/diagnostic centre, clinics and hospitals. A consultative process will be followed with key partners, potential partners from private sector with technical assistance from WHO to design and disseminate the strategy. Additionally, other relevant disease control/public health programmes will also be consulted for sharing their experience and lesson learned.

The training/re-training of private sector providers will include but not limited to, diagnosis and treatment/referral, and timely and quality reporting/notification malaria cases to the local health authorities within 48 hours of case detection as well as appropriate counselling to patients/families regarding EDPT, treatment compliance, adoption of personal protection measures, etc. The private sector providers will also be oriented/briefed on country's malaria elimination agenda.

After mapping and orientation, the formal private sector practitioners/facilities, who are diagnosing and treating the malaria cases with own resources are expected to follow the national guidelines and mandatorily report cases on malaria MIS through the link shared with them or through messaging. Coordination with various medical associations, hospital administrators/directors, owners of tea gardens with health facilities will be strengthened for the purpose. The informal private sector providers (pharmacies, drug vendors, village doctors, traditional medicine men/healers) are expected to refer the suspected malaria cases to the nearest GoB or partner NGO facilities for diagnosis and treatment. Incentives for referral by informal private sector providers will be considered. All private sector providers will be under the supervision of GoB/partner NGO. The NMEP will also attempt to develop a follow up mechanism and/or carry out random assessments periodically.

Coordination with private sector is expected to create a complementary service delivery channel to maximize outreach of early case detection (and treatment) and case reporting. Such efforts will help to build stronger and coordinated health system, which will benefit all communities across the country. Coordination with Bangladesh Medical Practitioners Association and relevant others will be initiated and strengthening of private sector engagement.

The NMEP may consider provision of RDT and antimalarials to selected private sector providers on regular basis after mapping and orientation. While the majority of private sector are expected to provide services with own resources, all of them will be under the purview of national QA system. The NMEP however, will coordinate for any emergency requirement. The NMEP will emphasize use of pre-qualified health commodities (and antimalarials) at the time of sensitizing/orientation sessions as well as review meetings/supervision visits. Coordination with relevant agencies will be strengthened for quality diagnostics, antimalarials. The laboratories/facilities providing microscopy services will be brought under the national QA system.

#### **1.1.1.8 Coordinate with Municipal Corporations/Municipalities for malaria control in urban areas:**

**All strata:** Health facilities (hospitals) under Municipal Corporations/Municipalities in metro cities/towns will be mapped followed by orientation towards strengthening EDPT (and case reporting).

As in case of the private sector, the NMEP will coordinate for QA of microscopy services and use of pre-qualified health commodities (and antimalarials). Emergency provision of diagnostics and antimalarials will be ensured.

#### **1.1.1.9 Coordinate with partner agencies for early case detection amongst FDMN:**

**Stratum 2:** Bangladesh is continuing with humanitarian response for FDMN population, in terms of health services coverage including malaria services, amongst others. However, this is putting immense pressure on and diverting health systems and development resources. Hence, EDPT and other interventions (LLIN, IRS, LSM, SBCC and community engagement, etc.), will be included in a package of services to be delivered with resources from partner agencies including the Global Fund. Necessary coordination with the Office of the Refugee Relief and Repatriation Commissioner (RRRC) of the GoB and various partner agencies, including WHO, UNHCR will be carried out.

It is envisaged that partner NGO will support implementation of EDPT and case-based surveillance in FDMN camps through their field level staff/volunteers and laboratories in coordination with Upazila/district health authorities and NMEP. They will also coordinate monthly reporting of cases from various entities including INGOs. The GoB/NMEP will be responsible for trainings, and supervision. Certain specific yet critical activities like TES, entomological surveillance will be carried out by GoB in coordination with RRRC, WHO, IOM, INGOs, and other relevant agencies.

#### **1.1.1.10 Ensure Quality Assurance (QA) in Microscopy:**

**All strata:** QA of microscopy is crucial. Strengthening of QA of microscopy will be emphasized. Collaboration between the NMEP and the Central Malaria Reference Laboratory (CMRL) will be revitalized to strengthen central, district and Upazila level laboratories (public, NGO, private) for the purpose. Efforts will be made to ensure filling of vacancies of/retention of Medical Technologists at all public sector health facilities. The NMEP will ensure an ‘Malaria Microscopy External Competence Assessment’ (ECAMM) for microscopists with technical assistance by the WHO. The NMEP will also carry out national competency assessment (NCAMM) for public sector Medical Technologists at district/Upazila levels.

The NMEP will update ‘Quality Assurance Guidelines for Malaria Diagnosis’ with technical assistance by the WHO and disseminate to all health facilities in Bangla. The QA Guidelines will ensure: (i) QA in Microscopy (and RDTs); (ii) QA in Case Management. The NMEP will also develop training materials/bench aids, provide basic and refresher training in consultation with WHO and individual experts. Internal QA system (cross-checking) guidelines will be updated and disseminated in Bangla to all public/NGO/private laboratories. Cross-checking of slides will be ‘blinded’ at district level to ensure the validity of results; and only a representative sample of slides will be cross-checked at high level and such details will be included in the guidelines.

A core group of trained senior Medical Technologists and selected technical staff from CMRL will provide supportive supervision (through field visits) for QA and provide support in training/re-training of microscopists (across all sectors).

The need for quality positive slides will be important for training/maintaining microscopy skills. At central level, a ‘Slide Bank’ will be established to support strengthening of QA of microscopy.

#### **1.1.1.11 Ensure Quality Assurance (QA) in RDTs:**

**All strata:** QA of RDTs and their interpretation will involve batch testing, testing of field samples, and supportive supervision in coordination with relevant stakeholders including private sector. Guidelines for QA of RDT will be developed and activities will be initiated with technical assistance by the WHO.

### 1.1.1.12 Other diagnostic methods:

**All strata:** Diagnostic methods with a higher sensitivity than RDT and microscopy, such as polymerase chain reaction (PCR) or other molecular-based techniques will be used in specific situations (elimination setting) and in research [example, to resolve discordant results from microscopy QA and RDT versus microscopy; to distinguish recrudescence versus reinfection; to confirm zero local transmission in Upazilas reporting zero cases; and detection of suspected *P. knowlesi* (*Pk*) cases with PCR among jhum cultivators, forest goers/settlers/other mobile and migrant populations with proximity to monkeys (macaques)]. Existing facilities/equipment in the country (with GoB or non-government research/other agencies) will be leveraged for the purpose. With support from the GF under the COVID-19 response mechanism (C19RM), molecular diagnostics infrastructure has been expanded to subnational level. Such facilities will be utilised, and necessary requirements will be assessed and provided.

## Strategy 1.2 Prompt and Effective Treatment

### 1.2.1 Intervention: Management of uncomplicated malaria, severe malaria; QA; pharmacovigilance

#### Activities:

#### 1.2.1.1 Ensure prompt and effective treatment at community level and in health facilities:

**Stratum 3:** Each confirmed malaria case detected in the community and health facilities (public, NGO, private sector, others) will be treated free of charge according to the national treatment guidelines (NTGs). Prompt and effective treatment of malaria will be integral part of case management for pregnant women visiting ANC clinics.

The NMEP is continuously striving to improve community-based malaria case management. The CCs provide free malaria treatment at community level besides GoB field level cadres (HAs). The role of partner NGO SK and SS will provide complementary support. In addition, the malaria health posts and MMWs being proposed will also provide treatment when found positive for malaria.

Case management training and refresher training will be organized for all public sector health facility staff at Upazila, districts, and tertiary hospitals nationwide as mentioned earlier. The training will incorporate a module on inter-personal communication (IPC) aiming to improve patient compliance with malaria treatment regimens (and other desired behaviours such as adoption of personal protection and appropriate treatment seeking). The national treatment guidelines to be effective, the same will be available at all points of care in local language including private sector providers. During supervision visits, treatment practices and compliance will be assessed across sectors.

Supervised treatment/DOT will be introduced to support patient adherence for radical treatment for vivax malaria with PQ. The patients will be followed up on Day 3, Day 7 and Day 14 by health worker/volunteer. The importance of treatment adherence will be emphasized during training/orientation sessions, review and planning meetings and supervision visits, and through BCC/advocacy/community engagement activities. Patient cards will be revived for supporting the follow up of treatment adherence. The cards will include necessary yet simple messages.

Quality-assured antimalarials will be made available (free of cost) at all service delivery points with public sector and partner NGOs (at all levels). Timely procurement of quality assured antimalarials (with 50% buffer) through the GF PPM mechanism and/or GoB will be priority. Deployment reserve will be considered for hard-to-reach areas/border areas facing constraints related to timely replenishment for uninterrupted services especially during monsoon period (coinciding with peak transmission season). In addition, certain critical quantities of antimalarials will be kept at central/district stores for contingencies and unforeseen circumstances.

Furthermore, the HAs and MHVs already cover a range of health programmes including malaria, which will continue. The partner NGO SK, SS support is significant at community level and who are recognized as extended complementary part of health system especially in hard-to-reach areas. Such support will be progressively involved in integrated Community Case Management (iCCM) to expand their role at community level to cover/refer common illnesses such as diarrhoea for children under 5 (and/or acute respiratory tract infections/malnutrition/any other priority health conditions for children) as well as fever management for all age groups. Such community level resource will be beneficial for malaria as well as other programmes. Accordingly, health commodities will be kept with the community level cadres with GoB and/or the GF/other resources.

#### **1.2.1.2 Ensure management of severe malaria in health facilities:**

**All strata:** Efforts will be made for management of severe malaria nationwide. Special training will be provided to doctors and paramedics at all levels on management of severe and complicated malaria. Besides, Bandarban district hospital particularly will be prioritized for equipping with skilled medical and paramedical manpower as well as necessary equipment and logistics. Facilities for biochemical examination and dialysis will also be made available at Upazila level where malaria burden is relatively high, and where referral to tertiary facilities is particularly difficult. It is envisaged that necessary pre-referral treatment [artesunate/artemether/quinine injections and artesunate suppositories (paediatric)] will be made available for pre-referral treatment at CCs and Upazilas. Provision of trainings/re-trainings will be made for Medical College Hospitals and those under City/Municipal Corporations, Armed Forces/BGB. Private sector hospitals will also be mapped for trainings/re-trainings. Real-time exchange of information will be prioritised.

#### **1.2.1.3 Ensure prompt and effective treatment at identified district/international border-crossing points:**

**Stratum 3:** As mentioned earlier, malaria health posts in identified transit points and MMWs will provide EDPT, when such areas are more than 2 Kms away from CCs and or partner NGO SK and SS. Linkages will be built with the nearest CC/other public sector health facilities. Collaboration with Armed forces, BGB, and other law enforcement agencies will be established for expanding such scope of case management. In addition, mobile and migrant populations, tourists, pilgrims, at identified national land/sea/air border crossing points, transit points, as well as weekly/monthly markets and or designated markets in border areas will be identified for establishing health posts and CCs in future. The NMEP will also advocate for establishing CCs within 2 Kms of border crossing/transit points. Support to such service providers will include provision of training and supply of RDTs and antimalarials.

#### **1.2.1.4 Ensure prompt and effective treatment services within Armed forces, BGB, Police and other law enforcement agencies:**

**All strata:** Armed forces, BGB, Police and other law enforcement agencies will follow the national treatment guidelines. Their doctors and nurses will be trained on case management.

#### **1.2.1.5 Ensure prompt and effective treatment services in private sector and in facilities under Municipal Corporations/Municipalities:**

**All strata:** The private sector providers (formal, informal) will be mapped and oriented on national treatment guidelines and reporting (mentioned earlier under 'early case detection'). Likewise, health facilities (hospitals) under Municipal Corporations/Municipalities will also be mapped and oriented.

#### **1.2.1.6 Introduce Targeted Drug Administration (TDA) in special circumstances:**

**Stratum 3:** “*Targeted drug administration (TDA) is a form of chemoprevention involving the provision of a full therapeutic course of an antimalarial medicine to individuals at increased risk of malaria infection compared to the general population. Depending on the frequency and duration of exposure, TDA could be provided before, during or after potential exposure to malaria transmission. The antimalarial medicines given during TDA treat all existing infections and prevent new infections over the duration of the drug’s post-treatment prophylaxis period. At minimum, a TDA strategy deploys an antimalarial medicine that targets the asexual, blood-stage malaria parasites (e.g. ACTs or chloroquine). TDA interventions may include additional medicines that target hypnozoites in the liver (e.g. primaquine for radical cure of *P. vivax*) or gametocytes in the blood (e.g. single, low-dose primaquine for *P. falciparum*). TDA, as opposed to MDA, is provided to specific individuals or a subset of the population rather than to everyone present within a delimited geographical area. The premise of the strategy is that providing chemoprevention to individuals whose occupations or behaviours put them at increased risk of malaria infection may reduce transmission in the community if their infections constitute a large proportion of the infectious reservoir. If found to be effective, a targeted strategy is likely to be more resource-efficient, acceptable, feasible and equitable than a mass strategy.*”<sup>24</sup> TDA in high *P. falciparum* burden areas will be introduced as pilot for specific occupational groups, like jhum cultivators, forest goers, other mobile and migrant populations (example, construction and plantation labour) in selected villages of Bandarban district in consultation with the WHO and Malaria Technical Committee and experts. TDA (in conjunction with all other control interventions) is expected to reduce *P. falciparum* burden.

Specific guidelines will be developed for TDA implementation and M&E with technical assistance by the WHO. Drawing on a pilot (in 2023), TDA (two rounds) in selected villages (purposive) in Lama Upazila of Bandarban district (with more than 10 cases in previous year). The target group will comprise occupational risk group, viz., those pursuing jhum cultivation and forest-based occupation. All individuals in the age group 15-59 years irrespective of gender (drawing on the demographics of affected populations) except those with certain contraindications according to national guidelines and or other criteria (to be determined). Ethnic groups who are the most at risk and affected, viz., Mro, Marma, Bangali and Tripura and who are mostly pursuing jhum cultivation, forest-based occupation, are expected to be covered. TDA package of activities will include but not limited to, advocacy at all levels, enumeration of risk groups/village census, community engagement and mobilisation, sensitization and involvement of local stakeholders, orientation of GoB/NMEP and partner NGO staff and volunteers (including selected MMW and Health Post), besides two rounds of TDA at specified intervals, and M&E. Necessary resources will be mobilized for the purpose besides coordination with local authorities, Armed Forces and other law enforcement agencies. Intermittent Preventive Treatment for risk group (IPT) [targeting jhum cultivators/ forest goers/other mobile and migrant populations in age group 15-59 years] will be carried out every month including those left out from coverage under TDA. For each targeted individual, distribution of forest pack is envisaged with Long Lasting Insecticidal Net/Long Lasting Insecticidal Hammock net (mentioned under next strategy and research), BCC materials, waterproof bag and floor mat, wrist bands with contact information of healthcare providers. The pilot TDA initiative will be evaluated for expansion, as appropriate. Active fever screening (AFS) and treatment of malaria cases on fortnightly basis will be carried out in each village (whole population) between TDA rounds during transmission season. Importantly, efforts will continue to strengthen access to EDPT, effective vector control and surveillance.

Drawing on the learning of the pilot through evaluation, scaling up this initiative to other identified Upazilas will be considered in discussion with WHO and Malaria Technical Committee and experts.

#### **1.2.1.7 Introduce G6PD testing to improve management of *P. vivax* malaria:**

**All strata:** The national treatment guidelines recommend primaquine – an 8-aminoquinoline based *P. vivax* radical cure. A study (2020) concluded that there was a high prevalence of G6PD deficiency amongst the ethnic groups in the CHT, but this varied significantly between ethnic groups.<sup>25</sup> Introduction of G6PD testing will be considered as pilot in selected areas, where ethnic minorities predominate and incidence of *P. vivax* (and so treatment with Primaquine) is relatively high (mentioned

under ‘research’). Findings will support development of policy on G6PD testing with WHO pre-qualified devices. Meanwhile, health facilities, and health workers/volunteers will be trained regarding Day 3, Day 7 and Day 14 follow-up for *P. vivax* patients treated with PQ to check for signs of haemolysis alongside assessing treatment adherence besides counselling patients and families on self-observation for signs of adverse effects and referral. The patient treatment cards will include simple messages on signs and symptoms and contacting health facilities immediately, if needed (self-reporting). Single dose primaquine for *P. falciparum* (for gametocytocidal effect) will continue without G6PD testing.

#### **1.2.1.8 Ensure Quality Assurance (QA) in case management:**

**All strata:** QA of patient care will entail supervision. Clinical reviews will also be carried out in underperforming health facility (based on reports or data analysis) and remedial measures will be put in place, as appropriate (including special needs-based training/re-training for the clinical staff). Such QA will be applied for both public and private sector with clear SOPs.

#### **1.2.1.9 Ensure monitoring of quality of anti-malarial drugs:**

**All strata:** For case management, it is critical that medicines are of good quality and that supplies are adequate. Monitoring of quality of antimalarials at public sector health facilities to be identified as sentinel sites (with focus on medicines not procured through the external support by the GF and/or the WHO) will be rolled out for testing using Minilab® test kits in collaboration with the Directorate General of Drug Administration (DGDA). Minilab® test kits and consumables will be procured, and staff will be trained. Sample private sector facilities/providers will be brought under the purview of such testing (spot-check). Supervision will be carried out periodically, both in sentinel sites and in additional spot-check sites. Confirmatory tests of selected samples will be carried out at central level (in coordination with DGDA). The NMEP will continue to improve supply management and update the Logistics Management Information System (LMIS) to reduce any shortages and prevent stock out in the supply chain. The logistics issues including any quality related ones will be discussed in meetings of relevant units within the MoHFW.

In addition, efforts to eliminate inappropriate, counterfeit, and sub-standard antimalarials being carried out by DGDA will continue. The MoHFW decision relating to banning import, manufacture, export, registration, re-registration, distribution, and sale of artemisinin monotherapy will be reinforced through identification of/communication with importers, manufacturers, exporters, wholesalers/distributors, pharmacies and drug sellers in coordination with the DGDA and concerned law enforcement agencies. The NMEP will coordinate with the DGDA and other concerned agencies, partner NGOs, private sector, relevant research institutes, and law enforcement agencies, as appropriate, especially to:

- eliminate artemisinin monotherapy products and register only quality-assured medicines, and diagnostics;
- strengthen quality assurance during and after registration to prevent the manufacture and sale of substandard products;
- intensify routine surveillance to detect and eliminate the sale of oral artemisinin-based monotherapies, spurious, falsified, falsely labelled and counterfeit antimalarials, especially in border areas;
- enforce the ban on inappropriate antimalarials import, manufacture, export, registration, re-registration, distribution and sale of artemisinin monotherapy and inappropriate antimalarials (even cancelling licenses if inappropriate antimalarials are found);
- and improve national capacity for quality-control testing (NMEP in collaboration with DGDA will monitor quality of antimalarials at peripheral facilities and outlets using *Minilab*® test kits); and
- improve rational and responsible use of all malaria medicines to reduce unnecessary use that may contribute to resistance.

#### **1.2.1.10 Strengthen pharmacovigilance system:**

**All strata:** The NMEP will work closely with the DGDA to strengthen pharmacovigilance system to capture adverse events (AEs) of antimalarials including 8-aminoquinolines used for the radical treatment of vivax malaria, particularly given the existence of G6PD deficiency in Bangladesh, predominantly affecting certain ethnic minorities. Pharmacovigilance will be part of training curriculum for all levels.

#### **1.2.1.11 Updating National Treatment Guidelines:**

Drawing on the WHO Guidelines released in 2022 and the new interventions like TDA and IPT being envisaged, the national treatment guidelines (NTG) will be revisited and updated and consensus from relevant experts, Malaria Technical Committee, and WHO will be sought. The updated NTG will also mention treatment regimens for *P. malariae* and *P. ovale*. The updated treatment guidelines will be disseminated at all levels and will be included in the training/re-training curricula. In the event any new evidence from TES and or new/updated WHO guidance is considered by the Malaria Technical Committee for revisiting treatment regimens (examples, seven-day primaquine regimen at the same total dose as 14-day primaquine for better compliance as pilot drawing on WHO guidance and/or weekly dose of primaquine for 8 weeks for G6PD deficient patients when such testing is rolled out), the NTG will be revisited.

***Objective 2: Ensure universal coverage of population at risk in targeted areas with appropriate preventive interventions through 2030.***

Reduction in human-vector contact by personal protection, reduction of longevity of vectors and vector density by use of anti-adult and or anti-larval measures are strategic elements. Selection of vector control interventions will be guided by an eco-epidemiological assessment informed by malaria case and entomological surveillance data. Universal access to effective prevention, viz., LLINs amongst all at-risk populations including key and vulnerable populations (mobile and migrant populations, ethnic minority groups, disadvantaged communities, communities in border and conflict areas, and refugees) in high burden areas will be priority. LLIN utilisation is monitored regularly, and surveys are conducted annually. In 2021, more than 95% population in eligible areas for LLIN distribution were found sleeping under the LLINs.<sup>26</sup> In another study in CHT districts, 93% of sample households had LLINs and 92% of population had access to LLINs within households.<sup>27</sup> Mass distribution of LLINs in eligible areas was carried out in 2022. IRS will be applied in active focus, as needed and LSM will be applied in appropriate context. An integrated vector management (IVM) strategy drawing from the WHO guidance<sup>28</sup> will guide planning, implementation and M&E based on the local context and transmission dynamics.

### **Strategy 2.1 Malaria Prevention with Appropriate Vector Control Measures**

#### **2.1.1 Interventions: Long Lasting Insecticidal Net distribution and use; Focal responsive IRS; Larval Source Management; Other vector control and personal protection measures**

##### **Activities:**

##### **2.1.1.1 Ensure universal coverage by free LLINs for population at risk - mass campaigns:**

**Stratum 3:** LLINs are highly effective measure of preventing malaria infection and reducing associated morbidity and mortality. Universal coverage by LLINs (responding to the three-year effective duration and protection as per the WHOPES specification) will remain a core malaria prevention measure and ‘absolute priority’ in 03 CHT districts until 2026. The NMEP will ensure that 100% population in endemic areas (villages) will be protected and at least 90% of them will use LLIN effectively to reduce transmission and provide personal protection. The target coverage rate for large sized LLINs will be 1.8 people per net (in-line with the WHO standards to achieve 100% coverage). Additional single LLINs (or LLIHNS after evidence generation) will be distributed to all those identified to be at occupational

risk of malaria and various vulnerable groups (please refer to sub sections below). In addition, certain quantities of LLINs will be considered ‘absolute priority’ for any outbreak/other contingencies like natural disasters.

After transition to low burden and low transmission setting (elimination setting), targeted distribution will be considered in 03 CHT districts. During elimination phase, the programme will move away from blanket coverage and apply targeted approach to maximize cost effectiveness. Malaria risk stratification will evolve to distinguish between indigenous and imported cases and thereby between endemic villages with indigenous malaria and villages where all cases are imported. From 2027, LLINs will be distributed through mass campaigns only in villages that reported indigenous malaria cases in the previous year. Rigorous micro-stratification until village level will be carried out to inform better targeting of LLIN coverage rather than considering entire district/Upazila/ward as endemic and eligible for LLIN coverage.

District and Upazila officials will conduct micro-level planning for LLIN distribution through mass campaigns according to the LLIN distribution guidelines and in coordination with partner NGOs. Orientation will be carried out for all concerned. Micro-level planning will take into consideration household sleeping patterns/socio-cultural behaviours to ensure universal coverage and use. This will be coupled with locally appropriate and gender sensitive BCC to ensure community mobilization and high and correct LLIN usage. External assessors (example, individual experts, research institutes) will conduct post-distribution LLIN coverage assessments in a random sample of targeted sites. Periodic studies will be conducted on utilisation, residual efficacy of insecticide on LLIN and the durability of the LLINs in coordination with relevant institutions/experts. LLINs will be stored at Upazila and district health facilities as well as central levels (for continuous distribution and emergencies).

**Stratum 2:** In elimination districts, LLINs will be distributed only in active foci with strengthening of case-based surveillance. In addition, provision of LLINs will be kept for any outbreak/emergencies. However, universal coverage by LLINs is envisaged for FDMN camps. The LLINs will be sourced through various partner agencies.

**Stratum 1:** LLIN distribution is not envisaged in 51 ‘non-endemic’ districts (and a few ‘non endemic’ areas within endemic districts).

#### **2.1.1.2 Ensure additional free LLINs for specific geographies and populations at risk – continuous distribution:**

**Stratum 3:** Additional LLINs will be distributed to risk groups in 03 CHT districts. Community-based healthcare providers will monitor and report on the LLIN needs and population movements to allow the programme to respond in a timely manner to maintain LLIN coverage level.

**Provide LLINs to pregnant women:** Additional LLINs will be given to pregnant women in communities targeted for mass LLIN distribution. LLINs will also be delivered through ANC services in coordination with district and Upazila level health authorities. This approach is expected to maximize LLIN coverage for pregnant women and children under 5 years; and positive impact on ANC attendance.

**Provide LLINs to residential schools, public health facilities:** Additional LLINs will be given to residential schools to cover children staying in hostels. LLINs will also be distributed to public health facilities with in-patient provision.

**Provide LLINs for use in jhum fields, forest/forest farms:** Additional LLINs will be provided for use in forest/forest farms (targeting *jhum* cultivators and forest goers/workers and other mobile and migrant populations working in forest and forest fringe areas). These LLINs will be delivered amongst targeted communities during mass distribution and/or during household visits (continuous distribution) and during TDA.

***Provide LLINs to select entities to provide to their workers/labour:*** Additional LLINs will be provided to selected employers to provide to their workers/labour. At the same time, efforts will be made to encourage employers to provide LLIN or other personal protection measures to their employees/labour at their own cost. This activity will target construction/development project settlements/camps (example, dams, bridges, culverts, mines, road/railway construction, large-scale logging); plantations (example, rubber, tea, food); forest workers in the formal sector (example, forest/wildlife protection services); and fishermen.

***Provide LLINs to protect people in new settlements:*** There will be special emphasis on providing LLINs to people in new settlements in target areas, example, roadside economic migrants, settlements adjacent to construction/development projects. New settlements will be identified through mapping by local healthcare providers.

***Provide LLINs to address any LLIN attrition in-between mass distribution:*** Continuous distribution of LLINs will be considered to address any LLIN attrition in-between mass distribution.

***Provide LLINs in response to malaria upsurges/outbreaks and the event of disasters:*** In any event of upsurges/outbreaks, and disasters, LLINs will be provided to anyone who has not already been covered.

***Provide LLINs to Armed forces, BGB, police, and other law-enforcing agencies:*** LLINs will be provided to uniformed personnel while they are stationed in endemic areas. LLIN distribution will be performed by their own channels, but oversight and technical support will be provided by the NMEP.

### **2.1.1.3 Conduct focal responsive IRS:**

**Stratum 3 and 2:** Endophilic malaria vectors usually tend to rest indoors. Hence, the ‘Indoor Residual Spraying’ (IRS) of human dwellings with insecticides can be very effective. Vectors that are exophilic and endophagic, i.e., those tend to rest outdoor but tend to feed or rest indoors briefly, can also be controlled by IRS. Insecticides having residual effect are sprayed indoors, so that mosquitoes after biting an infected person will rest in the house and will pick up sufficient insecticide particles sprayed on the walls and other indoor surfaces and its longevity will be reduced so much so that it does not survive to become infective. In areas where vectors are strongly exophilic and/or exophagic, i.e., they rest and bite outdoors, other control methods will be considered.

As with LLINs, the effectiveness of spraying the walls and ceilings of houses and animal sheds with IRS is somewhat constrained by the early outdoor biting habit of key local vectors in Bangladesh. Nevertheless, IRS can have an impact on malaria transmission provided the construction of houses is sufficiently solid with enough sprayable surfaces.

Instead of routine IRS, focal responsive IRS will be carried out in the event of upsurges/outbreaks. IRS will, however, only be applied in areas which have not been targeted for LLINs during the previous three years, except in special circumstances (example, in communities where LLIN utilization is low, IRS with a non-pyrethroid insecticide may be applied). Areas that have received LLINs in the last three years will instead receive top-up LLINs, as required. In practice, the effectiveness of spraying will depend on timeliness and quality coverage, adherence to the specified criteria of the insecticide and application procedure, community acceptance of spraying, availability of well-maintained equipment, adequately trained spraying personnel, effective supervision, and strong financial support. The NMEP will update IRS manual to guide all concerned to maintain the quality and increase its effectiveness. Further, in accordance with the national policy the choice of insecticide will consider safety, efficacy, cost, availability, existing susceptibility of vectors, and likely effect on susceptibility of vectors.

To be effective, IRS requires a well-organized operation by skilled spray-men and with very strong field supervision (field staff, Spray Supervisors/Team leaders). As with LLINs, IRS operations require careful planning at both the macro and the micro levels (including geographic reconnaissance to ensure

the suitability of house numbers, house construction in target areas). Community mobilization, and BCC will be key to ensure community acceptance and high level of coverage (>80%) for maximizing impact. Emphasis will be placed on timely and adequate supplies of consumables, equipment (spray pumps, replacement parts, personal protective equipment), vehicles and other means of transportation for supplies, equipment, and workforce besides funding. Attention will also be given to strengthen coverage assessments and documentation of IRS operations.

#### **2.1.1.4 Conduct larval source management (LSM):**

**Stratum 3 and 2:** Larval Source Management (LSM) refers to targeted management of mosquito breeding sites, with the objective to reduce the number of mosquito larvae and pupae. LSM is recommended as a supplementary vector control measure and will be carried out where vector-breeding sites are 'few, fixed and findable'. Effective management will require trained field personnel, entomologists, and public health professionals, with knowledge of local malaria transmission and vector control as well as through community mobilization. The approach will be managed by central and district level entomological teams. Guidelines will be developed for sound management of mosquito larval habitats.

#### **2.1.1.5 Initiate innovative vector control and personal protection measures:**

**Stratum 3:** Spatial repellents (repellent cream, spray, oil) and attractive toxic sugar baits may have potential for reducing human-vector contact and controlling malaria transmission and disease in specific situations (example, early outdoor biting vectors such as *An. baimai*). Insecticide treated hammock nets for population who sleep outdoors will be considered for pilot (and later scale up) besides other options such as, insecticide treated blanket and top sheets, clothing, and insecticide treated plastic sheet in specific circumstances (for mobile and migrant populations, viz., jhum cultivators, forest goers. Research in coordination with relevant agencies will be carried out for the purpose (mentioned under 'research'). Investigations into the effectiveness of personal repellents will be carried out. The outcomes will inform the integration of these tools into IVM strategy. Pilot studies on tailored packages of proven and or promising prevention measures from other countries to maximize protection of all those at occupational risk of malaria (example, jhum cultivators, forest goers, labour at construction/plantation sites, etc.) will also be conducted.

#### **2.1.1.6 Coordinate coverage by LLIN and other prevention measures for FDMN:**

**Stratum 2:** Universal coverage by LLINs is envisaged for FDMN, being at risk of and affected by malaria besides posing threat for malaria transmission beyond the camps. The LLINs will be sourced through various partner agencies (in addition to resources required for distribution and other activities). Whilst the national guidelines for LLIN distribution will be applied, coordination with RRRC and relevant partner agencies will be integral through planning, implementation and M&E. Partner NGO will support in LLIN distribution and monitoring use. Besides enhancing awareness and responsive behaviour, LSM will also be promoted through messaging, community engagement, where feasible.

**Objective 3: *Strengthen context-specific surveillance in all malaria settings and outbreak preparedness and response through 2030.***

Surveillance is a core intervention of malaria control and elimination. Surveillance systems will be expanded and strengthened nationwide for continuous and systematic collection, analysis and interpretation of malaria-related data, and use of that data in the planning, implementation, and M&E. The NMEP will lead and coordinate surveillance (and M&E) across all strata and all sectors. Routine surveillance will be strengthened in all districts. In elimination districts, any single case will be notified, investigated, classified, and notified and focus will be investigated followed by classification and appropriate response. Private sector and others will be brought under the malaria surveillance network. Mandatory notification of malaria cases by all sectors will be enforced through regular orientation, advocacy and communication, and supervision and follow up. An updated malaria MIS will be in place.

Further, early warning signs for any upsurge/outbreak will be monitored. Timely and appropriate actions will be ensured. In line with the WHO guidance, surveillance and response mechanisms will be reviewed and will be progressively integrated into the broader health sector approach as Upazilas and districts transition to elimination phase or become malaria-free. Necessary resources will be identified.

Effective coverage of vector control interventions is reliant on knowledge of local vector species and their susceptibility to insecticides, as well as on vector and human behaviours that may allow mosquitoes to avoid contact with interventions and thereby maintain residual transmission. Entomological surveillance is essential to inform IVM strategy and evidence-based implementation to maximize their impact on malaria transmission. Entomological monitoring will be strengthened for any change in entomological indicators and for providing guidance for revisiting IVM strategy periodically.

### **Strategy 3.1 Epidemiological Surveillance**

#### **3.1.1 Interventions: Routine and case-based surveillance; Malaria MIS; Death investigation**

##### **Activities:**

##### **3.1.1.1 Strengthen surveillance systems:**

**All strata:** Robust surveillance system is a pre-requisite for malaria control and elimination. Even during post-elimination phase, vigilance in terms of close monitoring for any occurrence of malaria and application of the necessary measures needs to be priority in receptive malaria-free areas to prevent re-establishment of malaria transmission. A routine surveillance system already exists to monitor the disease trend and analyse the epidemiological information for programme planning and implementation.

The NMEP follows the guidance from the WHO [A Framework for Malaria Elimination (2017), Surveillance and M&E: A Reference Manual (2018), GTS 2016-2030 (2021), and others]. For strengthening of surveillance at field level, a national surveillance manual has been developed with special emphasis on hard-to-reach areas, which will be updated periodically, as needed. The guidelines articulate how data will be collected, reported and used for decision-making. Surveillance guidelines will be updated from time to time, as required.

The routine surveillance system collects malaria related information including number of cases tested and treated for preparing monthly aggregated reporting in 13 endemic districts (Upazila- and district-wise). The dataset is further disaggregated into age, sex, malaria species (currently only Pf/Pv), treatment outcome, ACD/PCD. With transition to low malaria burden and low transmission towards elimination, 'case-based' surveillance has been rolled out in 10 elimination districts. This system will be strengthened whereby effectively every case is reported, investigated, classified followed by focus investigation, classification and appropriate response (mentioned in the next section).

Malaria data is reported from both active case detection (ACD) and passive case detection (PCD). PCD will be strengthened nationwide starting from CCs up to tertiary level hospitals. ACD will also be strengthened but will not substitute PCD. Community health workers/volunteers play a major role in ACD, while public sector health facilities conduct PCD. ACD is classified into proactive case detection (PACD) and reactive case detection (RACD). In hard-to-reach areas with limited accessibility to health facility/provider, proactive case detection (PACD) will be important for early detection of cases in the community and confirming the existence of active local transmission in target areas/populations. PACD will include house visits, as feasible according to local context. PACD will be conducted by health worker/volunteer with GoB and/or partner NGO. In identified hard-to-reach areas, PACD will be conducted through special health camps (mobile clinic) involving a team of doctor, paramedics, health workers/volunteers. Special health camps will be conducted before and during peak transmission season in coordination with local stakeholders at district/Upazila levels and Armed Forces and Border Guards. All detected with fever are tested and those testing positive will be treated according to national

treatment guidelines. Special health camps will not substitute routine case detection. RACD will be practised when a malaria case is reported in elimination settings and/or when there is upsurge/outbreak in any area in the country (mentioned in the next section).

Optimizing case detection being a priority, context-specific ABER will be set. Whilst ABER for Bandarban district will be set to at least 25%, and for other two CHT districts will be 15%. For Cox's Bazar and Chattogram districts, ABER is expected to be at least 8%, while in other elimination districts, ABER will be set at 5%. In rest of the 'non-endemic' districts, emphasis will be on testing each suspected malaria case. Such system will be rolled out in other districts too, as they attain elimination. ABER will also be revisited periodically for Upazilas/wards/villages within 13 endemic districts, where no indigenous case is reported for previous three years and or areas with no receptivity and vulnerability. In such areas.

Strengthening of capacities will be priority. Concerned staff at all levels will be trained to examine and evaluate surveillance data and carry out appropriate responses. Capacities of health workers/volunteers with partner NGOs will continue to be built/strengthened on programme data recording and reporting.

Each of the 13 endemic districts will have a dedicated SMO. In Bandarban district, additionally Field Epidemiologists will be positioned in high burden Upazilas (03 in number) who will be recruited to provide additional support to the SMO and Upazila and District Health Authorities to strengthen surveillance and M&E. These positions will continue even when a high burden district/Upazila transitions to low burden and low burden district transitions to malaria-free phase for prevention of re-establishment of malaria transmission. In rest of the country, one SMO in each Division will be positioned to support prevention of re-establishment particularly in terms of surveillance and M&E in 51 'non-endemic' districts. These Divisional SMOs will be involved in case investigations, 'zero reporting' from all health facilities and coordination with private sector and relevant others and supervision. In addition, trainings, advocacy and communication activities will be coordinated.

The NMEP will carry out an assessment of surveillance system with technical assistance by the WHO periodically and ensure its accuracy, reliability, completeness, precision, timeliness, and integrity. Feedback will be provided to the health facilities and community health workers/volunteers and others under the malaria surveillance network through regular monitoring and on-job training will follow.

The NMEP will coordinate with the MoHFW to operationalize mandatory notification of malaria cases nationwide (malaria is a notifiable disease according to Bangladesh Gadget 2018, Number 61). The public sector health facilities partner NGOs, and others including private sector, Armed Forces and other law enforcement agencies, Municipal Corporations/Municipalities, INGOs, will be mandatorily required to report each malaria case within 48 hours of diagnosis to their nearest public health facilities and/or malaria MIS.

As phase-wise elimination is achieved, efforts will be initiated to prevent re-introduction and re-establishment of indigenous malaria in malaria-free areas through appropriate surveillance systems. All fever cases will be tested, and all malaria positive cases will be treated (through supervised/follow up mechanisms) and reported (integrated under overall health care service delivery system). Special emphasis will be given in malaria-free areas with receptivity and vulnerability including border areas.

### **3.1.1.2 Case investigation, focus investigation and response:**

**All strata:** Surveillance systems will be strengthened to detect, investigate, classify each case in elimination phase. It will be critical to find remaining infections and any focus of ongoing transmission and investigate, classify, and clear them with appropriate response (case management and appropriate vector control). All districts will carry out case-based surveillance according to national surveillance manual except 03 CHT districts, where such system is expected to be rolled out from 2027.

Timeliness of the case and focus investigation and response to confirmed foci is key to effective control, and ‘1-3-7’ approach will be adopted for the purpose according to the national surveillance guidelines. Each suspected case will be diagnosed within 48 hours of onset of fever followed by treatment according to the national treatment guidelines. When a malaria case is detected, case notification will be done within Day 1 of diagnosis. The service provider will submit a ‘case notification report’ to their Upazila and district malaria focal points. Case investigation, classification will be done within Day 3; and focus investigation, classification and response will be done within Day 7.

Parasitologically confirmed cases (due to mosquito-borne transmission) will be classified according to the WHO guidance, as mentioned in national surveillance manual. Once a malaria case is investigated, it is classified as indigenous, introduced, imported, relapsing or recrudescent, induced (depending on the origin of infection). Classification of cases facilitates focus investigation, classification, and response.

There are two types of locally acquired malaria cases:

- Indigenous case: A malaria case contracted locally (within the country) with no evidence of importation and no direct link to transmission from an imported case.
- Introduced case: A malaria case contracted locally, with strong epidemiological evidence linking it directly to a known imported case (first-generation local transmission from an imported case). A recent infection without any travel history residing in the same household or within 1 km radius of an imported case (index case). If in doubt, cases will be classified as ‘indigenous’.

Both indigenous and introduced malaria cases reflect the need for strengthening of interventions, particularly early diagnosis and complete, prevention to interrupt local transmission.

- Imported case: A malaria case or infection in which the infection was acquired outside the area in which it is diagnosed. For operational purpose, imported case is infection acquired in another country outside Bangladesh and detected within 30 days of return. Imported cases are further classified into two sub-types:
  - Imported, non-local: a malaria case or infection acquired outside the country
  - Imported, local: a malaria case or infection acquired outside the district in which it is diagnosed and is referred as ‘locally imported case’, although it is in-country indigenous case

Symptoms of malaria often start from 7 to 30 days after an infectious mosquito bite. The minimum incubation period for *P. falciparum* is 7 days and for *P. vivax* is 10 days. Thus, detection of *P. falciparum* within 0–7 days of returning from another endemic area (outside country/area) or detection of *P. vivax* within 0-10 days of returning from another endemic area (outside country/area) indicates that the individual was infected before travelling from another endemic area (outside country/area) and that the case is imported. If the evidence is unclear regarding travel history, the classification that reflects more local transmission will be assigned; for example, cases will be classified as “introduced” or “indigenous” rather than “imported”.

- Relapsing case: A malaria case attributed to activation of hypnozoites of *P. vivax* (or *P. ovale*) [dormant parasite stages in the liver] acquired previously. The latency of a relapsing case can be more than 6–12 months. The occurrence of relapsing cases is not an indication of operational failure, but their existence will lead to evaluation of the possibility of ongoing transmission.
- Recrudescent case: A malaria case as a result of recurrence of asexual parasitaemia of the same genotype(s) that caused the original illness, due to incomplete clearance of asexual parasites after antimalarial treatment. Recrudescence is different from reinfection with a parasite of the same or different genotype(s) and relapse in *P. vivax* and *P. ovale* infections.
- Induced case: A case the origin of which can be traced to a blood transfusion or other form of parenteral inoculation of the parasite but not to transmission by a natural mosquito-borne inoculation.

Investigation will be conducted to identify relapsing and recrudescence cases for appropriate interventions. *P. vivax* and *P. ovale* are known to cause relapse. The pattern and reason(s) of relapse will be investigated. Recrudescence in *P. falciparum* and *P. malariae* will also be investigated.

According to the WHO guidance, the focus will be classified as active, residual non-active or cleared. Active foci will be defined as areas (village) with reported indigenous cases in the current year, residual non-active foci will be defined as areas (villages) without indigenous cases for one to three years and receptive/non-receptive and vulnerability will also be considered. Cleared foci will be defined as areas (villages) with no indigenous cases for more than three years. Cleared foci will further be categorised as areas (villages) with no indigenous cases for more than three years but receptive/non-receptive and vulnerability will also be considered.

Public sector health facilities and health workers and partner NGOs will be trained to record and review every malaria case (based on travel history, past malaria history) and submit a 'case investigation report', to their Upazila and district malaria focal points, which will include an assessment of likelihood of local transmission. The medical officer from UHC usually leads the case investigation team and reports back the findings to the district Head and NMEP. The partner NGO supports the case investigation process. Systems and capacities will be strengthened to initiate such classification followed by appropriate response. Provision of equipment and supplies and necessary funding will be made.

As part of focus investigation, RACD will be initiated within a circumscribed area. The scale of the RACD will be tailored by the team to fit the local situation and will cover ~500m around the index case. RDT-based diagnosis will be augmented by microscopy-based diagnosis to maximize sensitivity. RDT positive cases will receive treatment with DOT approach. Any slide positive patients detected subsequently will be provided treatment as soon as results become available. Focus investigation will also include group discussions and interviews (to assess risk behaviours).

Entomological assessments will be carried out as part of focus investigation for updating vector profiling and mapping using geocoded vector information. This will include geographical reconnaissance of adult collections or vector mosquito breeding sites during focus investigation and from spot survey to target interventions in active transmission foci. Reports will be standardized, including grading of receptivity based on entomological data (low, medium, high), ecological suitability for *Anopheles* vector breeding, number of breeding sites and rooms treated with appropriate insecticide (coverage), digital Google maps showing linear scales of vector distribution and breeding sites in relation to the house of the index cases and linking the entomological analysis to focus classification.

Both GoB and partner NGO staff, SK and SS are/will be involved in focus investigation (and later in focus response). For timely response, the focus investigation report will be reviewed by the Civil Surgeon, in consultation with NMEP staff. The case and focus investigation form exist in Bangla. The same will be updated and disseminated during training of concerned staff/health workers, volunteers in all elimination settings with detailed guidelines on '1-3-7' approach.

If an active transmission focus is confirmed, classification and likely scale will be assessed, and a response plan will be developed. The scale of the response will be tailored to suit each specific situation. As part of the response, either LLINs will be given to those in need or focal responsive IRS (and LSM, if appropriate) will be carried out, besides community and stakeholder sensitization.

With nationwide strengthening of surveillance system as well as launch of updated malaria MIS, case-based surveillance and real-time reporting will be emphasized. The NMEP will also strengthen 'zero' reporting from each Upazila (weekly/monthly) nationwide starting with advocacy meetings with Division, District and Upazila health authorities and capacity building.

### **3.1.1.3 Expand and strengthen the malaria information system (Malaria MIS-MMIS):**

**All strata:** The current malaria MIS (MMIS) comprises paper-based data from the community level that is transmitted to the UHC every month. Subsequently, the UHC enters the data on web-based database and monthly aggregated data is transmitted to the central NMEP office for overall compilation and analysis. A malaria information system based on ‘DHIS2’ (an open-source software platform) has been piloted with technical assistance by the WHO involving a series of processes such as customization of the WHO malaria elimination dashboard and inclusion of case-based reporting and tracking systems.

Drawing on the pilot, the MMIS will be updated and hosted on an appropriate platform. Strengthening of MMIS will be a continuous process for fulfilling the needs related to malaria elimination and prevention of re-establishment phases and later WHO certification. From 2024, the updated MMIS will be launched nationwide. The MMIS will cover public sector, NGO, private sector and others. Besides monthly aggregation of data, the new system will support real-time case-based reporting, and will include information on case investigation, focus investigation and focus response. Data collection tools/reporting forms/registers, data aggregation levels will be revisited beforehand and standardized. Case based surveillance related data will also be included including maintaining district/Upazila wise focus registers. Linkage with MoHFW HMIS will be defined as well. Malaria data will continue to be uploaded into the MoHFW HMIS’.

The MMIS will support surveillance and timely and tailored responses in terms of real-time and quality case reporting, data storage and management, automated data analysis, outputs and feedback. The MMIS dashboard will also provide results of all indicators relative to baselines and with necessary disaggregation. Available and new digital technologies will be adopted even at field level to support and enhance the MMIS. Every health care service delivery point, viz., CCs with public sector has already been equipped with a smartphone/tab for real-time recording/reporting. Likewise, the health workers with partner NGOs have also been equipped. Necessary resources including systems and human resources will be invested through 2030 and beyond. Capacity building of public, NGO, private sectors and others at all levels regarding MMIS and data reporting and analysis will be ensured.

More emphasis will be placed on data analysis and interpretation at district and Upazila level, and on the provision of timely feedback from central and district levels to Upazila teams and peripheral health staff/volunteers for action. During supervision visits, sample MMIS data will be verified with original reports/registers.

Spatial mapping (in coordination with relevant agencies) will be included and updated periodically to facilitate tracking of cases and foci (active, non-active residual, cleared) over time. A malaria atlas for entire Bangladesh using Geographical Information System (GIS) and/or other applications will be developed and updated periodically. This will support planning, implementation, and monitoring. The GIS will be used with support from research institutions to strengthen surveillance and response. Following activities are envisaged:

- Carrying out micro-level mapping (village, temporary settlements, health facilities); and updating various administrative unit boundaries.
- Promoting digitization and spatially geo-referencing specific health information, including from public and private health facility locations and community.
- Supporting real-time case data collection at village level including use of mobile applications and synchronization with GIS database. The smartphone/tab of CCs, health worker/volunteers will be aligned to facilitate reporting of the geographical position of all confirmed malaria cases.
- Carrying out geospatial analysis to identify malaria hotspots and to map fine scale malaria risk for targeting of interventions; analysis of health statistics and preparation of reports and visualizations down to the lowest administrative level.
- Carrying out accessibility analysis including modelling physical accessibility of health services for malaria to identify underserved populations and guide optimal location of service providers, referral of severe cases, etc.
- Supporting cross-border surveillance (mapping of villages and communities, mobile and migrant

populations along border areas; mapping health facilities and health service professionals (including private sector) along the border areas; mapping of imported cases; assess transmission risks and physical barriers for hard-to-reach areas; amongst others).

A systematic malaria elimination database of indigenous malaria over time will be part of the subnational/countrywide elimination process. The database as a sub-component of the MMIS will serve as the national repository for all information related to malaria elimination, and will include:

- National malaria case register: a database of all individual case information from identified sources, allowing detailed analysis and synthesis of epidemiological information and trends for guidance to the elimination programme over time.
- Entomological monitoring and vector-control records: a repository of information related to entomological monitoring and applications of chosen vector-control interventions.

Multiple data sources will be used, including routine information systems, household and health facility surveys, data quality audits, and longitudinal/cross-sectional analysis for key indicators as well as research. Technical guidance and oversight of the malaria elimination database will be the responsibility of the Malaria Technical Committee.

#### **3.1.1.4 Stratification and malaria risk mapping:**

**All strata:** The NMEP carries out district/Upazila level stratification periodically based on API per 1,000 population (until Upazila level). A village-level stratification will be initiated to identify ‘hot spot’ (10 cases or more in the reporting year) for response. Few other contextual parameters (forest cover, jhum cultivation, hard-to-reach area will also be considered. Each ‘hot spot’ village will be covered by PACD, entomological survey, distribution LLINs (if needed, due to any attrition/groups/individuals not already covered under mass or continuous distribution), or IRS and/or LSM (if context is appropriate). BCC and community engagement as well as necessary capacity strengthening of health worker/volunteers and other providers will be carried out. Positioning additional support as well as supervision will be emphasised. Private sector providers and local stakeholders will be sensitized regarding the situation and their roles in response.

Mapping of the extent of malaria transmission intensity will be done annually to facilitate understanding of multiple components of malaria risk and effective and efficient planning and better targeting of intervention-mix. The activity will draw on the WHO guidance (viz., receptive versus non-receptive areas; receptive areas with and without malaria transmission because of interventions; receptive areas with widespread transmission and areas with transmission only in discrete foci; and areas with persistent transmission by transmission intensity to guide targeting of interventions).<sup>29</sup> Coordination with relevant institutes/organizations will be carried out to collate necessary data regarding receptivity and vulnerability parameters viz., climatic and geo-ecological variables (altitude, temperature and humidity, rainfall patterns, proximity to water bodies, forest cover, land use), distribution of competent vectors, socio-demographic characteristics, and interventions (coverage by EDPT, LLIN, other measures); as well as population movement in terms of influx of infected individuals or groups who might bring in malaria, and/or infective anopheline mosquitoes). As mentioned earlier, GIS will be used to support this endeavour. In consultation with WHO and experts and Malaria Technical Committee, operational definitions of malaria risk will be deliberated (viz., no/potential risk, low, and high risk)

#### **3.1.1.5 Strengthen surveillance in border areas:**

**All strata:** Bangladesh has international border with India and Myanmar and therefore, spread of malaria through population movement is a concern to elimination and may re-establish transmission in malaria-free areas. Possible emergence of Artemisinin resistant *P. falciparum* already evident in neighbouring Myanmar [and other Greater Mekong Subregion (GMS) countries] also poses huge threat. Malaria surveillance will be strengthened along inter-district border areas and along international border (mentioned under ‘cross-border collaboration’).

Drawing from the guidance provided in the WHO operational framework for cross-border collaboration (2018) as well as various cross-border meeting recommendations in South-East Asia, case management, vector control as well as surveillance and response is being strengthened within country (within national boundaries). Since importation of malaria infection pose a huge challenge for reaching elimination in low burden settings and non-endemic malaria-free areas, interventions will be optimized along inter-district border areas in elimination districts sharing border with high burden CHT districts, especially Bandarban district. In a recent study<sup>30</sup>, the epidemiology of travel patterns of malaria patients in southeast Bangladesh was noted as complex with widespread temporal and spatial heterogeneity, presenting unique challenges for malaria control and needing targeted spatial interventions. The study approach demonstrated a framework for identifying key travellers' groups and their origins and destinations of travel in combination with knowledge of local epidemiology to inform malaria control and elimination efforts. Studies on population movement and its impact on malaria along inter-district and international border are envisaged (mentioned under 'research').

The NMEP has initiated dialogue with India for tackling malaria along international border with facilitation and support by the WHO. Salient discussion points include sharing of malaria information (from adjacent/non-adjacent border areas) and joint planning and implementation of appropriate responses (case management, vector control, communication).

With strengthening of case-based surveillance and MMIS, imported cases will be classified and reported on real-time basis. GIS will be used for mapping. Periodic situation analysis will be emphasised for case upsurge/outbreaks in border areas and receptivity, vulnerability and sharing of such information with neighbouring areas.

#### **3.1.1.6 Drug Resistance Monitoring:**

**Stratum 3 and 2:** In 2018-19, a study in three sentinel sites in Bandarban district showed adequate clinical and parasitological response (ACPR) in patients symptomatic with fever or history of fever (100%). There were no adverse and serious adverse events recorded.<sup>31</sup> Besides, the TRAC study conducted in Ramu Upazila in Cox's Bazar district did not find evidence of artemisinin resistance.<sup>32</sup> In recent years, TES could not be conducted due to COVID-19 pandemic. This is planned in 2023.

The NMEP with technical assistance by the WHO and other relevant partners will continue to monitor antimalarial drug resistance in-line with the latest WHO guidelines. First-line treatment efficacy will be monitored through Therapeutic Efficacy Studies (TES) biennially. Sentinel sites will be identified to ensure that TES results provide a representative overview of the situation nationally (example, new TES sentinel site will be identified in Cox's Bazar to assess drug resistance status in the Rohingya community). Staff will be trained, and equipment will be procured as necessary. Monitoring drug resistance in *P. vivax* will be carried out as well. The NMEP will also carry out special clinical fieldwork in outbreak areas and in areas where treatment failure is suspected. The data from these routine and ad hoc monitoring sites will provide essential information, which will feed into decision-making for updating the national treatment guidelines with technical guidance by the Malaria Technical Committee and the WHO. In addition, attempt will be made to collate information regarding different ACTs being used across other sectors.

Once the number of patients falls to low levels, it will no longer be possible to perform TES; instead, the focus will shift to follow up all patients (especially *P. falciparum* patients) as specified in the WHO guidelines. In consultation with the Malaria Technical Committee and the WHO, the NMEP will consider transition from TES to 'Integrated Drug Efficacy Surveillance' (iDES) to utilize routine surveillance system for monitoring antimalarial drug efficacy in elimination settings with technical assistance by WHO. Data will be collected for all cases (indigenous/ imported) and all species detected by PCD/ACD. Positive cases will be admitted to health facility to determine response to antimalarials.

#### **3.1.1.7 Investigation/verbal autopsy of malaria death cases:**

**All strata:** Verbal autopsy is regarded as an important technique to determine malaria-specific cause of death. Verbal autopsy will be used nationwide to assess the magnitude of malaria mortality, seasonal variation in mortality, age specific mortality, place of mortality, treatment seeking behaviour, treatment modality, treatment compliance, LLIN use, amongst others, when a death (due to malaria) is reported. The NMEP will take initiative to update existing verbal autopsy tool (questionnaire) in line with the WHO guidance; conduct training on Verbal Autopsy for central, district and Upazila health staff/medical colleges and relevant members of partner NGO, who will comprise the team to conduct verbal autopsy for malaria deaths.

### **3.1.1.8 Outbreak preparedness, investigation and response:**

**All strata:** According to the WHO guidance, malaria outbreak is defined as a sharp increase in the incidence of malaria in populations in whom the disease is rare, or a seasonal increase in areas of low-to-moderate transmission over and above the normal pattern. In addition, the NMEP will also follow the guidance regarding man-made/natural conditions that render populations vulnerable, viz., breakdown of prevention and treatment services, especially in highly receptive areas; migration of nonimmune people to areas with high malaria transmission; introduction of parasites and/or suitable vectors to receptive areas where transmission is low or not existent and where the population therefore does not have a high degree of immunity; increased population vulnerability after a long period of drought (and famine) with no malaria transmission, followed by intensive rainfall and creation of suitable environmental conditions for epidemics; and resistance of the vectors and parasites to insecticides and drugs, respectively.<sup>33</sup>

Outbreak preparedness is a priority. Surveillance system will include forecasting, early warning, and early detection based on epidemiological and other relevant parameters. Data from April-May will be closely monitored. Rapid seasonal increase in transmission in the month of June is a critical period for outbreak detection. Malaria cases will be analysed daily/weekly/monthly to ensure early detection of any potential outbreak with accurate information on the geographical distribution. Surveillance focal points in districts/Upazilas as well as peripheral health workers/volunteers will be on full alert during this period, with the NMEP standing by to ensure additional support including drugs and commodities. Every suspected malaria case will be accurately diagnosed, and complete treatment of confirmed malaria cases will be ensured. Surveillance of this kind will be used to detect early signs of outbreak, so that timely response is initiated to prevent or limit its size.

The early warning system for detection of malaria outbreaks will be strengthened. The current threshold system for outbreak detection based on ‘mean monthly caseload for the last 3 years plus 2 standard deviations’ will be continued. However, to improve sensitivity considering reduction in caseload, additional thresholds will be applied, viz., ‘cumulative sum (C-SUM)’ which determines the expected number of malaria cases using the average over three months (including the previous and following month) for five- or 10-years years and ‘percentiles over the median (medium + upper third quartile)’. To support malaria epidemic prediction, the NMEP will use epidemiological and entomological data, meteorological data (rainfall, temperature, and humidity), and population movement. Because variation in rainfall with humidity is found to be a major factor associated with the seasonal and inter-annual variation of malaria incidence, coordination with the Bangladesh Meteorological Department (BMD) will be established for district-wise short-term outbreak prediction system based on daily rainfall levels. The NMEP will also work with other government departments (Ministry of Agriculture, Ministry of Defense, etc.) both at central and district levels as well as international partner agencies (UNHCR, IOM, etc.) to ensure that it is fully informed regarding actual or expected population movement (including large-scale international travel) and major construction/development projects likely to impact on the malaria situation. The NMEP will advise government bodies on impact assessments for major projects in endemic areas and will liaise with them and above-mentioned ministries/agencies. In addition, national contingency plan will be drawn-up in accordance with the most likely risk scenarios. This will specify the channels for speedy mobilization of necessary resources and transferring emergency fund.

If an outbreak is suspected, then the CC/health worker/volunteer will submit an SMS-based ‘suspected

outbreak notification report' to their Upazila and district malaria focal points for prompt investigation. A team made up of staff from district and Upazila level will initiate an investigation. The investigation will cover parasitological (RDT and microscopy), entomological and socio-economic elements, and will also include group discussions and interviews focusing on risk behaviour, as well as active case detection (ACD). The scale of the ACD will be tailored by the team to fit the local situation. The investigation team will submit an investigation report to the district Civil Surgeon and to central level within 24 hours of completing their investigation. The report findings will be entered on the MMIS. The investigation report will be reviewed by the Civil Surgeon in consultation with central staff and if an outbreak is confirmed, its intensity and likely scale will be assessed, and an emergency plan will be developed. The scale of the response will be tailored for each specific situation based on guidelines. RDT-positive cases will receive treatment on the spot and follow-up treatment will be provided for any RDT-negative slide-positive patients. Either LLIN will be given to those in need or IRS will be applied based on entomological and ecological assessments. The national surveillance manual includes guidance on outbreak preparedness, investigation and response, and post outbreak assessment.

The NMEP will conduct trainings for District, Upazila levels as well as peripheral staff and community health workers/volunteers.

Outbreak preparedness and response efforts will be the responsibility of district Rapid Response Teams (RRTs) [also responsible for other epidemic prone diseases under general health services]. Training and provision of equipment and supplies for these RRTs will be ensured. Buffer stock of LLINs, insecticide, RDTs and ACTs will be maintained at central and district level to deal with potential outbreaks (and natural disasters). Stock rotation will be applied to prevent expiry of such buffer stock. In addition, the NMEP will discuss with the WHO for arrangements to obtain health products, antimalarials from outside the country, if necessary. Supportive supervision for all staff and volunteers will be conducted.

### **Strategy 3.2 Entomological Surveillance**

#### **3.2.1 Interventions: Entomological survey in different settings; Monitoring of insecticide resistance**

##### **Activities:**

##### **3.2.1.1 Strengthen entomological surveillance and insecticide resistance monitoring:**

**All strata:** Entomological surveillance provides understanding of the spatial and temporal changes in vector species, their habitats, density, bionomics, and susceptibility/resistance to insecticides used for malaria control besides understanding efficacy and effectiveness of vector control interventions.

Sentinel sites will be established in 03 CHT districts and selected elimination districts. The activities will include incrimination and reconfirmation of vector, GIS mapping of the anopheline mosquito, besides monitoring of IR (in areas at high risk of IR, such as areas with high agricultural pyrethroid use), quality and household coverage of LLIN, IRS interventions (where applied), physical condition of LLINs and residual efficacy of insecticides with time. Entomological intelligence will be rolled out to evaluate risk of re-introduction in elimination settings and malaria-free areas.

Strengthening entomological surveillance and insecticide resistance monitoring need adequate capacity. Entomological surveillance will be carried out by dedicated entomology technicians (to be positioned in 03 CHT districts) with support from central and division level entomologists and in coordination with relevant stakeholders (example, local authorities, Municipal Corporations/Municipalities having entomological resources for malaria and/or other vector borne diseases) and community health workers/volunteers (after training on mosquito collection and preservation). Besides, entomological surveillance and response will be carried out by central, divisional entomologists and supported by entomology technicians and relevant others in outbreak situation or any emergency. Linkages will be established with universities, academic/research institutions for supporting research as well as possible

sourcing of entomologists/entomological technicians (for malaria and other VBDs). Furthermore, need-based entomological surveys will be conducted in elimination districts, as required. In addition, a baseline entomological survey will be conducted in 51 'non-endemic' districts (and a few 'non endemic' areas within endemic districts) to understand malaria transmission and vector behaviour patterns.

Due to injudicious use of insecticides in public health for vector control and mass use of different types of insecticides in agriculture for pest control, insecticide resistance (IR) is a concern to plan, implement vector control activities. Existing information on the resistance status of the main malaria vectors in Bangladesh is patchy and countrywide comparable resistance data is required to make informed decisions on the correct use of insecticides for vector control. The NMEP carried out Insecticide Resistance Monitoring in 2021.<sup>34</sup> The findings showed *An. vagus* is susceptible (>98%) to only bendiocarb 1%, Permethrin 3.75% and 7.5%; whilst resistant to other pyrethroids as well as malathion 5%. *An. Annularis* is also susceptible only to bendiocarb 0.5% and 1% and malathion 5%, whilst resistant to different pyrethroids. *An. philippinensis* was however, found susceptible to most insecticides. In a recent insecticide resistance intensity assays conducted in two high burden districts, viz., Bandarban and Rangamati also revealed high intensity resistance of *An. vagus* to deltamethrin, bendiocarb and malathion, besides moderate resistance of *An. willmori* to deltamethrin.<sup>35</sup>

Close monitoring of IR will continue to be carried out at sentinel sites. The programme will conduct insecticide resistance monitoring surveys in sentinel sites (3 sites/year) and ad hoc surveys in additional sites in areas recording upsurge/outbreak where IR may be responsible for the outbreak and in areas at high risk of IR (example, areas with high agricultural pyrethroid use). Resulting data will be shared with Malaria Technical Committee and the WHO. If insecticide resistance is found its operational significance will be assessed and a suitable response will be developed, as required.

The NMEP with technical assistance from the WHO will establish a core group of trained entomologists at central level to provide overall guidance and oversight for entomological surveillance and IR, provide evidence-based recommendations about any necessary change in interventions or delivery mechanisms, and elimination- and prevention of re-establishment specific needs.

The NMEP will develop national plan for entomological surveillance and insecticide resistance (IR) monitoring in alignment with the overarching key principles in the WHO Global plan for insecticide resistance management in malaria vectors (GPIRM)<sup>36</sup> and WHO Framework for a national plan for monitoring and management of insecticide resistance in malaria vectors<sup>37</sup> and various available evidence. The national plan will be updated periodically.

### **3.2.1.2 Updating Integrated Vector Management (IVM) strategy, other manuals:**

Due to the significant threats from emerging and re-emerging vector-borne diseases (VBDs), WHO has developed a Global Vector Control Response (GVCR) 2017-2030.<sup>38</sup> The GVCR is a new advocacy strategy to strengthen vector control worldwide and countries are called upon to update and harmonize their national vector control strategic plans in line with its generic framework. The GVCR builds on the basic concept of integrated vector management with renewed focus on improved human capacity at national and subnational levels.

The MoHFW has developed an integrated vector management strategy (IVM) for vector borne diseases including malaria, drawing on GVCR and other WHO guidance. In reference to elimination and prevention of re-establishment, an IVM strategy specific for malaria in alignment with the existing one for vector borne diseases (VBDs) will be developed with technical assistance by the WHO. Key focus will be on reducing human-vector contact and vector density (adult and larval) or the duration of vector survival (longevity of vector mosquitoes). Interventions like Long Lasting Insecticidal Net (LLIN), IRS, larval source management, entomological surveillance, and multi-sector coordination, M&E tailored for burden reduction and elimination settings will be included, besides creation of national data repositories, capacity strengthening, and BCC and community engagement. Relevant research will be

included for evidence generation including innovative vector control and personal protection measures. Integrated approaches/mechanism with other VBDs will be considered, as much as feasible.

### **3.2.1.3 Strengthening of entomology capacities; laboratory and insectaries:**

In addition to recruiting entomology technicians for malaria and other vector borne diseases and building capacities of these new recruits as well as existing entomologists and entomological technicians will be prioritised. An Working Group of entomologists (including relevant members of the Malaria Technical Committee) and WHO will be constituted to provide technical directions for entomological surveillance and control including epidemiology-led entomology for problem solving, review and update training curricula/modules and support trainings as resource persons, and make evidence-based recommendations about any necessary changes in interventions or delivery strategies, address any elimination-specific challenges, monitor and manage insecticide resistance. This core group will be expected to provide guidance on other vector borne diseases as well.

Strengthening entomological surveillance and insecticide resistance monitoring need necessary infrastructure. Linkages will be established with entomological laboratories and insectaries with relevant research/academic institutions, which will be linked to GVCR. Such resources will be used to generate vector mosquitoes required for product testing and for QA of vector control operations.

***Objective-4: Enhance Social and Behaviour Change Communication (SBCC) with special emphasis on community engagement and mobilisation, context-specific communication and advocacy for enabling environment through 2030.***

Social and Behaviour Change Communication (SBCC) promotes behaviour change and supports the requisite social change for the purpose of improving health outcomes. *The addition of an “S” to BCC intends to signify that individuals and their immediate social relationships are dependent on the larger structural and environmental systems: gender, power, culture, community, organisation, political and economic environments. SBCC explicitly encompasses social change perspectives that foster processes of community dialogue and action. SBCC encompasses core elements: communication using channels and themes that fit an intended audience’s needs and preferences; behaviour change through efforts to make specific health actions easier, feasible, and closer to an ideal that will protect or improve health outcomes; and social change to achieve shifts in the definition of an issue, people’s participation and engagement, policies, and gender norms and relations.<sup>39</sup> SBCC applies a socio-ecological model (SEM) that recognizes the relationship between people and their environment to identify “tipping points” to change individual behaviours and social norms. An enabling environment is crucial besides cross-cutting factors (determinants of behaviours) applicable at all levels of analysis and influence.<sup>40</sup> There are a number of ways SBCC can contribute to malaria elimination programmes at different times and to varying degrees. Behaviour maintenance, rather than one-time trial or intermittent practice, by all priority groups, is the overarching goal, so that perceptions of “what others are doing” and “what is the right thing to do” eventually become powerful motivators in themselves. Effective SBCC strategies contribute to these shifts in social norms.<sup>41</sup>*

## **Strategy 4.1 Social and behaviour change communication**

### **4.1.1 Interventions: Advocacy, Behaviour Change Communication, Community engagement and mobilisation**

#### **Activities:**

#### **4.1.1.1 Develop SBCC strategy for malaria elimination and prevention of re-establishment of malaria transmission:**

A SBCC strategy will be developed drawing on evidence, reviews, assessments, and various theories/models/frameworks and technical guidance and Comprehensive Social and Behaviour Change

Communication (SBCC) strategy of MoHFW (2016). SBCC strategy will be evidence-based and theory-informed, target audience-centered, and results-oriented besides addressing barriers and inequities at individual, household and community levels. Strengthening of enabling environment and capacities and M&E will be integral part of the SBCC strategic design.

The strategy will be evidence-based and audience-centered and address socio-cultural and human rights barriers and inequities at individual, household and community levels and accordingly focus on changing behaviours towards realization of outcomes (example, LLIN use, EDPT, treatment compliance, etc.) and impact (example, further burden reduction, elimination). Important considerations for the SBCC strategic design will be the approaches addressing inequities, human rights and gender-related barriers in malaria interventions. SBCC strategy will prioritise following key approaches:

- Advocacy for appropriate target audiences for seeking support for policy, strategy, regulation, resources: political, administrators/policy makers, media, multiple stakeholders, local government, non-government and private sectors
- BCC for reaching and engaging appropriate target audiences through communication channel-mix
- Social and community mobilisation for engaging with appropriate target audiences and multiple stakeholders and seeking participation, ownership: community consultations, involvement of community groups/networks/change agents, professional or civic associations; community based and community-led planning, implementation and monitoring

The NMEP will seek inputs from district/Upazila levels; key stakeholders including community and civil society, national and/or international experts, Malaria Technical Committee to finalise the strategy and associated guidance for action plans. The strategy will be printed and disseminated at all levels. The strategy will facilitate the delivery of consistent and harmonized messages on malaria, address the needs of key and vulnerable populations, encourage use of information and communication technology (ICT), and improve coordination. The NMEP will also document, consolidate, and share best practices related to SBCC activities.

#### **4.1.1.2 Advocacy at different levels for reinforcing commitments, strengthening of enabling environment**

**All strata:** Strong political commitment is a prerequisite for achieving and sustaining malaria elimination. Bangladesh has committed to achieve the SDGs and signed the Malaria Elimination Roadmap in 2015 (facilitated by APLMA) and Ministerial Declaration on Accelerating and Sustaining Malaria Elimination in the South-East Asia Region in 2017, which has been renewed in 2022 (facilitated by WHO).

Key elements of advocacy include high-level political leadership commitment for malaria elimination irrespective of competing priorities, and adequate and sustained funding from domestic and other potential sources and maximizing interventions at all levels. One or a combination of approaches will include networking, dialoguing, appealing, persisting and mobilization.

**Advocacy at national level:** The NMEP will continue and strengthen advocacy activities for sustained commitment from political leaders, policy makers, high level decision makers and administrators for malaria elimination. Such commitment is crucial for adequate financial support, designing and roll out of appropriate policies and strategies, successful implementation at national, district and local levels and coordination of responses across multi-sector partners (with other health sector programmes, relevant non-health sectors, local authorities/Municipal Corporation/Municipality, non-government organizations, civil society and community, private/corporate sector, research and academic institutions and partner, donor agencies) for collective action. An advocacy package will be developed targeting all stakeholders, partners at central, district and Upazila and below levels. Advocacy will be continued in malaria-free areas for continued commitments and mobilisation of resources. The package specifying the level of implementation, target audience, activity planned, person responsible, necessary budget and desired output/outcome.

The NMEP will disseminate the NSP 2024-2030 at all levels and amongst various partners, donors, stakeholders. Since phased elimination journey is starting with zero indigenous cases in 04 districts in 2024, a mega advocacy event is envisaged with the gracious presence by the highest political level as Chief Guest and key stakeholders and partners as Guests of Honor and delegates. Signature campaign and pledge for “Malaria-Free Bangladesh – Socio-economically Developed Bangladesh”, will be launched, which will be expand nationwide. The NMEP branding as a strong national identity and champion for malaria-free Bangladesh will be emphasised. A strong investment case for achieving and sustaining malaria-free Bangladesh will be developed besides annual programme reports for sharing with relevant entities. Salient points from NSP 2024-2030 will be synthesized into a business plan including financial gap analysis and resource requirements to facilitate advocacy.

The NMEP will also organize advocacy meetings and round-table discussions involving the high-level decision makers, media, and other stakeholders for support and resource mobilization. The NMEP will organize ‘World Malaria Day’ on 25 April every year on a large-scale, which is an important opportunity for advocacy (political, administrative, media, stakeholder, private/corporate sector, donor/partner) for reinforcing commitment for and ownership of elimination agenda and exploring resource support. Television and radio talk shows, rallies and other events (marathon, rallies, song/drama show, quiz competition, banner display, road show, sports, group discussions, sessions on malaria will be organized. Likewise, World Mosquito Day (20<sup>th</sup> August) campaign will be planned possibly in integrated manner with other mosquito borne disease programmes (and other nationally/globally important days).

A National Malaria Elimination Task Force (NMETF) with the Honorable Health Minister in chair is envisaged for high-level advocacy for sufficient and sustained resource mobilisation for malaria elimination and prevention of re-establishment. A major focus will be on inter-ministerial and multi-stakeholder and partner coordination (mentioned under ‘Partnership and coordination’).

**Advocacy at District/Division level (across all strata):** Advocacy meetings will be carried out at Division and District levels involving district/division level health officials, NGO and private sectors, representatives of non-health ministries, local authorities and leaders, Municipal Corporation/Municipality, business enterprises, media, partners. Advocacy activities will be organized on “World Malaria Day” at all division level nationwide and at district level in 13 endemic districts. Advocacy targeting travel agents, hospitality sector, industries/corporate sector will also be conducted besides construction/development project sectors. Group advocacy sessions will be conducted and they will be requested to inform mobile and migrant populations/travellers regarding risk of acquiring malaria when they visit malaria endemic districts/countries. Advocacy materials for travellers will be shared with travel agents.

**Advocacy at Upazila Level and below (stratum 3 and 2):** All Upazilas in 13 endemic districts will organize advocacy meetings involving health authorities, local authorities including Chairman, members, headman/karbari, religious leaders, teachers, and community. Advocacy activities will also be organized on “World Malaria Day” at all Upazila levels in these districts. Ward Committees will be formed in each ward of an endemic Upazila involving the Union and other local leaders, health staff, and relevant stakeholders (mentioned under ‘Partnership and coordination’).

**Advocacy with corporate sector/various donors/funders (other than the GF):** It is expected that the GF support will continue until Bangladesh achieves nationwide elimination stage by 2030 and receives WHO certification, with phased transitioning. Advocacy will continue with corporate sector/business enterprises as well as various multilateral/bilateral agencies, donors/partners, and foundations for investing in malaria elimination journey for overall socio-economic development and achievement of SDGs. Resource mobilization will be one of the key agenda. Advocacy meetings will be planned with appropriate advocacy products including investment case.

#### **4.1.1.3 Context-specific Behaviour Change Communication**

**All strata:** Behaviour Change Communication will be carried out through routine activities and campaigns (umbrella/localized campaigns) through a combination of following channels.

- Inter-personal communication (IPC) [one-on-one], group communication (courtyard meetings, community/risk group consultations), point of service promotion (CC, Health worker/volunteer/MMW/Health Post and health facilities);
- mid-media (traditional song-dance/plays); public announcements (miking) at local 'haat/bazar'; school programmes;
- mass media - broadcast media (TV, radio), print media (newspaper, magazine), social media (Facebook, YouTube, Instagram, Twitter, other available/popular ones), digital media (mobile advertisements, SMS), outdoor publicity (billboards, posters, standees, etc. at identified places including health facilities, land, sea, airports/market places, hotels/tourist places/construction sites, transit points in border areas, relevant others.

Important considerations will include but not limited to, desired reach (national/district/Upazilas/peripheral level) and available resources. Reach of and access to various media, media habits, preferences of target audiences (preferred watching/listening time, programs, channels) and perception about a particular media; and costs related to development/replication/distribution of materials, AV production and airing, etc. will be taken into account. Communication planning will provide clarity regarding: five Ws: 1) What: the specific behaviour/action aimed at; 2) Who: the target - care taker/care provider/policy maker; 3) When: the time frame; 4) Where: the site; and 5) Why: the overall purpose. In addition, "how" or the approach/mode for communication. Communication activities will be complemented by necessary service delivery including malaria case management, appropriate prevention measures.

A steady flow of messages will be disseminated on priority behaviour through channel-mix targeted to the right audiences and using the right tools at right times; ensuring continuity, which is critical for recall; intensifying activities before and during transmission season; fostering positive messages/stories and countering negative ones; publicizing achievements and success stories. In conjunction with implementation of interventions, example, during mass LLIN distribution, health staff, community health workers and volunteers will implement BCC activities as well. Likewise, messages will be disseminated during EDPT, surveillance and response activities. Target audience segmentation, i.e. to whom the messages will be targeted is a critical element of communication strategy. The target audiences will include risk groups, general population as well as care providers, local leaders/influencers. Messages will be simple, distinctive for clear understanding and application. Messages will focus on behaviour change amongst the target audience as well as advocacy and community mobilisation. Messages will draw on technical policy/guidelines, evidence and importantly, from an understanding the communities, contexts and environment including rights and gender related barriers and inequities.

The NMEP will develop and produce target-group-specific and locally appropriate BCC materials (calendars, stickers, leaflets, brochures, folders, traveller/tourist guidelines, etc.) for all risk groups, as well as for community at large drawing from assessments/research. Materials are likely to include inter-personal communication (IPC) aids as well as, mid media and mass media options. Materials will be multilingual, as needed. Communication materials will be developed together with relevant stakeholders, concerned Departments, partners and finalised following pre-test. Materials will be distributed in the community, health facility, community meeting places, markets, airport, land & seaports, bus and rail station, ferry boat counters (*kheya ghat*), hotels, etc. Key messages will include but not limited to, daily & correct use of LLINs, care and washing practices; the importance of sleeping under an LLIN; the importance of LLIN use in the forest; the importance of early diagnosis and treatment; the importance of compliance with the full course of treatment; availability of services (location of, and services provided by the CCs, health workers, volunteers of partner NGOs, health facilities, trained private sector and others). Consultations/brainstorming led by the NMEP will be periodically conducted to revisit message content and materials for the target audience in a given

context. Research/Knowledge, Attitude, Practice (KAP) studies will be considered periodically to inform any revision/reinforcement. If resources are available and as feasible, commissioning a creative team (i.e., any communication/media agency) will be considered to support overall content creation for advocacy, communication, and social and community mobilisation related products selecting right messages for right audience for the right purpose; under the overall guidance and inputs by NMEP and concerned departments, WHO and experts.

Interpersonal communication (IPC) in and outside the health facilities/house/school, is effective and works best when there is one-on-one contact between the health worker/volunteer/peer and target group - individual/family, etc. Over a period, if done consistently, this participatory method can result in adoption of interventions on a sustainable basis through mutual trust building at community level. IPC from peer to peer and/or family member to patient/family member and/or support groups/individual/family will be encouraged after necessary capacity building.

School-based initiatives being critical in creating change agents in the short- to long term, various programmes will be carried out. Child-to-Child/Child-to-Family communication for dissemination of messages will foster knowledge and awareness and responsive behavior among peer groups and family. The initiative will include orientation for students, Principal, Teacher; seminars/debates, message dissemination during morning assembly, special classes. In addition to holding competitions - Poster/Painting/Projects/Essay/Slogans/Drama on malaria; conducting classroom sessions on how to spread messages on malaria elimination will be prioritized. On important days (example, World Malaria Day), processions by schoolchildren and or competitions - Poster/Painting/Projects/Essay/Slogans/Drama, will be organized displaying BCC materials (placards). Incentives/prizes in terms of vouchers, samples, etc. may be sponsored through contests to encourage the audience to adopt a desired behavior.

Appropriate mass media/social media will be tapped for dissemination of messages.

- Broadcast/telecast: TV, radio (especially local cable TV network/community & FM radio) – commercials/spots, jingles, music/dance programmes, interactive programmes (phone-in programmes/talk shows/capsules within reality shows/quiz programmes);
- Multi-media: Documentaries/short films
- Mobile/digital technology, mass messaging (sms)/calls, social media (Facebook, twitter, tik tok, Instagram, etc.)
- Print: Newspapers, magazines; and booklets, brochures, gate folders, mailers and posters, pamphlets, leaflets, stickers, flip books, flash cards, bus tickets, OPD registration forms, calendars, and wall charts/information scroll, comic strip/books, games.
- Outdoor publicity: Hoardings/billboard, Glow Signs, advertising on wheels (bus, taxi, private car) - panel, blimps (including at border crossing points/FDMN camps/tourist places); Mobile film/video shows at local 'haat/bazar' (markets).

The website of the MoHFW/NMEP will include appropriate messaging especially related to the vision of malaria-free Bangladesh and criticality of sustaining prevention of re-establishment. NSP 2024-2030, relevant technical articles, fact sheets will be included.

#### **4.1.1.4 Enhance community engagement and mobilisation:**

**Stratum 3 and 2:** Community engagement and ownership will be important drivers of achieving sustaining malaria elimination. Malaria interventions must go hand in hand with community participation. Unless individuals, communities are aware and see the merits of preventing illness, even the best-designed strategies might not work. Community leaders/community networks/ affected individuals and their families/risk groups will be involved as catalysts for community dialogue and collective action.

The NMEP together with concerned Departments, partner NGOs and other relevant agencies, will carry out community engagement activities to motivate people/risk groups to understand their own health situation in general and malaria elimination in particular; and initiate/scale up community level actions with their own initiative and creativity. Such initiatives including community consultations, courtyard meetings, amongst others, will progressively strengthen social mobilization process to bring together all societal and personal influences to raise awareness of and demand for quality services, assist in the delivery of services, and promote community ownership. Community engagement will prioritise rights-based approach and address any exclusions, marginalization related to access to interventions. The Ward Committees mentioned earlier will be an active convenor of community engagement activities. Community representatives will be included in various Committees/Working Groups at different levels.

The NMEP together with partner NGOs and relevant agencies will pursue community engagement in 13 endemic districts. BCC activities with special emphasis on inter-personal & group communication will complement such endeavours. Every year a large-scale community mobilization will be aimed at on World Malaria Day (25 April). The NMEP has carried out a CRG assessment with technical assistance by the WHO. A 'Malaria Matchbox' tool will be applied periodically to update understanding of community, rights and gender issues and addressing those through SBCC activities with key thrust on inclusiveness, equitable and gender sensitive approaches.

**Stratum 1:** In 'non-endemic' areas, community participation will be targeted through BCC channel-mix.

#### **4.1.1.5 Strengthen SBCC management and M&E:**

**All strata:** Expert management of SBCC efforts will be ensured. The activities will be coordinated with various core interventions (example, EDPT, LLIN distribution, PCD/ACD), besides inclusion of SBCC component as an integral part of trainings/orientation at all levels. A dedicated SBCC expert will be considered at NMEP level apart from constituting a SBCC Working Group (with participation by Communication Department of MoHFW and other concerned ones, experts, relevant partners, institutions) with defined Terms of Reference. Review of SBCC activities will be conducted during periodic meetings and supervisory visits at subnational level. The NMEP will conduct independent assessment of SBCC impact periodically and revise strategy, as appropriate. Appropriate research will inform evidence based SBCC strategy (mentioned under 'research').

**Objective-5: Ensure strengthened program management, monitoring & evaluation and partnership and coordination through 2030.**

#### **Strategy 5.1 Programme Management, Capacity Building and Strengthening**

Successful malaria elimination depends on effective programme management, resilient and sustainable health systems with skilled, motivated, and well-supported staff, service providers at all levels as well as appropriate policy, strategy, and guidelines, review and planning. It will be ensured that the NMEP policy/strategy/guidelines are available at all levels and fully implemented. Ensuring programme and data quality are extremely important and therefore, supervision and monitoring will be in place, besides timely and accurate routine reporting and regular data quality audits. The NMEP will need to be responsive to the evolving needs in line with phased elimination to maximize impact. Strategic multi-sectoral collaboration at all levels will be a priority for harmonized collective action. Partners will provide support covering a broad range of programme areas and will work with the NMEP to strengthen the leadership and management capacity of the NMEP.

Whilst decentralized planning, decision-making for programme implementation will be fostered particularly in view of variable malaria burden and transmission intensity as well as contexts, certain components will remain under the central level, viz., strategy, policy, guidelines, SOPs, overall programme management and oversight, financing, ensuring equity related to access to services, integration of disease programme and health systems strengthening, procurement and supply chain

management, quality assurance and M&E, MIS, operational research. These components will be coordinated with subnational levels and across partners.

### **5.1.1 Interventions: Developing/updating strategies, plans, SOPs; Strengthening of programme management, Human Resources development and management, Health systems infrastructure and maintenance, Procurement and Supply Chain Management, and Finance management**

#### **Activities:**

#### **5.1.1.1 Strategy Development of/Updating strategies, policies, plans, guidelines, and standard operating procedures**

Strategies, policies, plans, guidelines, and SOPs will be developed periodically for various interventions, as needed and or new ones will be developed. Diagnosis and treatment guidelines will be revised, as necessary. The NMEP will develop elimination and prevention of re-establishment (in malaria-free areas) guidelines with technical assistance from the WHO. These guidelines will also provide guidance on the requisite planning and actions related to initiation of subnational elimination verification and preparedness for WHO certification. The NMEP will also participate in development/updating of health policy, health sector strategy, operational plan, as needed, towards strengthening of integration and linkages between health sector and malaria specific strategy, policy and plan.

#### **5.1.1.2 Ensure capacitated human resources and management; Integration of disease programme**

**All strata:** The NMEP has direct responsibility for planning and implementing malaria control and malaria elimination. The NMEP has three main sections: Epidemiology; Entomology and Laboratory (Central Malaria Reference Laboratory - CMRL). The NMEP central unit will provide strong leadership, effective management and mentoring at all levels to enable rapid and high-quality implementation of the elimination strategy. At NMEP level, nodal officers for 13 endemic districts as well as 'non endemic' districts will be identified for intensified focus on programme implementation and M&E.

At central level, the NMEP under the CDC, DGHS, MoHFW, has direct responsibility for planning, implementation and M&E of malaria control and malaria elimination. The multi-disciplinary experts, officers of the NMEP central programme management unit (PMU) and Surveillance Medical Officers (SMOs) positioned at district level, headed by the Deputy Programme Manager (DPM) are responsible personnel for strategy, planning, implementation, and M&E, stakeholder/donor/partner coordination under the overall leadership of the Director, Disease Control & Line Director, CDC, DGHS, MoHFW, GoB. The NMEP PMU has a lean structure with experts for the following programme areas: epidemiology, M&E, MIS, Programme Operations, Entomology, Training, Procurement and Supply Chain Management, Finance, Advocacy/SBCC, who are assisted by few supporting staff. Few officers will support M&E, MIS, training, finance, PSM components. The PMU is/will be supported by district level Surveillance Medical Officers in each of 13 endemic districts. For augmenting microscopy and related QA, and in order to reach/maintain ABER, laboratory support will be augmented with a progressive planning for integration under national laboratory system. A pool of entomologists will be created to address malaria and other vector borne diseases (VBDs) of public health importance. Strategic positioning and strengthening of CCs, HAs, MHVs will be advocated with MoHFW.

From 2024 onwards, Bandarban district will be provided additional HR support package at least until 2030 in terms of Field Epidemiologists (3) for high burden Upazilas (under the supervision of respective SMOs) and Entomological Technicians (3) [under the supervision of divisional entomologists]. [Efforts will be made to position adequate number of community health worker/volunteer to cover all population at risk following comprehensive mapping of villages per Upazila, with detailed information on geographical accessibility, number of households, which will be reviewed periodically. The Bandarban

district additional support will include SS, SK for each village, PO/FO in each ward, MMW serving especially to jhum cultivators, forest goers and other mobile and migrant populations, Health Post in selected transit points in border areas and MIS Officer (1) under partner NGO besides their ongoing support in 03 CHT districts, Cox's Bazar, Chattogram until 2026 with gradual transitioning from 2027 except in Bandarban district. Minimal coordination support will also continue in other 08 elimination districts until 2026].

In order to establish surveillance and M&E and strengthening of case management, advocacy and coordination (across sectors) in 51 'non-endemic' districts, one SMO will be positioned in each Division level.

All levels (GoB) will be adequately supported in terms of competitive remuneration and travel, meeting and IT support, and other necessary compensations for optimized dedication and fulfilment of responsibilities. Likewise, travel, meeting, IT and other necessary support (as appropriate and needed) will be provided to partner NGO staff, field level workers/volunteers (besides recognition of their contributions).

The requirements of staff/community health worker/volunteer and or retention will be justified in terms of absolute necessity to progress towards elimination goal. The NMEP will take initiative and coordinate with relevant departments/units to recruit new staff and fill the vacant posts at all levels. Efforts will be made to retain experienced staff through regular mentoring. The NMEP will introduce measures to strengthen staff, health worker/volunteer motivation based on non-cash incentives, such as formal recognition of and recognition of their contributions for accomplishing national/subnational objectives and goals. The NMEP will periodically conduct a comprehensive review of HR and identify gaps in relation to changing requirements from burden reduction to elimination to prevention of re-establishment. The assessment will inform about deployment of HR with special emphasis on effective and efficient delivery of interventions and fulfilling other necessary responsibilities related to implementation, management and M&E. A Human Resources (HR) Development Plan will be prepared aligned with MoHFW with focus on strengthening of career path. Efforts will also include academic accomplishments (international/national doctorate/master's degrees) and in-service training/re-training. Access to higher-level courses will be competitive and merit based. Workshops/exposure visits will be organized both at national, regional, and international levels. Advocacy will be carried out at high level and with donors/partner agencies.

Knowledge and competence of health workforce will be enhanced through training/re-training including in-service training. Subsequent to nationwide training needs assessment especially in-line with elimination and prevention of re-establishment requirements, a comprehensive capacity building and strengthening for health cadres under general health services, community health worker/volunteer will be implemented. The training will be integrated with other capacity building programmes wherever practical to maximize cost effectiveness and efficiencies. The NMEP will organize training for Community Health Care Providers (CHCP), peripheral health workers/volunteers on EDPT, SBCC, supply management and recording/reporting. Specialized training will be supported for staff at central, district and Upazila levels (doctors, clinicians, epidemiologists, entomologists, laboratory technicians, M&E/MIS staff, management staff, SBCC specialists). Technical and managerial capabilities will also be strengthened at these levels. Efforts will be taken to maintain technical and operational capacities within NMEP in view of retirement of workforce, internal transfers, and somewhat limited opportunities for high-level training. NMEP will also conduct training and workshop to foster effective leadership management and ownership at district and Upazila levels. Partner NGO staff and field level cadres will be trained/re-trained, mentored periodically for quality service delivery. The NMEP will roll out e-learning courses in consultation with the WHO, research/academic institutions (in-country/foreign) and experts, tailored for the type of health workforce/volunteers and implementation level wherein online certification will be provided.

Documentation of community systems and responses highlighting contributions of community level workforce/volunteers will be pursued to boost recognition of their valued support especially to go the

extra mile and ensure that suspected malaria cases are found, diagnosed, referred and provided treatment. Many community health workers/volunteers of the GoB and partner NGO are recruited locally and belong to the populations at risk/affected populations. Capacitated local presence will also contribute to community systems strengthening.

**Integration with health systems:** The public sector health facilities from CC to District level facilities and community level cadres, HAs, MHVs (where present), are already providing integrated services for all disease programmes including malaria elimination programme. In elimination settings and ‘non-endemic’ settings, hence malaria is already integrated under the aegis of general health services [with minimal (yet critical) additional vertical support funded by the Global Fund]. All positions are directly under the HNPS OP, which also covers infrastructure development and maintenance nationwide; except most of the central PMU positions, SMOs and few supporting staff. The CMRL and various laboratories at subnational level are already part of the national laboratory system including QA. The MoHFW HMIS will also capture malaria information with MMIS linkage. The procurement and supply chain of RDTs, antimalarials for ‘non-endemic’ areas are also managed and overseen by the concerned Department of MoHFW, responsible for all programmes. The health commodities are also kept in GoB stores and warehouses (except in special circumstances). As elimination is achieved in phased and with progressive transitioning of the Global Fund support, the NMEP PMU and other necessary activities will be brought under the GoB HNPS OP gradually. The NMEP will advocate for position of ‘Public Health Specialist’ for malaria elimination programme and others.

Furthermore, even the partner NGO field cadres are also providing complementary support for WASH, COVID-19. Many of them are also involved in TB control programme (supported by the Global Fund). Those serving in FDMN camps are also involved in HIV/AIDS control programme (supported by the Global Fund). Going forward, involvement of these critical trained field cadres may be explored for community level activities and/or when MHVs will be expanded especially in hard-to-reach areas.

#### **5.1.1.3 Strengthening infrastructure (development, maintenance)**

Health systems infrastructure at all levels is being progressively strengthened by the GoB, which will continue to be supported with GoB resources. Buildings, equipment, vehicles will be procured and maintained at all levels, as needed, in addition to appropriately insuring those. Such infrastructure strengthening including laboratory systems will be done at all levels especially prioritising hard-to-reach areas and functioning status will be ensured.

#### **5.1.1.4 Strengthening procurement and Supply Chain Management (PSM)**

**All strata:** The NMEP is responsible for procurement of health and non-health products and pharmaceuticals, viz. LLINs, RDTs, ACTs, inj. Artesunate as well as CQ/PQ, microscope, reagents, and non-health products like IT equipment with funding by the GoB and the GF. Product specifications are made by the NMEP. Procurement will continue to be carried out in strict accordance with the GoB guidelines as well as the PSCM plan (especially for procurement of health/non-health products with the GF support). A SOP for health product management is in place, which will be updated. Health commodities are kept in GoB stores/warehouses (except in special circumstances like LLIN distribution when premises are rented by NMEP) from where those are distributed to GoB facilities nationwide as well as partner NGO (03 CHT districts, Cox's Bazar, Chattogram). Stock registers will continue to be maintained at all store facilities and central, district, Upazila and CC level as well as with partner NGO. There will be continuous efforts to improve storage and distribution facilities including but not limited to, maintaining standard temperature and humidity at district and Upazila warehouses/store house.

Forecasting and deployment of health products and antimalarials will be strengthened in consultation with district, Upazila, CC levels (and partner NGOs in 03 CHT districts, Cox's Bazar and Chattogram). The basis is the consideration-mix of previous consumption trend, technical requirements (assumptions of malaria indices/indicators and trend analysis), and requisite buffer and deployment reserve (example, RDTs required for targeting ABER are defined during forecasting), local context, season. At times, the

quantities are adjusted during implementation phase, as needed, with justification. Replenishment is done before stock out for commodities. Setting of thresholds will be revisited for minimum number of stocks of RDTs and drugs that each facility and store/warehouse will maintain especially with changing disease trend. In addition, a certain minimum quantities of RDTs, antimalarials and LLINs will be kept under NMEP for any unexpected upsurge/outbreak, emergency as well as any new active focus. Re-distribution of commodities will be considered, as needed and feasible. The timing of procurement will take both suppliers' expected lead-times and past delays into consideration. Necessary coordination will be maintained to anticipate and avert stock outs, and interruption of services. The NMEP will ensure that there is always an adequate stock of malaria commodities in addition to necessary buffer stock especially in hard-to-reach areas.

The NMEP has developed distribution plan for all types of commodities for 13 endemic districts, which will be updated to cover the entire country including 'non-endemic' districts/Upazilas in view of requirements for determination of such status and prevention of re-establishment of malaria transmission. As private sector engagement is rolled out, use of quality assured RDTs, antimalarials will be discussed with them for compliance. In addition, the NMEP will support the national regulatory authorities to collect samples from the private market to check for counterfeit and substandard products such as RDTs, antimalarial drugs, insecticides, etc.

Assessment of PSM, including forecasting and deployment will be done drawing on disease trend analysis, elimination and prevention of re-establishment phase related requirements involving District/Upazila levels. A web based LMIS has been initiated, which aims to track the stock status of health products and antimalarials. Uninterrupted and timely supply of necessary logistics will be ensured to avoid stock out situation and avoid using any expiry date products

The NMEP will ensure quality of all health products including RDTs, reagents, equipment and antimalarials. Quality assurance will be managed according to the SOPs. Currently, the LLINs are procured through the GF mechanism, which follow the required quality assurance procedures, which will continue. 'On receipt batch testing' for RDTs and antimalarials will be carried out. The samples will be sent for testing at the WHO collaborating centres prior to distribution to ensure that they are within the specifications set out in the manufacturer's product documentation. Sub-standard products will be rejected and returned to the supplier. National quality control unit will be identified, and malaria commodity samples will be sent for testing during tendering and for batch quality control during supply and use. The cost of quality control will be borne by the suppliers, which will be included in tender specifications.

Supply systems will be strengthened through training, supervision, and system updates, as appropriate. Workshops will be held periodically. The NMEP will carry out supportive supervision from central level to ensure efficient supply chain management. A system for the collection and proper disposal of expired antimalarials will be established, wastage will be monitored, and mitigation measures will be put in place.

#### **5.1.1.5 Strengthening finance management**

**All strata:** The NMEP funding is sourced mainly from three sources: the GoB, funds from the World Bank on re-imburement basis (RPA) and funds from the GF (DPA= Direct Project Assistance). There is also a contribution from the WHO for technical assistance. The GoB contribution is mainly for payment of salaries, training, and logistics as well as infrastructure and maintenance, various overheads; the GF for programme implementation in 13 endemic districts. The management of external funding for malaria control and elimination by the NMEP started in 2007 when the GF provided additional support to tackle malaria with implementation of the first NSP. The GF contribution is for commodities, viz. LLINs, RDTs, ACTs (including the costs incurred in the process of PSM except in-country taxes/VAT), surveillance and M&E, capacity strengthening. Contractual HR of the NMEP at central and district levels as well as programme management costs are supported by the GF.

Since 2007, the GF support also initiated the adoption of a dual-track financing arrangement wherein funding is provided to the NMEP as well as partner NGO (BRAC) complementing service delivery, surveillance, and M&E efforts at community level in 13 endemic districts. This arrangement has changed from 2021 with changes in local and focal distribution of malaria and progressive transitioning of programme implementation to public sector health facilities/field cadres. The partner NGO support is currently being given in 03 CHT districts and Cox's Bazar, Chattogram, which will continue until 2027. Minimal coordination support is given in Mymensingh and Sylhet zones, which will continue until 2027. Whilst in Bandarban district, partner NGO support on same scale will continue until 2030, in other CHT districts, the support will gradually decrease with expected changes in malaria situation and achievement of subnational elimination. The funding categories for partner NGOs include HR, community level service delivery, laboratories, surveillance, and M&E, SBCC, trainings, implementation management, and operational research.

The NMEP will continue to provide sound financial management in-line with national guidelines (and in-line with internationally recognized best practices). Besides the HNPSp guidelines, the GoB financial rules and regulations, are/will be followed. In addition, the NMEP has developed the Financial SOP for NMEP financial operations especially regarding the GF grant, which is followed apart from the GF budget and audit guidelines. The SOP will be updated, as needed.

The NMEP has the responsibility for overall programme audits and compliances relating to HNPSp OP according to national guidelines, in addition to the GF grant related audits and compliances. External and internal audits are/will be regularly done. The NMEP will continue to preserve relevant documents (bills, vouchers etc.) for the purpose. The partner NGOs too, follows financial rules and regulations of the organization including internal & external audit (based on country requirements, as applicable) as well as the GF.

Financial flows to public sector health facilities at district/Upazila level are limited mostly to training funds and travel/subsistence allowances. Few HR for surveillance and M&E is/will be supported, whose salaries are/will be paid directly from central office. Most health products, antimalarials procured with the GF support centrally and supplied to district and Upazila levels. Health products, antimalarials are also supplied to partner NGOs at subnational levels.

Each expenditure is related to the approved work plan/activity plan and budget and is accompanied by supporting documents duly approved by the competent authority. The NMEP ensures proper control over expenditure against budget provision. The NMEP receives expenditure statement from districts (subnational level) monthly/quarterly. The NMEP consolidates all report using software for reporting to the GF through PU/PUDR and AFR. Internal control is exercised through financial, budgetary, and administrative controls. An overview of fund inflow/outflow and audits and compliances is as under:

#### A. Fund Inflow (Receipt):

- Receipt of the GF grant by the Director, Disease Control (for disbursement to the NMEP) through the approval of the Secretary, MoHFW to the CONTASA Account then transferred to a dedicated Bank Account maintained with Govt. scheduled Commercial Bank. [In addition to the grant for supporting malaria elimination, the GF has also provided additional resources to mitigate the impact of COVID-19 pandemic on malaria programme to strengthen formal and community health systems under C19 Response Mechanism (C19 RM).
- Receipt of the GoB funding by the Director, Disease Control, which is maintained in a dedicated Govt. scheduled Commercial Bank account.
- Receipt of funding for technical support by DPM, NMEP/PM, Malaria, from the partners like the WHO, which maintained in a dedicated Govt. scheduled Commercial Bank account.

#### B. Fund outflow (Disbursement):

- Disburse fund in tranches (quarterly, semi-annually, or annually) at central level based on projected cash requirement, financial performance, and funding decision.

- Disburse fund to districts (subnational level) upon receipt of requisition and review of budget quarterly.
- Coordinate disbursement of fund to third parties by the GF on behalf of the NMEP under PPM upon receipt of the statement from IDA & PFSCM.
- Coordinate disbursement of fund to the WHO by the GF.
- Disburse fund to in-country third parties for specific services and technical support.

#### C. Audit and Compliances:

- Annual Audit: By Govt. FAPAD and internal audit by MoHFW; and by External Audit Firm (CA Firm).
- Periodical Review: By the Local Fund Agent (LFA) of the GF (PwC, India).
- Investigation and Periodical Review: By the GF Office of the Inspector General (OIG) and the GF Secretariat (the GF Internal Audit team).
- Financial SOP: Guidelines for NMEP financial operation including procedures of compliance.
- Procurement SOP: Guidelines for NMEP procurement of drugs, diagnostics & other materials.
- Government Public Procurement Rules (PPR 2008): For Procurement.
- Government. Financial Guidelines

The Global Fund support remains and will continue to remain crucial to accelerate programme towards elimination and prevention of re-establishment until WHO certification and beyond. The GoB will advocate for and pursue such support. The JMM 2022 recommended that the Global Fund funding for malaria services and health systems strengthening need to be sustained. The Global Fund investment in malaria services is also expected to contribute to complementary health systems strengthening and vice-versa. Resilient health systems will ensure quality management of all communicable diseases including malaria (and non-communicable diseases) as well as readiness and better management of any future pandemic/emergency drawing on lessons learned from COVID-19 pandemic.

Yet, towards progressive transitioning from the Global Fund support towards sustainability, a transitional readiness assessment is being carried out (commissioned by the Global Fund). Drawing on the assessment recommendations, a 'transition plan' will be developed in consultation with NMEP, MoHFW and various concerned ministries/Departments of the GoB. Implementation of the transition plan will be the responsibility of the GoB. It is expected that increasingly GoB resources will cover implementation of malaria elimination that are currently being covered with the Global Fund support. The current HNPSOP OP period will end in June 2024 and the next OPs will be until June 2029 and June 2034. The NSP 2024-2030 and expected WHO certification in 2033 will be implemented through these OPs.

In order to enable smooth transition to greater self-reliance through the HNPSOP OP with emphasis on progressive integration of NMEP within MoHFW, the following steps will be considered:

- Including malaria elimination indicator in upcoming HNPSOP framework.
- Strengthening health systems with essential services including integrated malaria services (related to fever management, laboratory system, QA of commodities and services, integrated disease surveillance system and M&E, HMIS).
- Creating necessary posts in GoB so that there is no disruption in national level positions in NMEP.
- Undertaking necessary institutional restructuring and reforms, updating policy and strategy so that activities currently under the Global Fund funding (example, partner NGO activities) can be managed with GoB funds either directly through public health systems and/or with partnership support from partner NGO, others.
- Collaborating with/contracting NGOs already engaged in health and/or development sector especially in hard-to-reach areas and supporting key and vulnerable populations.
- Urging the Global Fund and other donor/partner for support for resilient and sustainable systems for health.
- Exploring resources from sources other than the Global Fund.

Furthermore, the Sector Wide Approach (SWAp) is well established in the health and nutrition sector in Bangladesh and several development partners channel funds through a pooled funding arrangement. The overarching objective is to support improved access to and utilization of an essential health services package (EHSP) and population and nutrition services, especially for vulnerable groups, under the umbrella of Universal Health Coverage (UHC). The EHSP includes malaria-related services. Monitoring is crucial in the SWAp to assess progress and address problems through future planning. The performance indicators are agreed upon by MoHFW and SWAp partners and revisited annually. The UHC progress is monitored using 16 tracer indicators with focus on priority areas. In 2017, number of malaria cases per 1000 population in the 13 endemic districts was one of these tracer indicators. However, in 2020 list there is no indicator for the malaria elimination program. This will be discussed at MoHFW level and inclusion of an appropriate indicator related to malaria elimination will be pursued.

## **Strategy 5.2 Programme Monitoring and Evaluation (M&E)**

### **5.2.1 Interventions: Strengthening of M&E at All Levels**

#### **Activities:**

#### **5.2.1.1 Monitoring progress:**

**All strata:** A national M&E plan 2024-2030 will guide M&E at all levels and for sharing malaria information with the GoB, the GF, other donors, partners, stakeholders, as relevant. M&E will focus on the following key elements:

- M&E will be part and parcel of the disease burden reduction and phased elimination in line with the NSP 2024-2030.
- M&E will be led by the NMEP and will be harmonized across sectors, viz., public, NGO, private and others.
- Standardized tools (data collection and reporting formats, checklists) will be used across sectors, viz., public, NGO, private and others, at all levels.
- M&E will draw on logic models viz., Input->Process->Output->Outcome->Impact, and results matrix.
- M&E will follow established standards, ensuring quality, reliability, transparency, and usefulness.
- Through M&E, the results will be measured to provide the basis for performance, accountabilities and informed decision-making at both programme and policy levels.
- M&E will allow for data to be collected, aggregated, analysed and used for prioritisation, planning and actions tailored to the local context.
- M&E indicators will be SMART (specific, measurable, achievable, realistic, and time bound).
- Data quality dimensions (timeliness, completeness, accuracy, reliability, integrity) will be in-built within the overall M&E with emphasis.
- MIS will be integral to M&E and transition to DHIS2 platform for facilitating and strengthening of data access and reporting at multiple levels, preparation of graphs and maps and other forms of analysis, quality checks.
- Available technologies will be increasingly used for facilitating real-time reporting, communication across levels.
- Regular supervision using checklists will be ensured followed by feedback for action.
- Information dissemination and use will be key constituents. Evidence generation through M&E will inform advocacy efforts, allowing sharing of success story, learning, innovation.
- Technical and management aspects of M&E/MIS will draw from the recommendations of the Malaria Technical Committee, the WHO, the GF, experts, as needed and appropriate.

The NMEP will continue to monitor implementation progress and provide supportive supervision for public and partner NGO for continuous quality improvement. Integrated supportive supervision by Upazila/District health authorities, MoHFW will be an important, which already exists. This will be

emphasised towards strengthening capacities of human resources for health (including malaria) and quality of care. Oversight will be crucial for private sector and others too. Furthermore, reporting of disease specific data into the integrated data platforms (DHIS2) of MoHFW HMIS will be ensured.

[Further details of M&E framework are described in chapter ‘Monitoring and Evaluation’].

## **Strategy 5.3 Partnership and Coordination**

### **5.3.1 Interventions: Multi-sector partnership and coordination; Cross-border collaboration**

#### **Activities:**

#### **5.3.1.1 Partnership and coordination, constitution of multi-sector committees:**

**All strata:** Strong partnership and coordination are instrumental for malaria elimination. The country will follow one NSP 2024-20230, one main authority (NMEP) to oversee, coordinate and harmonize implementation of strategies at all levels and across stakeholders & partners; and one M&E framework.

Concerted action will be priority involving multi-sector stakeholders across different sectors beyond the health sector. Strategic collaboration will be pursued with following partners: regulatory agencies; other government ministries; civil society; private sector; the WHO and other international organizations. The NMEP will involve key stakeholders at subnational level, including community leaders, hoteliers, major employers of development projects in endemic areas. Clear roles and responsibilities will be developed for all partners concerned. Representatives from various sectors (government and non-government) will be involved in planning and implementation of malaria elimination efforts, as appropriate. Partnership and coordination will continue to be strengthened through review and planning meetings with implementing and technical partners to exchange information, assess progress and address any issue. The NMEP will share its annual plans with partners and will require those partners to also share their plans related to malaria elimination. Training/orientation sessions and sharing of relevant information/advocacy and communication products will be emphasised. The NMEP will organize sessions for sharing of experiences and knowledge on malaria prevention and control measures, surveillance systems, treatment guidelines, and disseminate technical updates and research/survey/assessment findings, as appropriate.

Key mechanisms/entities/structures and platforms for partnership and coordination (technical/implementation) are/will be as under:

- An independent National Malaria Elimination Task Force (NMETF) with the Honorable Health Minister in chair is envisaged for high-level advocacy for sufficient and sustained resource mobilisation for malaria elimination and prevention of re-establishment of malaria transmission as well as for transparent and open review of programme activities, strengths and weaknesses; and for strategic direction to attain WHO certification for malaria elimination. A major focus will be on multi-sector coordination with relevant Departments, agencies for harmonized strategy, implementation and M&E and seeking support/resources for malaria-free and socio-economically developed Bangladesh.

The NMETF will comprise the following members: malaria experts, other vector borne diseases experts, entomology experts, health system specialist, SBCC specialist; and representatives from the PMO, relevant health departments under MoHFW (CBHC, RMNCAH, other disease programmes, DGDA) & non-health ministries/departments (Women and Children Affairs, Social Welfare, Road Transport and Bridges, Home Affairs, Agriculture, Information, Finance, Education, Foreign Affairs, Planning, Industries, Commerce, Chittagong Hill Tracts Affairs, Environment & Forest & Climate Change, Tourism, A2i, and relevant others), port authorities (land/sea/air), local governments (CHT district council, Zila Parishad, Upazila Parishad and Union Parishad), Municipal Corporation, Municipality, Armed Forces and other law enforcement agencies, academia/research institutions (viz., IEDCR, NIPSOM, BITID, as well as icddr, b, others), private

sector and business houses, civil society, philanthropic organizations, religious organizations, and the community. The WHO will be included as a technical partner, while other partner and donor agencies, INGOs will be included as observers. The member secretary will be Director, Disease Control and Line Director, CDC of the DGHS. The recommendations and action points of the NMETF will be publicly available on the website of the MoHFW.

- Malaria Technical Committee (MTC) chaired by the Director, Disease Control and Line Director, CDC of the DGHS. It comprises malaria experts and multi-stakeholders from the GoB, research and academic institutions, partner NGO, the WHO and various other partner agencies, Armed Forces, private sector, and professional bodies. Mandate of the committee is to provide technical advice and oversight on various technical aspects of programme planning, implementation and M&E including review/update of strategy, policy, guidelines. The committee meets once a quarter or more, if required. Under the guidance of the Malaria Technical Committee, the NMEP will carry out an assessment to revisit different partnership and coordination mechanisms and propose effective institutionalized mechanisms.
- Ad hoc Working Groups/Thematic groups for specific interventions, viz., case management, vector control, surveillance and M&E, SBCC, will be considered to support the NMETF and Malaria Technical Committee in terms of review of implementation progress of the NSP 2024-2030, adaptation of WHO guidance and lessons learned from within and outside country, and providing support for subnational elimination verification, preparedness for WHO certification. The members will also review and provide recommendations for updating guidelines, manuals, training curricula/modules and participate in trainings as resource persons, as appropriate. The members will include experts, and members of similar bodies within MoHFW, GoB.
- At district level, under the leadership of the Civil Surgeons multi-sector coordination meeting is held monthly as part of overall review of all disease control/elimination programmes. These meetings are attended by the by District hospital, UH&FPOs, UHC/CHCP, medical officer, statistician, and various health & non-health departments (viz., agriculture, fisheries, forest), partner NGOs, INGOs, representatives from development partner agencies, Armed Forces, and other law enforcement agencies, municipality, private sector. This meeting is joined by the NMEP surveillance medical officers (SMOs) and relevant others from central level. Trend of malaria cases of different Upazila and programme interventions and needs, challenges are reviewed and guidance on critical issues are discussed. This meeting also functions as multi sector advocacy platform.
- At Upazila level, under the leadership of the UH&FPO multi-sector coordination meeting is held monthly as part of overall review of all disease control/elimination programmes. These meetings are attended by the by District hospital, UH&FPOs, UHC/CHCP, medical officer, statistician, and various health & non-health departments (viz., agriculture, fisheries, forest), partner NGOs, INGOs, representatives from development partner agencies, Armed Forces, and other law enforcement agencies (viz., BGB, police), municipality, private sector. This meeting is joined by the NMEP surveillance medical officers (SMOs) and relevant others from central level. Trend of malaria cases of different Upazila and programme interventions and needs, challenges are reviewed and guidance on critical issues are provided. This meeting also functions as multi sector advocacy platform.
- Municipal Corporation/Municipality coordination: Coordination will be strengthened with all Municipal Corporation and Municipality in cities/towns for strengthening of malaria services and surveillance and M&E under integrated urban health systems besides expanding linkages with MMIS and context specific SBCC. The WHO 'Global Framework for the Response to Malaria in Urban Areas' highlights key elements, viz., leadership, community engagement and multi-sector response, integrated strategic and response planning, surveillance, prevention, quality clinical care, and innovation, research and development.<sup>42</sup> Drawing on such guidance and other relevant resources, experiences, guidelines to tackle malaria in urban setting will be developed in coordination with urban stakeholders, WHO, and experts.
- NGO/Civil Society coordination: Partnership between the NMEP and partner NGOs has been recognized both nationally and internationally as an example of best practice in collaboration between government and NGO sector. It has strengthened implementation influencing both the quality and the timeliness of programme outputs/coverage and ultimately optimized outcomes and impact. Going forward, the NMEP will also attempt to involve NGOs beyond the current partner

NGOs. The NMEP will continue to strategize and improve coordination and collaboration at community level involving government and non-government health workers/volunteers with an increasing focus on integrated community case management (iCCM).

- Research/academic institution coordination: Inclusion of malaria elimination and prevention of re-establishment with special emphasis on case management and surveillance and M&E according to national guidelines. Likewise, inclusion of IVM, entomological surveillance, IRM, related to malaria in graduate course curricula of concerned streams (example, zoology). Encouraging students/researchers for assignments, dissertations on malaria related topics. Internships and placements will be promoted as well. Research institutions will be urged to carry out research on relevant topics to address programme gaps, challenges.
- Country Coordination Mechanism (CCM): The Bangladesh-CCM (BCCM) with the Honorable Minister for Health and Family Welfare in chair, is the key partnership and coordination mechanism in relation to the GF funding to fight HIV, Tuberculosis and Malaria. The BCCM ensures country-driven, coordinated, and multi-sectoral processes for leveraging and effecting additional resources. The members include, representatives from both the public and civil society and private sectors, multilateral or bilateral agencies and key affected populations (KAP) and people living with the diseases (PLWD) that coordinates the submission of one national proposal to the GF on the basis of priority needs. In addition, BCCM is responsible for overseeing the progress of program implementation.
- Coordination for FDMN: Coordination with the Office of the Refugee Relief and Repatriation Commissioner (RRRC) of the GoB and various partner agencies, including WHO, UNHCR will be maintained in view of on humanitarian premise. NMEP will coordinate with WHO Sub office (responsible for coordination in Cox's Bazar), IOM, INGOs, and others, and participate in meetings periodically. Such coordination will facilitate implementation of malaria interventions according to national guidelines and to harmonize interventions and reporting of cases across various agencies. Furthermore, in consultation with the NMEP and Malaria Technical Committee, special intervention package will be designed for the FDMN. Resources for this package will be sought from partner/donor agencies in coordination with RRRC and UNHCR, IOM.
- Ward committee: Ward Committees will be formed in each ward of an endemic Upazila involving the Union and other local leaders, health staff, teachers, and relevant stakeholders. The Ward Committees will be provided meeting and travel related costs. The committee will be expected to provide support for implementation of interventions, community mobilisation and ownership and at the same time an independent oversight locally. At least 50% women representation will be ensured. Regular meeting will discuss local solutions to issues in the form of action plan. Such endeavour will inculcate a sense of ownership of elimination and prevention of re-establishment in the ward and will render a voice to the marginalized and vulnerable sections at community level.
- Village committee: Likewise, Village Committees will be formed in selected high endemic villages in hard-to-reach areas comprising village head and other important community members. The Village Committees will be provided meeting costs. The committee will be expected to provide support for implementation of interventions, cleanliness/sanitation drives, community involvement and ownership. At least 50% women representation will be ensured. Monthly meeting will discuss local solutions to issues in the form of action plan. This will render a voice to the marginalized and vulnerable sections at village level.

#### **5.3.1.2 Technical assistance (WHO and other multilateral/bilateral agencies):**

Technical assistance (TA) by the WHO has played and will continue to play vital role in development of policy, strategy, guidelines as well as QA, review and assessments, research, procurement and supply related issues. Other UN agencies as well as bilateral agencies will be consulted on relevant topics and support will be sought, as needed.

#### **5.3.1.3 International Exchange and Cooperation:**

The NMEP will continue to participate in and host meetings, workshops, seminars, conferences of national/regional/global importance, as needed. In addition, study tours/exposure visits, exchange programmes will also be planned dependent on the need and resources. During such events, the NMEP will share success stories, best practices, as well as lessons learned and challenges besides taking note of experiences of other countries. Cooperation and collaboration will be strengthened with various platforms/mechanism, viz. RBM Partnership to End Malaria, APLMA, APMEN, Mekong Malaria Elimination (MME) Programme, SAARC, South-East Asia Regional Coordinating Mechanism Forum (SRCMF), and relevant others.

#### **5.3.1.4 Strengthen cross-border collaboration:**

Six administrative units out of the eight in Bangladesh share border with India, namely, Chittagong, Khulna, Mymensingh, Rangpur, Rajshahi and Sylhet. Nearly half of Bangladesh's 64 districts (30 districts) are on the border facing these Indian states (spanning ~4000 km).<sup>43</sup> Of the 13 endemic districts, 11 districts have an international border with India. The remaining 51 districts bordering India (~19 in number) report no or sporadic malaria cases although many adjacent Indian districts are reporting indigenous cases and hence potential cross-border transmission of malaria remains a threat. A small part of Bangladesh (spanning ~300 km) is connected to Myanmar, viz. with the districts of Bandarban (and Cox's Bazar).

Similar eco-epidemiological factors and challenges exist on both sides of the border. Moreover, there is cross-border population movement for tourism/trade/economic pursuits besides influx of Rohingya Refugees from Myanmar. This has created an urgency to deal with continued malaria transmission and even possible emergence of Artemisinin resistance. Moreover, zero transmission status that is being aimed at subnational levels may possibly get jeopardized with potentials risk of re-introduction and re-establishment until the border districts in India and Myanmar achieve the same status. Further, the border areas are fraught with complex geographies & difficult settings. Health and various social/welfare services along international borders are relatively weak and poorly staffed than in more central areas, in part because some of these areas are affected by security concerns and tensions. Moreover, many people living in border areas, especially in remote ones, are from socioeconomically vulnerable ethnic minorities, and disadvantaged in terms of access to health care & social services, and in instances they lack citizenship rights. Further, malaria risk amongst Rohingya refugees coming from Myanmar need to be addressed in coordination with all relevant agencies to minimize the risk of importation of resistant parasite strains.

Bangladesh has been participating in consultations (organized mostly by the WHO) for some time where the critical need for initiating cross-border collaboration has been continually expressed. In 2017, Bangladesh signed Ministerial Declaration on Accelerating and Sustaining Malaria Elimination in South-East Asia thereby committing to cross-border-related strategic areas (amongst others). Cross-border collaboration initiatives (sharing of relevant malaria information for appropriate responses) will be strengthened starting with India with support from the Global Fund, WHO, RBM Partnership, APLMA-APMEN, South-East Asia Regional Coordination Forum, and others. Bangladesh has initiated dialogue with the WHO for additional technical assistance under the Mekong Malaria Elimination (MME) programme, which will be taken forward.

At the same time, malaria services, surveillance and M&E, SBCC will be strengthened along inter-district border areas within national boundaries. As mentioned earlier, Health Posts in strategic locations will be established. Necessary capacity strengthening and coordination with local authorities, security agencies and other relevant stakeholders will be emphasised.

A situation analysis of border malaria will be updated. A roadmap for cross-border collaboration is envisaged including but not limited to joint review and planning with neighbouring countries, malaria information exchange, notification on outbreak situations, besides strengthening of interventions along the border areas.

***Objective-6: Carry out research to guide strategy and policy to address programme gaps and challenges through 2030.***

Research agenda will be identified throughout the implementation of the NSP 2024-2030 to address programme needs and support and guide strategy/policy. Meaningful research questions are best generated for operational research as part of the process of implementation, when challenges, barriers/gaps in implementation are identified. Priority will be given to research that address programme needs, gaps and bottlenecks especially in hard-to-reach areas and amongst high-risk key and vulnerable populations.

**Strategy 6.1 Research**

**6.1.1 Interventions: Strengthen and expand research**

**Activities:**

**6.1.1.1 Identify, facilitate and conduct research:**

Operational research will be intensified for evidence generation and synthesis optimizing impact and cost-effectiveness of existing and new tools, strategies, and interventions; developing novel tools and approaches to respond to existing and new challenges, such as drug resistance, insecticide resistance, outdoor biting, malaria in specific risk groups, and varying patterns of population mobility; take action to facilitate rapid uptake of new tools, interventions, and strategies. Research priorities will be reviewed periodically. A list of research topics, that will likely to be pursued, as needed, is appended as Annex-3.

The Malaria Technical Committee will support the NMEP to identify research agenda and as well as review of proposals/protocols, recommend funding, and then peer review the final reports (keeping the conflict of interest in mind). The NMEP will initiate yearly research meeting where all stakeholders involved in malaria research will present either completed work or preliminary findings for review. The NMEP will work in collaboration with the WHO and national and international experts and institutes to develop research capacity and improve the quality and relevance of research outputs. The NMEP will initiate a repository of research/papers published on malaria in Bangladesh. An open access research platform will be planned in coordination with partners for accessing topics of interest, including research proposal submission procedures, ethical regulations, potential funding sources, informal results, publications and a 'Questions & Answers' forum. Concerned senior management/Units within MoHFW will emphasise moving proven new interventions and approaches quickly towards piloting and operational adoption. The NMEP will also initiate engagement with private sector, NGO (beyond partner NGO), research/academic institutions in reviewing and implementing operational research for burden reduction, malaria elimination and prevention of re-establishment. Research will be carried out following approval by the Bangladesh Medical Research Council (Ethics Review Committee).

***Objective-7: Prevent re-establishment of malaria transmission in malaria-free areas.***

**Strategy 7.1: Prevention of re-establishment of malaria transmission**

**7.1.1 Intervention: Prevent Re-Establishment of Malaria Transmission (POR)**

**Activities:**

**7.1.1.1 Launch of prevention of re-establishment phase:**

**Stratum 1 followed by 2 and 3:** As phased elimination is initiated and districts get national recognition for interruption of indigenous transmission through several steps, prevention of re-establishment phase related activities will be initiated.

A programme for prevention of re-establishment of malaria transmission is a pre-requisite for WHO certification for malaria elimination. This means preparedness needs to be initiated well before countries apply for certification as they achieve interruption of local transmission and zero indigenous case progressively at subnational level and ultimately nationwide.

The activities will draw on various guidance from the WHO on prevention of re-establishment of malaria transmission as mentioned below.

The WHO framework for malaria elimination (2017)<sup>44</sup> mentions the following key points for prevention of re-establishment, amongst others:

- *“WHO certification of malaria elimination in a country requires proof that local transmission of all human malaria parasites has been interrupted, resulting in zero incidence of indigenous cases for at least the past three consecutive years. Even though indigenous malaria cases are no longer observed but imported and introduced cases may continue to be reported, measures to prevent re-establishment of transmission are required indefinitely until eradication is achieved. Countries need to report annually to WHO in order to maintain its malaria-free status.”*
- *“Integrating the malaria programme into public health programmes should be considered, once elimination is achieved. A central reference laboratory with expertise in malaria diagnostics, including blood slide reading, should be maintained. At the peripheral level, if possible, staff with expertise in surveillance and response should be appointed as malaria focal point.”*
- *“Malaria should remain a notifiable disease in health reporting systems, and special studies should be integrated into the investigation systems for other emerging and epidemic vector-borne diseases.”*
- *“Political and financial commitment at national and subnational levels should be sustained.”*

The WHO Malaria Elimination Audit tool will be applied periodically for identifying programmatic strengths and weaknesses for reaching malaria elimination and preventing re-establishment of malaria transmission.<sup>45</sup> The assessments will include but not limited to, *“adequacy of the systems and activities to monitor the potential for re-establishment of malaria into the country, to identify the areas that are receptive to resumption of transmission, to identify areas that are likely to become receptive, to identify areas vulnerable to parasitic importation and capture changes in vulnerability, and to take adequate measures to prevent re-establishment of transmission.”*

In 2018, the WHO manual on surveillance and M&E<sup>46</sup> mentions that, *“Countries and subnational areas that have eliminated malaria must prevent re-establishment of transmission and must therefore maintain a surveillance system in order to rapidly identify all cases of malaria that might indicate the emergence of transmission, although some activities may be scaled down. Surveillance systems may at this stage be integrated with broader disease surveillance systems. Nationwide early detection and prompt treatment of imported malaria cases that could result in re-establishment of transmission and monitoring of changes in receptivity and vulnerability should be a priority.”*

In 2022, the WHO consolidated guidelines for malaria provided some guidance regarding post-elimination settings and prevention of re-establishment. *“Countries will need to ensure that diagnosis and treatment services are available everywhere as part of universal health coverage as imported cases can be identified anywhere and at any time. However, the extent and intensity of additional activities during the post-elimination period will depend on the health system and the malariogenic potential of the area, that is, the degree of receptivity to transmission and the risk or rate of importation of malaria infections. Strategies targeted to specific higher-risk areas or groups, or in response to the identification of an imported or introduced infection, are required in post-elimination settings to prevent re-establishment of transmission.”*<sup>47</sup>

In 2022, WHO updated the guidance to countries regarding elimination certification wherein the criticality of reorienting the programme to sustain minimum activities necessary for prevention of re-establishment. *“As malariogenic potential differs (e.g. risk of importation of malaria cases, species of*

*malaria vectors, the physical environment, levels of social and economic development, the strength of the health system), the activities necessary to prevent re-establishment of malaria transmission will also differ, as will the cost of maintaining malaria-free status. Key elements for prevention of re-establishment stage include: national structure (unit or focal point); surveillance and response; malaria diagnosis network; case management; vector control and entomological surveillance; multi-sectoral collaboration; inter-country information sharing and border collaboration; raising awareness and providing preventive strategies for travellers.<sup>48</sup>*

In 2023, technical consultation to develop global framework on prevention of re-establishment is envisaged by the WHO.

Various published documents on prevention of re-establishment of malaria transmission also refer to maintaining surveillance and response through integrated health care service delivery systems, entomological surveillance, diagnosis and treatment, provision for vector control and entomological surveillance, communication activities and community engagement, multi-sector collaboration, cross-border initiatives, and mobilizing necessary resources.

Drawing on WHO guidance and various published documents, as well as experiences from WHO-certified countries, following activities will be rolled out in malaria-free areas at subnational levels and eventually nationwide:

- assessment of status of malaria burden, elimination and POR at subnational level by an independent body (in-line with the WHO guidance),
- WHO Malaria Elimination Audit tool (MEAT) to identify programmatic strengths and weaknesses with regard to elimination and POR,
- high level advocacy and networking to reinforce country's political will and financial commitment for malaria elimination and prevention of re-establishment,
- maintaining a malaria programme structure with essential capacities and skill sets integrated under the umbrella of communicable diseases at all levels,
- mobilizing necessary resources from the GoB, in-country partners/stakeholders and the GF and various development partners, Foundations, and others,
- orientation/re-orientation of concerned cadres at all levels on malaria elimination and prevention of re-establishment as well as preparedness for WHO certification,
- development and dissemination of operational plans with costing, SOPs,
- maintaining case based surveillance and response through integrated health care service delivery systems,
- carrying out active case detection for organized groups/high risk groups in receptive areas, where feasible,
- drawing on WHO guidance, chemoprevention may be considered in post-elimination settings for groups with increased risk of infection for POR, besides, reactive strategies need to be considered when a malaria case is detected within the overall response for POR,
- maintaining outbreak preparedness including but not limited to orientation of existing rapid response teams and ensuring provision of necessary commodities,
- carrying out epidemiology-led entomological surveillance, as needed,
- timely diagnosis and treatment, provision for prevention interventions tailored for contexts with special attention to areas with receptivity and vulnerability,
- communication campaigns (for prevention and early treatment seeking behaviour targeting travellers and even general population),
- multi-sector coordination and collaboration,
- cross-border initiatives in terms of sharing malaria information and harmonizing interventions, as feasible drawing on lessons learned and WHO guidance with technical support from the WHO and facilitation support from various coordination platforms, and
- M&E.

Malaria will be integrated under the general health services under the aegis of MoHFW. Advocacy and coordination with the MoHFW and concerned ministries (particularly Finance) and external donors (including the Global Fund and others) will be intensified from the beginning of this National Strategic Plan period (2024) for sustained and sufficient resources for various activities through the prevent re-establishment of transmission phase. Technical assistance of the WHO will be sought throughout elimination, POR phases and WHO certification.

## **Strategy 7.2: Preparedness for Subnational elimination verification; WHO certification for malaria elimination**

### **7.2.1 Interventions: Preparedness for subnational elimination verification; and WHO certification**

#### **Activities:**

#### **7.2.1.1 Roll out subnational malaria elimination verification**

**Stratum 1 followed by strata 2 and 3:** The NSP 2024-2030 has set milestones and targets for achievement of phased elimination in country including determination of ‘non-endemic’ and malaria-free status of 51 ‘non-endemic’ districts (and a few 'non endemic' areas within endemic districts) [418 Upazilas]. In this background, processes and requirements related to the subnational elimination verification is envisaged as priority besides initiation of programme preparedness related to the WHO certification drawing on the WHO guidance.<sup>49</sup> These processes and requirements will remain dynamic, as the country evolves and transitions from burden reduction phase to elimination and reaches malaria-free phase with prime focus on maintaining the status and preventing re-establishment of transmission.

According to the WHO guidance, “*Verification of subnational malaria elimination is an option in countries with subnational elimination goals. This is expected to promote ownership of malaria elimination in subnational areas and reinforce the commitment to prevent re-establishment of malaria transmission. Subnational verification helps to strengthen surveillance and response systems and to prepare the country for national certification by the WHO. The criteria used in verifying subnational elimination will be similar to those for national certification set by the WHO. The evidence used to evaluate a claim of malaria elimination in a subnational area and to verify that effective activities are under way to prevent re-establishment is similar to that used for national certification. It comprises: a subnational elimination report; documents and records; observations and findings from a subnational verification mission and additional documentation, such as peer-reviewed journal articles.*”<sup>50</sup>

Subnational elimination verification will be considered for districts/Upazilas that have fully interrupted local malaria transmission, resulting in zero indigenous human malaria cases for at least 03 consecutive years (36 months); and have initiated activities to prevent re-establishment of malaria transmission. The malaria free-status of districts/Upazilas will validate the achievements of respective health authorities.

For subnational elimination verification, advice by the National Malaria Elimination Task Force (NMETF), oversight by the Malaria Technical Committee, and technical assistance from the WHO will be sought, besides coordination and support by various stakeholders, partners, and individual experts. The subnational elimination certification will be recommended by the Malaria Technical Committee and awarded by the NMETF. An independent evaluation team (subnational elimination verification mission) will be constituted by the Malaria Technical Committee comprising national experts (non-members of this Committee and NMETF) from malaria, health systems and other relevant domains. Selected international experts will also be considered. Subnational health authorities/implementing entities in the districts will not participate in evaluation of own districts but may be involved in other districts. Prior to consideration of subnational elimination verification, the applicant district/Upazila will prepare subnational elimination report (Annex-4) and supporting documents and records and will undergo a readiness assessment, which will be a self-assessment exercise. The subnational elimination report will be a narrative report with data and information to demonstrate that the district has met the

criteria for subnational elimination verification. The report will draw from the WHO guidance on national elimination report required for WHO certification so that the information in the subnational elimination report may be readily integrated into the final national elimination report.

Determination of elimination will rely principally on a high-quality, comprehensive system for case-based surveillance and outreach, with systematic documentation of the absence of indigenous malaria over time, such as the three years before verification or certification of malaria elimination. The case-based measures will include the following:

- All cases of suspected malaria are tested with quality-assured methods (RDTs or microscopy)
- All tested cases are negative or are positive with probable exposure to malaria outside the area
- All test-positive imported cases are followed and shown not to lead to indigenous transmission

**Key steps for subnational malaria elimination verification:** Drawing on the WHO guidance, the following steps will be considered for subnational elimination verification.<sup>51</sup>

- Designing of method the processes by NMEP/MoHFW for subnational elimination verification using the WHO national certification process as a reference
- Submission of request by the district/Upazila health department to the national authority for subnational verification on behalf of the local government authority
- Submission of subnational elimination report and compiling supporting documents and records
- Organization of subnational elimination verification mission comprising national and international experts for review of subnational elimination report, other documents and records, published materials; and conducting field visits to verify information and provide recommendation with special emphasis on quality of the surveillance systems, vigilance of the general health services, and whether the last foci were cleared (zero indigenous cases in the past 3 consecutive years)
- Reporting of findings and recommendations of the subnational elimination verification mission to Malaria Technical Committee, who in turn, will provide own recommendation to the NMETF and MoHFW to declare the district as malaria-free
- Issue of official letter to the district, NMEP by the MoHFW and announce the malaria-free status thereby recognizing the achievement with copy to the WHO and other relevant entities
- Review of malaria-free status (absence of local malaria transmission and zero indigenous cases) by the Malaria Technical Committee annually
- Recommending way forward if malaria-free status changes in the district and if evidence of re-introduction is noted, considering revoking the subnational elimination certification.

Prior to subnational elimination verification, NMEP will carry out following activities.

- Engage with division, district and Upazila authorities on subnational elimination verification
- Organize orientation sessions of division, district, Upazila and relevant stakeholders, partners on preparation of subnational elimination report, subnational elimination verification method and processes, compilation of documents, records
- Guide and coordinate readiness assessment by district (self-assessment), preparation of subnational elimination report

In stratum 1, it is envisaged that prevalence of malaria infection will be studied besides receptivity and vulnerability assessments with technical assistance of the WHO. Historical data will also be reviewed. Case based surveillance and zero reporting will be rolled out immediately. An independent committee will be constituted comprising selected members of the Malaria Technical Committee, independent experts (national, international), relevant agencies, who will review the evidence and the process of declaring the 51 'non-endemic' districts (and a few 'non endemic' areas within endemic districts) [418 Upazilas] as 'non-endemic' and 'malaria-free' will be initiated followed by roll out of prevention of re-establishment related activities. In stratum 2 and 3, such activities will start when an Upazila/district is declared 'malaria-free'.

**Documents required for subnational elimination verification (& later elimination certification):** Strategy, plans, guidelines, SOPs, records, reports are to be maintained at national and subnational levels. Documents are to be kept at the health facility/office right from the CC level (as relevant for the

level), where the data are generated. A list is appended here drawing on the WHO guidance (Table-14). The NMEP will consult with the WHO, experts and Malaria Technical Committee regarding all or a subset of document requirements for subnational elimination verification process. At the same time, other documents, records/reports may be considered to support subnational elimination verification and later country certification, as needed.

Table-14: Documentation requirements for subnational elimination verification

| Key component   | Key documents   | Reference period   | Level where documents should be maintained   |
|---|---|--|--|
| National Strategic Plan, Other Plans and Reports, Legislation | 1. Costed National Strategic Plan for Malaria Elimination   | Past five years before elimination when transmission is still ongoing (-1 to -5 years to elimination year)   | National/Central, District levels  |
|   | 2. Plan of action for POR of malaria transmission   | Current year   | National/Central, District and Upazila levels  |
|   | 3. Operational or Implementation Plan   | Past five years before elimination when transmission is still ongoing (-1 to -5 years to elimination year)   | National/Central, District and Upazila levels  |
|   | 4. Annual report with overview of malaria activities, trainings/re-trainings, review and planning meetings for monitoring progress & optimizing response<br><br>[Entomological and vector control reports, related training/re-training reports may be compiled separately] | Past five years before elimination when transmission is still ongoing (-5 years to elimination year) to current year to every year through the period when country is eligible for certification | National/Central, District and Upazila levels  |
|   | 5. Published and unpublished reports of studies on malaria epidemiology and malaria vectors including evidence for strategies for POR (including operational research results)  | Any year   | National/Central level   |
|   | 6. Legislation or regulations related to malaria and vector control to demonstrate that malaria is a mandatory notifiable disease   | Current year   | National/Central, District and Upazila levels  |
|   | 7. Country commitments/declarations on malaria elimination signed at national/regional/global platforms   | Any year   | National/Central level   |
| II. Diagnosis   | 8. SOPs and bench aids for malaria diagnosis for laboratories in line with the WHO guidance   | Current year   | National/Central, District and Upazila levels; concerned health facility, community health worker, volunteer |

| Key component        | Key documents  | Reference period   | Level where documents should be maintained   |
|----------------------|--|--|--|
|                      |  |  | (public/NGO, private sectors, others)  |
|                      | 9. Laboratory register, out-patient/in-patient registers, and patient records/registers with CCs, community health workers/volunteers  | Past five years before elimination when transmission is still ongoing (-5 years to elimination year) to current year to every year through the period when country is eligible for certification | National/Central, District and Upazila levels; concerned health facility, community health worker, volunteer (public/NGO, private sectors, others) |
|                      | 10. Guidelines, reports/records of quality control and assurance activities to demonstrate that malaria diagnosis is quality-assured in the country and the capacity is likely to be sustained | Current year to every year through the period when country is eligible for certification   | National/Central, District and Upazila levels; and Central Reference Laboratory; health facility/laboratory (public/NGO, private sectors, others)  |
| III. Case management | 11. National malaria treatment guidelines in line with the WHO recommendations   | Current year (past guidelines if changes/updates)  | National/Central, District and Upazila levels; concerned health facility, community health worker, volunteer (public/NGO, private sectors, others) |
|                      | 12. Patient register/log, line listing of malaria cases  | Past five years before elimination when transmission is still ongoing (-5 years to elimination year) to current year to every year through the period when country is eligible for certification | National/Central, District and Upazila levels; concerned health facility, community health worker, volunteer (public/NGO, private sectors, others) |
| IV. Vector control   | 13. Guidelines, SOPs for entomological surveillance and vector control in line with the WHO recommendations  | Current year (past guidelines if changes/updates)  | National/Central, District and Upazila levels  |

| Key component           | Key documents   | Reference period   | Level where documents should be maintained  |
|-------------------------|---|--|---|
|                         | 14. Annual report of entomological and vector control activities (also refer to #4)   | Past five years before elimination when transmission is still ongoing (-5 years to elimination year) to current year to every year through the period when country is eligible for certification | National/Central, District and Upazila levels                                       |
| V. Surveillance and M&E | 15. Guidelines and SOPs for malaria surveillance (public, NGO, private, others) including the design for prevention of re-establishment   | Current year (past guidelines if changes/updates)  | National/Central, District and Upazila levels                                       |
|                         | 16. Annual malaria surveillance reports (information on changes in malaria transmission over time)  | Past five years before elimination when transmission is still ongoing (-5 years to elimination year) to current year to every year through the period when country is eligible for certification | National/Central, District and Upazila levels                                       |
|                         | 17. Malaria case database (register) – cases tested, diagnosed, treated with relevant disaggregation (information on cases over time - electronic)  | Past 10 years before elimination when transmission is still ongoing (-10 years to elimination year) to current year to every year through the period when country is eligible for certification  | National/Central, District and Upazila levels; concerned health facility/laboratory |
|                         | 18. Case investigation and notification forms (each case is to be assigned unique identification number)  | Past 5 years before elimination when transmission is still ongoing (-5 years to elimination year) to current year to every year through the period when country is eligible for certification    | National/Central, District and Upazila levels; concerned health facility/laboratory |
|                         | 19. Focus register with database of all focus investigations and response, focus investigation forms, map (includes formal listing of all malaria foci with unique identification number with full information about each focus including entomological investigation details). The register needs to be structured so as to update the foci classification status ( <i>active</i> versus <i>residual non-active</i> versus <i>cleared</i> ) and date of status change. | Past 5 years before elimination when transmission is still ongoing (-5 years to elimination year) to current year to every year through the period when country is eligible for certification    | National/Central, District and Upazila levels                                       |

| <b>Key component</b>   | <b>Key documents</b>   | <b>Reference period</b>   | <b>Level where documents should be maintained</b>  |
|--|--|---|--|
|  | 20. Reports related to outbreaks and responses   | Past 5 years before elimination when transmission is still ongoing (-5 years to elimination year) to current year to every year through the period when country is eligible for certification | National/Central, District and Upazila levels  |
|  | 21. Reports related to supervision, monitoring and feedback to reporting units (for peripheral health facility, CC, community health worker, volunteer, feedback may be written on their registers)  | Past 5 years before elimination when transmission is still ongoing (-5 years to elimination year) to current year to every year through the period when country is eligible for certification | National/Central, District and Upazila levels; concerned health facility, community health worker, volunteer |
|  | 22. Joint Monitoring Mission reports, other assessment/evaluation reports  | Past 5 years before elimination when transmission is still ongoing (-5 years to elimination year) to current year to every year through the period when country is eligible for certification | National/Central, District and Upazila levels  |
|  | 23. Self-assessment of readiness for certification   | Year prior to certification is requested  | National/Central, District and Upazila levels  |
|  | 24. Subnational elimination verification reports   | Year when subnational elimination verification initiated until current year   | National/Central, District and Upazila levels  |
|  | 25. Reports related to drug resistance, insecticide resistance   | Past 5 years before elimination when transmission is still ongoing (-5 years to elimination year) to current year to every year through the period when country is eligible for certification | National/Central, District and Upazila levels  |
| VI. Enabling environment to support elimination and prevention of re-establishment of transmission | 26. Guidelines, MoUs, agreements, action plans and implementation reports of multi-sectoral coordination and collaboration (including meeting reports of National Malaria Elimination Advisory Committee and Malaria Technical Committee) [also refer to #4] | Past 5 years before elimination when transmission is still ongoing (-5 years to elimination year) to current year to every year through the period when country is eligible for certification | National/Central, level  |
|  | 27. Reports of cross-border coordination, action plans, roadmap, situation analysis, agreements (also refer to #4)   | Past 5 years before elimination when transmission is still ongoing (-5 years to elimination year) to current year to every year through   | National/Central, District and Upazila levels (concerned district/Upazila)                                   |

| Key component | Key documents  | Reference period  | Level where documents should be maintained    |
|---------------|--|---|---|
|               |  | the period when country is eligible for certification   |   |
|               | 28. Guidelines/strategy, reports of IEC/BCC, community mobilisation (also refer to #4) | Past 5 years before elimination when transmission is still ongoing (-5 years to elimination year) to current year to every year through the period when country is eligible for certification | National/Central, District and Upazila levels |

### 7.2.1.2 Preparedness for Certification of Malaria Elimination by the WHO: Overview

**All strata:** After reporting zero indigenous malaria cases for 03 consecutive years (36 months) nationwide, the country will plan certification of malaria elimination by the WHO. Certification of malaria elimination by WHO requires the elimination of the four main human parasite species: *P. falciparum*, *P. vivax*, *P. ovale* and *P. malariae*. Certification might be granted to countries where cases of other Plasmodium species are reported if the risk to humans is assessed negligible.

Whilst the WHO certification will be aimed at in 2033, the preparedness will be initiated through this strategy period. The process entails expert, objective and independent review and evaluation of declaration of malaria elimination and its programme to prevent re-establishment of transmission by the Technical Advisory Group on Malaria Elimination and Certification (TAG-MEC) [previously Malaria Elimination Certification Panel (MECP)], subsequent to the official request by the country.

Preparation for certification in terms of compiling of evidence, documentation of malaria elimination efforts, and planning a prevention of re-establishment programme are envisaged much before the country interrupts indigenous transmission and reports zero indigenous malaria case. The WHO Malaria Elimination Audit Tool (MEAT) will be applied periodically to monitor progress of elimination strategy implementation and identify key actions to be taken for elimination, prevention of re-establishment and the WHO certification.

According to the WHO guidance (2022<sup>52</sup>), *the criteria for certification of malaria elimination are:*

- *local malaria transmission fully interrupted, resulting in zero indigenous human malaria cases for at least the past 03 consecutive years (36 months), and*
- *an adequate fully functional programme for preventing re-establishment of indigenous transmission throughout the country.*

*The steps in certification of malaria elimination includes:*

- *Documentation of an effective elimination programme*
- *Orientation of the elimination programme to prevent re-establishment*
- *Official request*
- *Readiness assessment*
- *Plan of action and timeline*
- *Submission of a national elimination report*
- *Independent evaluation mission by a subset of the TAG-MEC*
- *Consideration of evidence and recommendation*
- *Consideration of evidence and recommendation by the WHO MPAG*
- *Certification by the WHO Director-General*

*The national malaria elimination report comprises characterizing the history of malaria in the country, detailing the activities undertaken to achieve elimination, presenting evidence that the elimination goal*

*has been achieved and describing the programme to prevent re-establishment. Other documents comprises National Strategic Plan, Other Plans and Reports, Legislation, data and reports related to diagnosis, case management, vector control, surveillance and M&E, and enabling environment to support elimination and prevention of re-establishment of transmission.* A list is presented in Table-14. The NMEP may add, revise the list, as deemed appropriate, following further guidance by the WHO.

An independent evaluation mission convened by the WHO, verifies the findings in the national malaria elimination report by reviewing documents and records and conducting field visits and interviews with the MoHFW, the NMEP and other relevant sectors and partners. The TAG-MEC reviews findings of the independent evaluation mission and recommends to the WHO MPAG, whether the country should be certified as having achieved malaria elimination at that time or certification should be postponed. Final decision on certification is made by the WHO Director-General. After certification is granted, the country is listed in the official WHO Register of areas where malaria elimination has been achieved. Country will need to report annually to the WHO about the malaria-free status.

The country will need to immediately report any indigenous cases or outbreaks to WHO so that the Organization can advise on further action to prevent re-establishment. A minimum indication of possible re-establishment of transmission is the occurrence of three or more indigenous malaria cases of the same species per year in the same focus for 3 consecutive years. As certification represents recognition of a considerable operational achievement by a country, a careful investigation and consultation with the TAG-MEC will be conducted before a country's malaria-free certification status is revoked.

## CHAPTER-5 IMPLEMENTATION FRAMEWORK

### 5. IMPLEMENTATION FRAMEWORK

#### 5.1 Implementation Arrangements

For planning, implementation, and M&E, the NSP 2024-2030 will build on bottom-up approach with the CCs and vast majority of community health workers, volunteers getting involved and influencing the design of locally appropriate implementation plan. The WHO and other partner agencies will continue to provide technical assistance for critical areas of need.

##### **Central level:**

At the central level, the NMEP under the CDC, DGHS, MoHFW, has direct responsibility for planning, implementing and coordinating malaria elimination and will now include prevention of re-establishment of malaria transmission. The NMEP leads development of policy, strategy, guidelines, SOPs, QA/QC, and planning and implementation of interventions, procurement of health products/pharmaceuticals and supply to public sector health system and partner NGO, besides leading M&E/MIS, oversight as well as partnership and coordination, research. The NMEP has three main sections: Epidemiology; Entomology and Laboratory (Central Malaria Reference Laboratory - CMRL). An M&E system is in place for strengthening and assessing program performance nationwide.

The NMEP has been receiving support from the GF since 2007. The GF supported Program Management Unit (PMU) is set up at the central level, which supports/carries out overall planning, implementation, M&E. The PMU consists of technical and administrative staff at the central level.

##### **District, Upazila and Community level:**

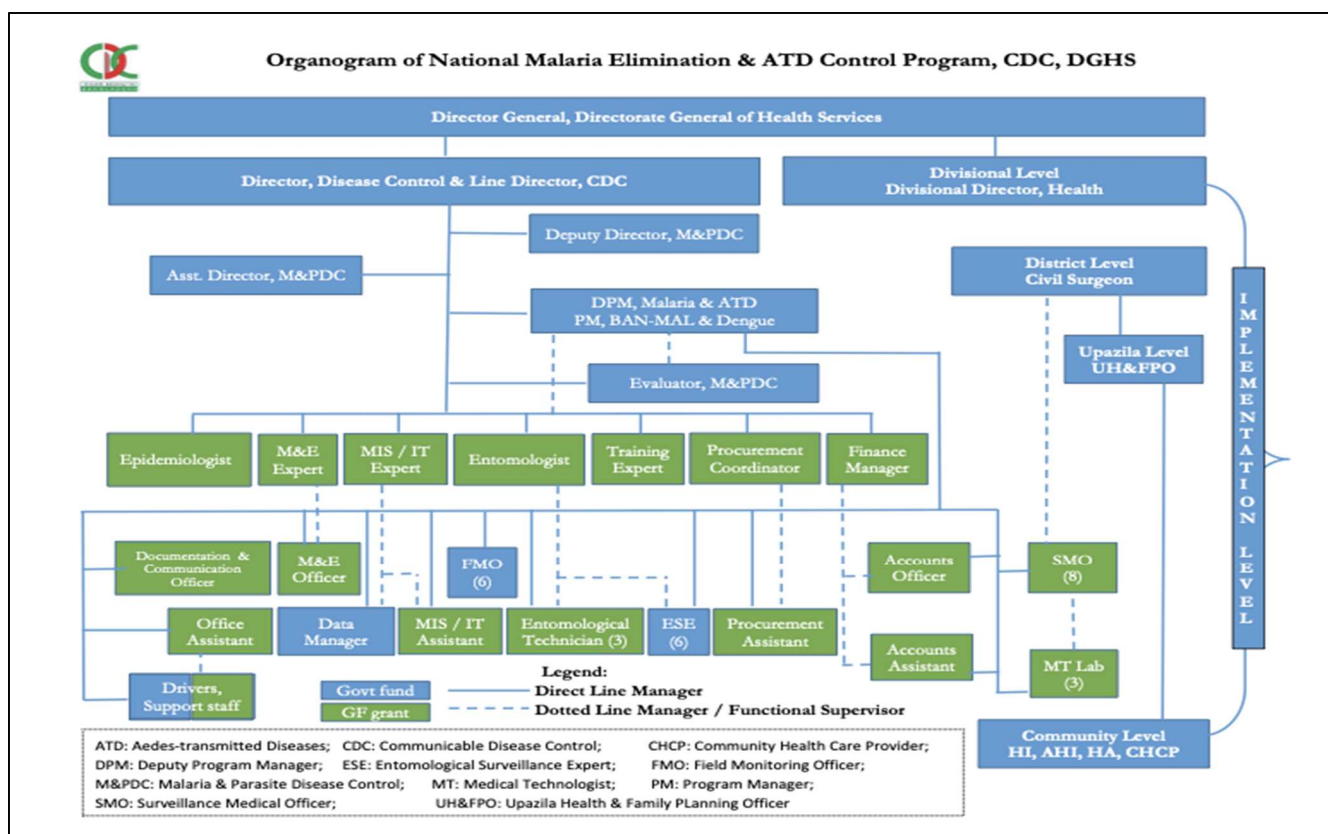
As mentioned earlier, the district health system consists of District Hospitals, Upazila Health Complex (UHC), Union Sub-centers, Union Health & FW Centers, EPI vaccination centres. Bangladesh has well-established free community-based malaria services delivered by CCs. The CCs are the lowest level public sector health facility at community level. They provide basic outpatient services for communicable and non-communicable diseases, including malaria services, through a team of two health workers - a community health care provider (CHCP) and a health assistant (HA). Recently, the GoB has introduced multipurpose health volunteers (MHVs)<sup>53</sup> connected with the CCs in selected districts under the Community Based Health Care (CBHC) Department of MOHFW, which is expected to progressively support EDPT. In order to support the NMEP and district/Upazila health authorities in strengthening of surveillance and M&E, surveillance medical officers are positioned in 13 endemic districts (with support by the GF) besides a few additional medical technologists (MT) in selected districts having vacant positions (at the district level) to enhance diagnosis and QA. Additional positions are envisaged under this NSP 2024-2030 with special attention on Bandarban district.

At the district and sub-district (Upazila) levels in 13 endemic districts, malaria services are provided by the district Hospitals, Upazila Health Complexes (UHC), Union Sub-centers, Union Health & FW Centers, and CCs. In 51 'non-endemic' districts (and a few 'non endemic' areas within endemic districts), capacity building has been initiated, and systematic diagnosis and treatment, surveillance and M&E, and multi-sector coordination as well as cross-border collaboration will be rolled out.

As the malaria elimination related activities are initiated and intensified, the NMEP will progressively integrate malaria services with overall healthcare service delivery system maximizing synergies in elimination districts as well as in alignment with the National Health Sector Strategy that will provide funds and human resources for malaria elimination activities in the future.

The NMEP organogram from central to community level is illustrated in Figure-10 below.

Figure-10: NMEP organogram



Source: NMEP, 2021

Partner NGO (BRAC) and their NGO partners provide strong complementary support in 03 CHT districts and Chattogram and Cox's Bazar districts with resource support by the GF. Key activities include diagnosis and treatment of cases and surveillance and M&E at community level, LLIN distribution and SBCC activities, amongst others. They proactively coordinate with the NMEP as well as district/Upazila authorities and below levels for timely and quality implementation of interventions and reporting. In 08 elimination districts (Sylhet and Mymensingh zones), limited HR are positioned with the GF support through partner NGO for providing support to the UHC for implementation coordination.

The NMEP with support from the partner NGO has initiated mapping of private sector health care service providers, viz. hospitals, clinics, laboratories in addition to individual formal and informal providers. An assessment of private sector involvement in malaria case management in 2019 with technical assistance by the WHO has been conducted and a private sector engagement strategy will be developed for systematic participation in national elimination programme in terms of case detection, case management and referral, reporting according to national guidelines. Implementation arrangements with the GF support is appended as Annex-5. The implementation arrangements will remain dynamic and change with changing epidemiological settings and achievement of milestones and targets, as mentioned earlier.

Furthermore, the Armed Forces and other law enforcement agencies also carry out malaria diagnosis, treatment, surveillance in their service areas in endemic districts; besides few INGOs in FDMN camps. In addition, there are research and academic institutions, which support the NMEP from time to time; example, Bangladesh Institute of Tropical and Infectious Diseases (BITID); and NIPSOM, IEDCR besides private sector institutions like iccdr, b and universities. Multi-sector coordination will be pursued under NSP 2024-2030.

## 5.2 Operational Plan

The NMEP will lead implementation of NSP 2024-2030 via an operational plan. An objective-wise and strategy-wise operational plan will be prepared, which will be reviewed and updated periodically. Preparation of operational plan will involve coordination within the MoHFW, and with partner NGO, the WHO, the GF and other relevant agencies.

Overall, the malaria programme planning follows and embedded within the HNPSP OP. Annual plans of NMEP are developed in consultation with districts, Upazilas for resource proposition. In addition, detailed work plan will be developed regarding the GF funding to steer implementation of interventions, capacity building, and M&E.

## CHAPTER-6 RISK MANAGEMENT AND MITIGATION

### 6. RISK MANAGEMENT AND MITIGATION

For successful NSP 2024-2030 implementation, some risks may be inevitable. The NMEP and partners will pursue understanding the magnitude of, and management and mitigation of the risks. A non-exhaustive list of key risks that may occur during the implementation and possible mitigating actions is outlined in Table-15. Going forward, the NMEP will strengthen risk identification, assessment, and mitigation through the NSP period. During reviews, supervision, internal and external risks impacting targets and achievements will be assessed. Attempt will also be made to create a risk-aware culture at all levels.

Table-15: Risk categories, key risks, mitigating actions

| Risk Category                | Key Risk  | Mitigating actions   | Timeline  |
|------------------------------|---|--|-----------|
| Financial risk               | Lack of sustained and sufficient funding for malaria elimination and prevention of re-establishment from the GoB and partners, especially the GF; and unsuccessful efforts in mobilizing resources (from within and outside country) commensurate with the need for malaria elimination and prevention of re-introduction and re-establishment of malaria transmission. | <ul style="list-style-type: none"> <li>▪ Transform political commitment in terms of sustained and sufficient domestic resources for malaria elimination and prevention of re-establishment of malaria transmission.</li> <li>▪ Advocate for vital continued support by the GF at least until WHO certification for malaria elimination is achieved. Strong justification for sustained GF support will be developed in collaboration with the WHO and other relevant stakeholders.</li> <li>▪ Advocate for funding for malaria elimination and prevention of re-establishment as an investment case for ending poverty and achieving overall socio-economic development and SDGs to in-country corporate sector and other donors and development partners as well as Municipal Corporation/Municipality, local governments.</li> </ul> | From 2024 |
| Financial & fiduciary risk   | Issues relating to low absorption capacity; suboptimal financial efficiency   | <ul style="list-style-type: none"> <li>▪ Ensure completion of all activities relative to plan and regular review of progress.</li> <li>▪ Continue focus on financial efficiencies.</li> </ul>  | Ongoing   |
| Financial and extrinsic risk | COVID-19 and/or such pandemic related crisis in future impacting timely and quality service delivery, re-purposing of funding and human resources, issues of safety of health workforce/volunteers  | <ul style="list-style-type: none"> <li>▪ Develop, adapt and implement appropriate guidelines in line with the WHO, the GF, and other international/national guidance to maintain uninterrupted health care services including malaria services with safety.</li> <li>▪ Design strategic ‘catch-up’ plan to mitigate adverse impact of pandemic related crisis drawing guidance from the WHO, the GF, other partner agencies, as well as MOHFW, Malaria Technical Committee, various health programmes, as well as regular engagement with implementation levels.</li> </ul>  | Ongoing   |

| Risk Category     | Key Risk  | Mitigating actions  | Timeline                |
|-------------------|---|---|-------------------------|
|                   |   | <ul style="list-style-type: none"> <li>▪ Mobilize additional domestic resources as well as additional funding from the GF and/or other donor/partner has been/will be mobilised for tackling the pandemic.</li> </ul>   |                         |
| Extrinsic risk    | <p>Natural disasters, cyclones, heavy rain and flash floods occur frequently in Bangladesh; and these affect timely implementation of interventions especially during monsoon and post-monsoon months, which also coincides with peak seasonal malaria transmission and adversely impacting malaria cases and deaths. Besides, diversion of efforts and resources to affected areas also affect implementation as per plan elsewhere.</p> | <ul style="list-style-type: none"> <li>▪ Ensure adequate buffer stock in the procurement of key programme commodities (RDTs, antimalarials, LLINs).</li> <li>▪ Ensure deployment reserve with community health workers/volunteers during monsoon and post-monsoon months, especially in hard-to-reach areas.</li> <li>▪ Ensure EDPT, use of LLINs by affected populations by community health workers/volunteers.</li> </ul>  | Ongoing                 |
| Extrinsic risk    | <p>Massive influx of Rohingya refugees (FDMN).</p>  | <ul style="list-style-type: none"> <li>▪ Advocate for resource support for interventions in FDMN camps from development partners including the GF. A costed package of interventions will be updated for this NSP 2024-2030 (including prevention and case management interventions as well as buffer necessary for response to any upsurge/outbreak; besides Artemisinin resistance monitoring).</li> <li>▪ Advocate for coordinated response by partner agencies (WHO, UNHCR, IOM, others) and INGOs, national NGOs for FDMN humanitarian crisis.</li> <li>▪ Request WHO and the GF to consider inclusion of Bangladesh under GMS network.</li> </ul> | Ongoing and as required |
| Programmatic risk | <p>Reversal of progress on malaria targets for 2030, due to financial risks, various programmatic risks, upsurges, other threats and disruptions.</p> <p>In addition, shift of focus from malaria may be a reality.</p>   | <ul style="list-style-type: none"> <li>▪ Reinforce and sustain commitments.</li> <li>▪ Optimize programme interventions with special attention to Bandarban district.</li> <li>▪ Ensure robust surveillance and M&amp;E in elimination districts.</li> <li>▪ Orientation and strengthening of health systems.</li> <li>▪ Generate quality data, and ensure use of data at local level.</li> <li>▪ Ensure optimal vigilance and proactive action as and when there is indication of rise in number of cases especially starting from April-May, even if the rise does not reach ‘outbreak threshold’.</li> </ul>   | From 2024 onwards       |

| Risk Category     | Key Risk  | Mitigating actions   | Timeline |
|-------------------|---|--|----------|
|                   |   | <ul style="list-style-type: none"> <li>▪ Ensure mitigation of financial and programmatic risks.</li> <li>▪ Multi-sector advocacy and coordination.</li> </ul>  |          |
| Programmatic risk | Development and spread of ACT resistant falciparum malaria in Bangladesh.   | <ul style="list-style-type: none"> <li>▪ Close monitoring of drug resistance status will be pursued through TES in sentinel sites and through molecular studies analyzing samples collected nationwide. Resulting data will be shared with the WHO, relevant partners/stakeholders. In the event of development of ACT resistance, a suitable response will be developed following the recommendations of the WHO.</li> </ul>  | Ongoing  |
| Programmatic risk | Development and spread of operationally significant insecticide resistance in Bangladesh.   | <ul style="list-style-type: none"> <li>▪ Close monitoring of insecticide resistance will be carried out at sentinel sites. Resulting data will be shared with the WHO, relevant partners/stakeholders. If insecticide resistance is found, its operational significance will be assessed, and a suitable response will be developed, as required, in consultation with the WHO.</li> </ul>   | Ongoing  |
| Programmatic risk | <p>Access to timely interventions remain critical risk in view of extreme remoteness of some areas that is often compounded by poor physical infrastructure and lack of staff. Security issues also renders access difficult in certain areas of CHT districts.</p> <p>Community, rights and gender related barriers, and inequities, although waning over time, pose risks in terms of disproportionate adverse impact on key and vulnerable populations in accessing interventions at the right time and right place.</p> | <ul style="list-style-type: none"> <li>▪ Community level health workers/volunteers who are often recruited locally will ensure that affected population is served effectively. The timing of visits as well as special health camps in hard-to-reach areas will be planned to take seasonal constraints, remoteness, etc. into consideration. Deployment reserve of stock of commodities with community level health workers/volunteers during monsoon and post-monsoon months, which also coincides with peak seasonal malaria transmission is envisaged especially in remote areas. In high burden areas of Bandarban district and selected border areas, additional community level support is envisaged.</li> <li>▪ Introduce special interventions like TDA with technical guidance by the WHO.</li> <li>▪ Further strengthen coordination and linkages with community systems, networks as well as local self-governments, tribal/ethnic heads/councils. Local knowledge and experience and community-based presence of health workers/volunteers will facilitate further learning to deal with such situation. For any delay/postponement of implementation of interventions that may be at times necessary in view of the local situation, tailored efforts will be made to resolve problems.</li> </ul> | Ongoing  |

| Risk Category     | Key Risk  | Mitigating actions  | Timeline |
|-------------------|---|---|----------|
|                   |   | <ul style="list-style-type: none"> <li>▪ Malaria matchbox tool will be used periodically to update understanding of community, human rights and gender issues and addressing those through inclusion, equity, equality, and gender responsive approaches. SBCC activities will be emphasised to address barriers and inequities.</li> </ul>   |          |
| Programmatic risk | The new more stringent stratification, used for targeting LLIN delivery, may miss out provision of additional LLINs for focal upsurges/emergencies. | <ul style="list-style-type: none"> <li>▪ Ensure continued advocacy and orientation of general health services, stakeholder; ensure optimal systems for rapid response as appropriate for the context, to any new transmission focus, as required. Buffer LLINs and RDTs, antimalarials are proposed.</li> </ul>   | Ongoing  |
| Programmatic risk | Inherent weaknesses in the health systems often limit the quality of services.  | <ul style="list-style-type: none"> <li>▪ Advocate for overall improvements in health systems. The NMEP will oversee capacity building/strengthening. Further emphasis on malaria services by capacitated CCs will be a key measure. Capacity building of recently recruited MHVs and other proposed cadres are expected to minimize existing gap.</li> <li>▪ Extensive use of health worker/volunteer network of partner NGO and coordination with the Army and other law enforcement agencies for malaria services in less accessible communities and areas with health system weaknesses will attempt to solve some of the issues associated with access and at the same time reduce the burden on overstretched health workers, particularly in the periphery.</li> <li>▪ Some other potential mitigation actions are as under: <ul style="list-style-type: none"> <li>- regular health system review including but not limited to, performance audit of all cadres and based on the results develop and implement quality improvement/capacity strengthening plan; development and implementation of mentoring system to develop specific skills / expertise</li> <li>- strengthening supportive supervision and monitoring</li> <li>- ensuring ownership of the program by the district/Upazila health authorities and empowering them to improve the quality of services</li> <li>- improving collaboration between district health authorities and partner NGO, other entities involved in malaria services, private sector</li> </ul> </li> </ul> | Ongoing  |

| Risk Category     | Key Risk   | Mitigating actions  | Timeline          |
|-------------------|--|---|-------------------|
|                   |  | <ul style="list-style-type: none"> <li>- analysis and use of surveillance data for timely response</li> <li>- other actions depending on the key reasons for weaknesses in the health system that often limit the quality of services.</li> </ul>   |                   |
| Programmatic risk | Non-compliance of national guidelines by private sector as well as variable reporting from them  | <ul style="list-style-type: none"> <li>▪ Develop and implement private sector engagement guidelines in coordination with relevant sectors/agencies.</li> </ul>  | From 2022 onwards |
| Programmatic risk | Timeliness and completeness of reporting and variable quality of data undermine programme management and implementation.   | <ul style="list-style-type: none"> <li>▪ Data quality is being progressively strengthened. With nationwide roll out of updated MMIS, the timeliness, completeness, accuracy will be further streamlined. Malaria focal points, SMOs and central M&amp;E staff will carry out on site data verification, supervision at service delivery points regularly and send prompt feedback to the local levels.</li> </ul>   | From 2022 onwards |
| Programmatic risk | Supervision and monitoring for measuring progress and impact may miss out regular risk assessments and mitigation.   | <ul style="list-style-type: none"> <li>▪ Supervisory visits will be comprehensive with risk-aware/risk mitigation focus. Trainings/re-trainings will also enhance requisite comprehension and skills.</li> </ul>  | Ongoing           |
| Programmatic risk | In malaria-free areas particularly those with high receptivity, vulnerability, re-introduction of indigenous malaria and re-establishment of malaria transmission. | <ul style="list-style-type: none"> <li>▪ Plan and progressively roll out prevention of re-establishment related measures starting at subnational level and then nationwide.</li> </ul>  | From 2023 onwards |
| Programmatic risk | Sexual exploitation, abuse and harassment with regard to programme related risks for beneficiaries, staff and community cadres.                                    | <ul style="list-style-type: none"> <li>▪ Development of guidance on mitigation of prevention of sexual exploitation, abuse and harassment (PSEAH) through TA with regard to program related risks for beneficiaries, staff and community cadres through all stages of programme planning and implementation; trainings; meetings.</li> <li>▪ Field visits/supervision visits to cover assessment of PSEAH including gathering feedback from community members and grant beneficiaries.</li> </ul> | From 2024 onwards |

## CHAPTER-7: MONITORING & EVALUATION

### 7. MONITORING & EVALUATION FRAMEWORK

Monitoring is a regular, systematic process of measuring performance, results against set targets and benchmarks in a programme, while it is ongoing. Evaluation periodically assesses current versus desired performance standards and seeks to analyze whether the needs are met, and results are as envisaged and any gap, bottleneck are to be addressed to improve further programme performance in similar or different contexts to achieve the desired goals and objectives. M&E has played and will continue to play a key role in the successful programme implementation. M&E provides opportunities to measure the programme output, coverage and outcome, impact and to allow evidence-based decision making at both programme and policy level and gauge accountabilities.

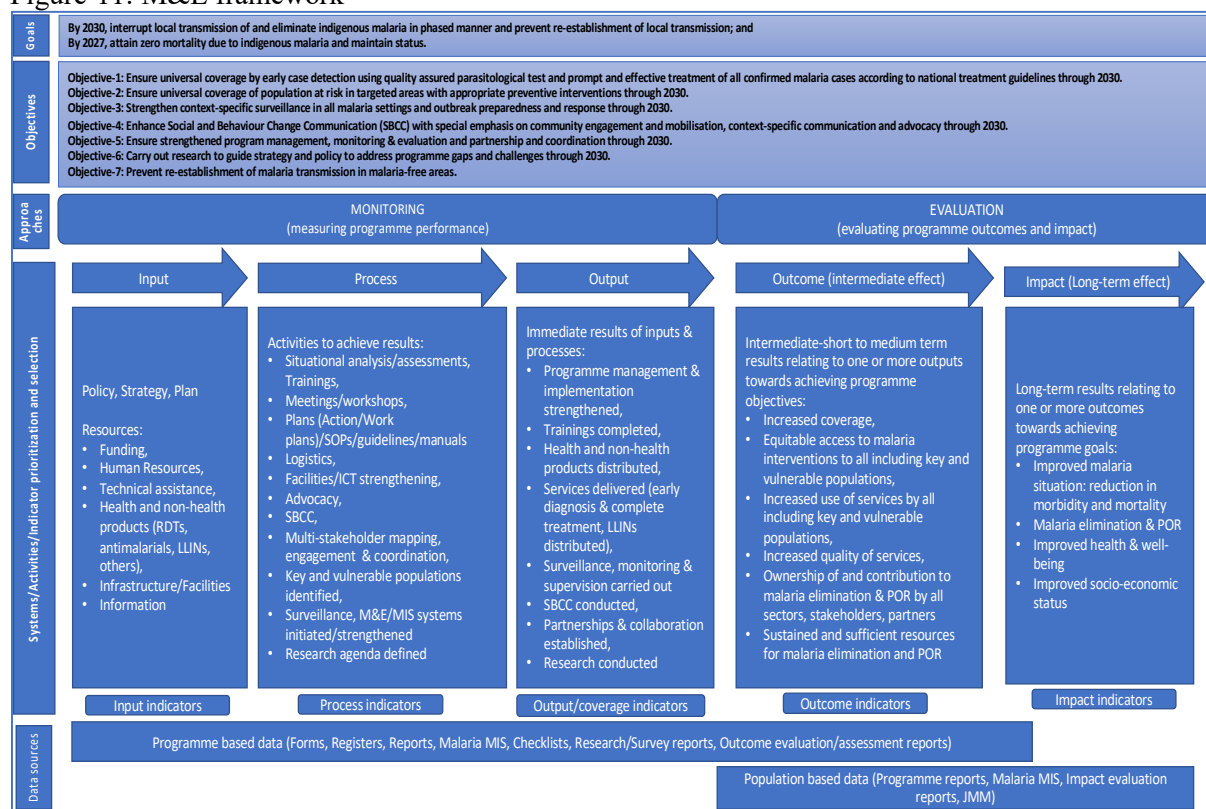
Robust M&E is a key component of the NSP 2024-2030. The M&E will entail frequent reflections and learning regarding what worked and what did not as well as what needed to evolve, change, and be tailored and adapted relevant to the context. The national M&E plan will be updated in line with the NSP 2024-2030. The objectives of the M&E plan will be to:

- provide guidance for effective M&E system for assessing programme performance and results in terms of output/coverage, outcomes and impacts;
- facilitate harmonization of data collection, aggregation based on standardized definitions, tools and indicators across levels and promote M&E coordination across partners, stakeholders;
- strengthen M&E mechanisms to verify programme implementation & accountabilities at all levels;
- strengthen data analysis and use especially at local level, and feedback and dissemination; and
- strengthen M&E capacities including enhancing reflection and learning for necessary action.

The national M&E plan will remain dynamic and will be revisited, as needed, with any change in context, requirements.

The M&E framework is presented in Figure-11.

Figure-11: M&E framework



## 7.1 M&E Indicator Framework

The indicator framework comprises choice of coverage/output indicators that indicate programme coverage and scale, outcome indicators that demonstrate short- to medium-term results towards achieving objectives, and impact indicators that demonstrate long-term results towards achieving goals. The indicator set included in NSP 2024-2030 for measuring impact, outcome, and output/coverage is founded on SMART elements (specific, measurable, achievable, realistic, and time bound) and drawn from the list of indicators in the Malaria Surveillance and Monitoring and Evaluation: A Reference Manual (WHO, 2018), Household Survey Indicators for Malaria Control (MEASURE Evaluation, The Demographic and Health Surveys Program, President’s Malaria Initiative, Roll Back Malaria Partnership, United Nations Children’s Fund, WHO, 2018), M&E Indicator Guidance (the Global Fund, 2020), Modular Framework Handbook (the Global Fund, 2022).

The indicator framework (Annex-6) includes indicator, baseline values with baseline year and data source, targets, frequency and methods of data collection (monthly, quarterly, annually), entities responsible for data collection and reporting. The targets are epidemiological projections and various estimations drawing on a mix of technical requirements, past trends, various contexts and expected milestones to be achieved. Most indicators will be applied in 13 endemic districts including 03 CHT districts and 10 other endemic districts in elimination phase. Selected indicators will be considered for 51 ‘non-endemic’ districts (and a few 'non endemic' areas within endemic districts) [418 Upazilas], as the sensitization of governance structures, capacity building of health systems, strengthening of surveillance and M&E are initiated and continued. The applicability of the indicator set will change with changing epidemiological setting (from burden reduction to elimination to malaria-free setting) through the NSP 2024-2030 period. Detailed description of each indicator will be included in the updated national M&E plan 2024-2030 (rationale/purpose, numerator, denominator, data collection frequency, measurement tool, method of measurement, interpretation, and other relevant information). Forward epidemiological projections can be seen as “best estimates”, and associated targets not considered as hard numbers that must be achieved.

Impact and outcome indicators are measured every 1-3 years. The results of the impact and outcome indicators are used for programme reviews/evaluations and other assessments/studies together with all other available information. The findings and recommendations are used to inform policy and strategy, development of guidelines, concept notes/proposal/investment cases as well as strengthening of programme implementation and advocacy, and resource planning and mobilisation. Coverage and output indicators are regularly measured to monitor programme performance, every 6-12 months or at lesser frequencies, for accelerating the pace of progress, remaining on course or mid-course corrections, re-programming, resource allocations.

Indicators to be considered for different strata is mentioned in Table-16. Appropriate disaggregation [age (<5, 5-14, 15+); gender, risk group/key and vulnerable populations, species (*P. falciparum*, *P. vivax*, *P. malariae*, *P. ovale*), source of infection (locally acquired, imported), type of case detection (ACD, PCD), setting (burden reduction, elimination and rural, urban), type of care provider (public, community, private sectors; and health facility/community health worker and volunteer) will be considered.

Table-16: Stratum-wise indicators

| Indicator   | Stratum                         |
|---|---------------------------------|
| <b>Impact indicators</b>  |                                 |
| Confirmed malaria cases (microscopy or RDT): rate per 1000 persons per year | Stratum 3, 2, 1 (All districts) |
| Inpatient malaria deaths per year: rate per 100,000 persons per year        | Stratum 3, 2, 1 (All districts) |

|  |  |
|--|--|
| Annual parasite incidence: Confirmed malaria cases (microscopy or RDT): rate per 1000 persons per year (elimination settings)  | Stratum 3, 2 (13 endemic districts)        |
| Test positivity rate   | Stratum 3, 2 (13 endemic districts)        |
| Number of locally acquired malaria cases   | Stratum 3, 2, 1 (All districts)            |
| Proportion of Upazilas reporting locally acquired malaria cases  | Stratum 3, 2, 1 (All districts)            |
| Number of active foci  | Stratum 2 (Strata 3 from 2027)             |
| Malaria case fatality rate: Percentage of deaths among confirmed malaria cases   | Stratum 3, 2, 1 (All districts)            |
| Number of malaria free Upazilas  | Stratum 3, 2, 1 (All districts)            |
| <b>Outcome indicators</b>  |  |
| Proportion of population that slept under an insecticide-treated net the previous night  | Stratum 3, 2 (for LLIN eligible districts) |
| Proportion of children under five years old who slept under an insecticide-treated net the previous night  | Stratum 3, 2 (for LLIN eligible districts) |
| Proportion of pregnant women who slept under an insecticide-treated net the previous night   | Stratum 3, 2 (for LLIN eligible districts) |
| Proportion of households with at least one insecticide-treated net   | Stratum 3, 2 (for LLIN eligible districts) |
| Annual blood examination rate: per 100 population per year   | Stratum 3, 2, 1 (All districts)            |
| Proportion of detected cases that contacted health services/care provider within 48 hours of onset of symptoms   | Stratum 3, 2, 1 (All districts)            |
| Proportion of confirmed malaria cases that received first-line antimalarial treatment at public sector health facilities/in the community within 24 hours of case detection                        | Stratum 3, 2, 1 (All districts)            |
| Percentage of case investigation reports received within day 03 after detection  | Stratum 2, 1 (Strata 3 from 2027)          |
| Proportion of population who can recall signs and symptoms of malaria, mode of malaria transmission, and diagnosis, treatment and prevention measures, and availability of services free of charge | Stratum 3, 2, 1 (All districts)            |
| <b>Output/coverage indicators</b>  |  |
| Number of long-lasting insecticidal nets distributed to targeted risk groups through continuous distribution   | Stratum 3, 2 (for LLIN eligible districts) |
| Number of long-lasting insecticidal nets distributed to- at-risk populations through mass campaigns  | Stratum 3, 2 (for LLIN eligible districts) |
| Number of suspected malaria cases that receive a parasitological test nationally   | Stratum 3, 2, 1 (All districts)            |
| Proportion of suspected malaria cases that receive a parasitological test at public sector health facilities   | Stratum 3, 2, 1 (All districts)            |
| Proportion of suspected malaria cases that receive a parasitological test in the community   | Stratum 3, 2                               |
| Number of suspected malaria cases that receive a parasitological test at private sector sites  | Stratum 3, 2, 1 (All districts)            |
| Proportion of confirmed malaria cases that received first-line antimalarial treatment at public sector health facilities   | Stratum 3, 2, 1 (All districts)            |
| Proportion of confirmed malaria cases that received first-line antimalarial treatment in the community   | Stratum 3, 2                               |
| Percentage of confirmed cases fully investigated and classified according to national guidelines   | Stratum 2, 1 (Strata 3 from 2027)          |

|   |                                 |
|---|---------------------------------|
| Number of active foci fully investigated and classified according to national guidelines (including initiation of response by Day-7)                                | Stratum 3, 2                    |
| Timeliness of facility reporting: Percentage of submitted facility monthly reports (for the reporting period) that are received on time per the national guidelines | Stratum 3, 2, 1 (All districts) |
| Completeness of facility reporting: Percentage of facility monthly reports (for the reporting period) that are actually received including zero reporting           | Stratum 3, 2, 1                 |
| Number of health cadres (public, NGO, private, others) trained/re-trained on elimination and prevention of re-establishment of malaria transmission                 | Stratum 3, 2, 1                 |
| Number of villages covered/population reached by SBCC activity (by type of activities)  | Stratum 3, 2                    |
| Number of advocacy sessions organized for Division/District/Municipal Corporation/Municipality/Local authorities/community leaders/Elected representatives/Media    | Stratum 3, 2, 1                 |
| Number of supervision visits carried out by central/district/Upazila level officials (public, NGO)  | Stratum 3, 2, 1                 |
| Number of service delivery points with no stock outs of RDTs, antimalarials   | Stratum 3, 2                    |

As the NSP 2024-2030 implementation is rolled out, indicators will be revisited, as needed and appropriate, in consultation with the Malaria Technical Committee, experts, WHO, the Global Fund.

## 7.2 M&E System

A national M&E system is fully functional that entails routine data collection, aggregation, analysis, reporting, and feedback, and supportive supervision, data quality assurance, evaluations. The M&E system ensures that quality data is collected, processed, and transformed into strategic information to allow informed decision-making at national, subnational, and local levels. The M&E system comprise personnel with specific responsibilities, data collection tools, reporting formats, and requisite equipment/accessories/software for MIS. The malaria MIS data is used to analyze trends in malaria to monitor progress vis-a-vis programmatic targets, besides quantifying the consumption of health products, antimalarials both for the public sector and partner NGOs, amongst others. The M&E system will be reviewed periodically and strengthened/updated according to the needs related to programme phasing and context.

The NMEP (and partner NGO) with a well-established network are responsible for M&E and MIS. The partner NGO follows the national M&E system/MIS, although the latter has independent MIS units for collecting, summarizing, analyzing, and producing timely reports for sharing with the NMEP and the GF. Besides the GoB and partner NGO, the national M&E system has initiated collection, aggregation of malaria data from various agencies and partners, viz., Armed Forces, BGB and any other law enforcement/security agencies, INGOs, and development partners, which will be progressively strengthened. Further, malaria is a notifiable disease in Bangladesh under the Infectious Disease Act 2018. However, reporting from non-government/private sector is yet to be optimal. Malaria case reporting from private sector is initiated and will be systematically strengthened with roll out of the private sector engagement strategy.

The web-based malaria MIS (MMIS) is in the process of being revamped in-line with the elimination and prevention of re-establishment requirements including real-time and case-based reporting from the lowest reporting level and will be hosted on an appropriate platform. The MMIS will be linked to the national DHIS2 based HMIS.

### 7.2.1 Routine data collection, flow, analysis, and reporting

Routine system includes data collection, aggregation, online entry, storage, validation, analysis and synthesis, visualization, monitoring/verification and supervision, and feedback.

Malaria data is collected monthly and aggregated at Upazila level. The aggregated malaria case data in the MIS is broken down by gender, age, and parasite species, type of case detection (ACD, PCD), severity of disease, and treatment outcome. In areas where case-based surveillance has been initiated, case investigation forms capture travel history and geographical origin of infection. In addition, LLIN distribution related information is also uploaded on the MIS. The LMIS reports contain data related to stock, consumption, and expiry related status of diagnostics, antimalarials, and LLINs.

All data collection is primarily paper based at service provider level, and this approach will be maintained. The data collection tools, and reporting formats are/will be as under:

- For case detection and management:
  - Public sector health facilities - Laboratory registers (public sector health facilities)/Outpatient/inpatient registers/records); RDT/treatment registers with HAs, HIs of public sector health facilities; registers and records for proactive case detection and reactive case detection (these are being strengthened as part of the national surveillance system and the details are available in the national surveillance manual).
    - In addition, monthly data aggregation form is used (disaggregated for public sector, partner NGO, private sector, others) [this form will be revisited line with the requirements associated with real-time reporting as case-based surveillance is strengthened in elimination settings]
  - Partner NGO - Laboratory registers; and RDT/treatment registers with SS, SK, PO, FO, MMW, Health post, Laboratory
  - Private sector sites (the sites will be identified and mapped following roll out of private sector engagement strategy) - Registers/records of identified laboratory, outpatient/inpatient registers/records)
  - Others (Armed Forces, BGB and any other law enforcement/security agencies, INGOs, and development partners) - Outpatient/inpatient registers/records
- For vector control/prevention:
  - LLIN distribution register – with UHC, partner NGO
    - LLIN distribution register/records
- For other supporting interventions: SBCC, training, supervision and monitoring
  - Registers, activity reports
- For logistics (LMIS):
  - Registers, records with product name, batch no., expiry date, required stock dependent on disease burden/trend), available stock, used stock, balance stock, amongst others]

The above-mentioned data collection tools and reporting formats will be standardized in alignment with the finalization of the MMIS and initiation of reporting through such system. All forms will be available in Bangla language.

**Routine data collection, flow and reporting in 03 CHT districts and 10 elimination districts:** From 2024, routine system involving public sector health facilities, CCs and partner NGO in 03 CHT districts will remain like the ongoing system and will continue to be strengthened (Figure-12). From 2027 onwards, with progressive transitioning of interventions to public sector health facilities from partner NGO support (except in Bandarban district), changes in routine system are envisaged. Routine data collection, aggregation, analysis, reporting and feedback will be the primary responsibility of public sector only (Figure-13). Limited implementation and M&E coordination support may be considered by partner NGO, as needed.

Figure-12: Malaria MIS, data flow and feedback in 03 CHT districts and Cox's Bazar and Chattogram (until 2026)

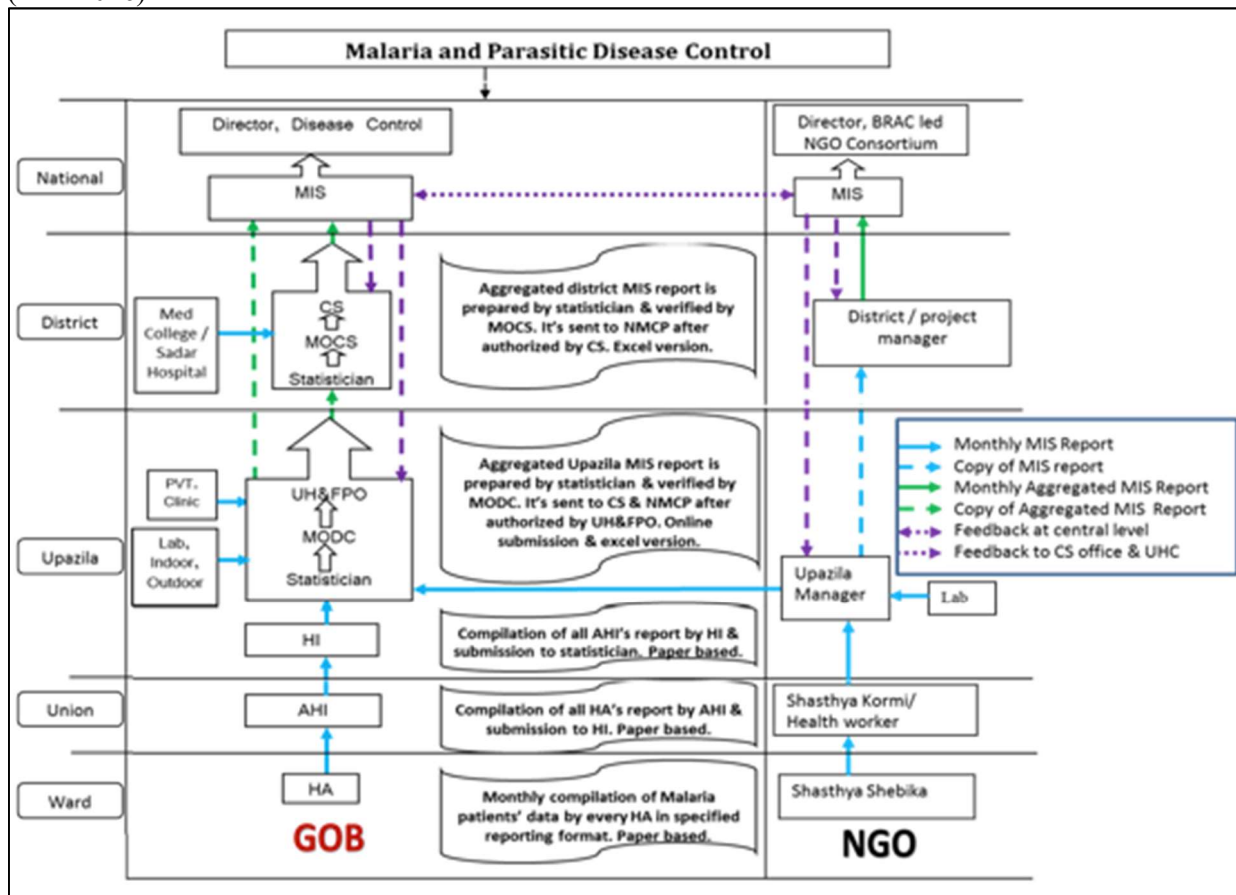
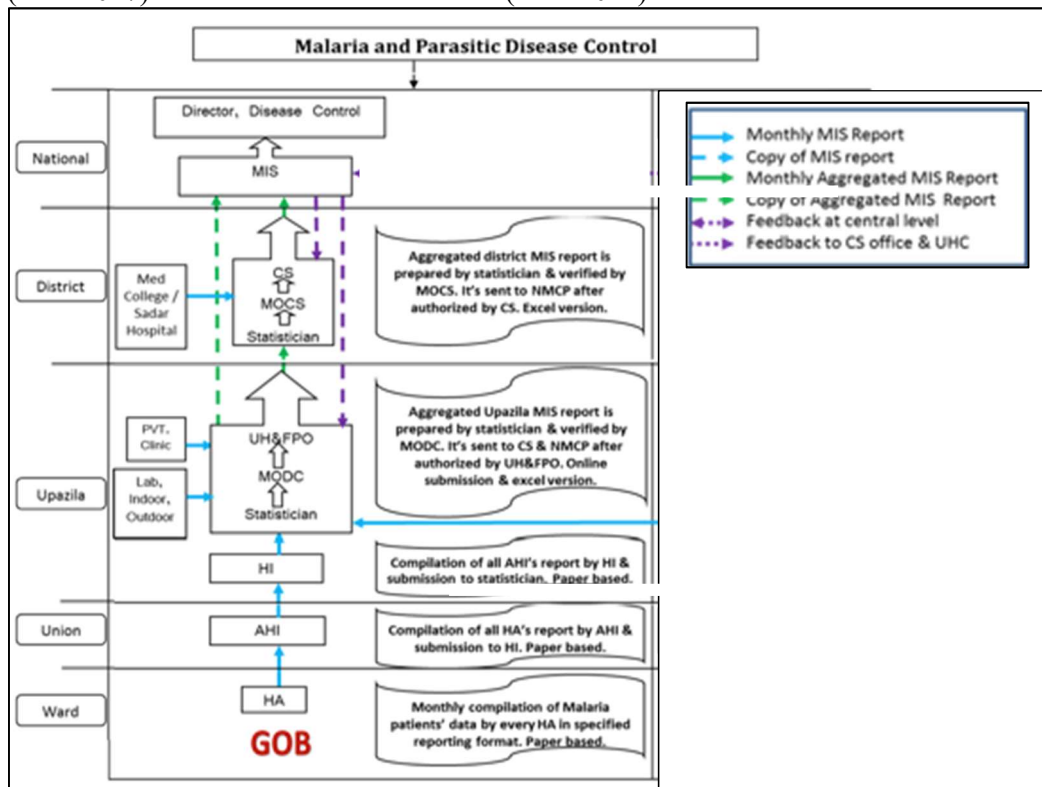


Figure-13: Malaria MIS, data flow and feedback in 03 CHT districts and Cox's Bazar and Chattogram (from 2027) and in the rest of the districts (from 2024)



Note: At Upazila level, limited staff of partner NGO are supporting the UHC in implementation and M&E coordination until 2026.

*Village (community) level:* The public sector peripheral healthcare workers [Health Assistant (HA)/Community Health Care Provider (CHCP)/MHV] who are involved in malaria diagnosis and treatment at community level keep registers for all suspected and confirmed cases. They are supervised by the AHI/Hi. The HAs are deployed at ward level. Mobile based reporting (number of tests, positive cases, referral) will be done immediately from community level (and other levels). The mobile based reporting will be linked to updated MMIS in elimination settings to trigger case investigation.

*Upazila level:* The AHI compiles monthly paper-based reports of all HAs under his/her supervision and submits a consolidated report to the Health Inspector (HI) stationed at Upazila level. In addition, CHCPs at CCs also submit monthly reports to the HI. The HI then compiles a consolidated report and submits this to the statistician at the UHC. The statistician also collects reports from health facility laboratories, and from in-patient, outpatient, and emergency departments of the UHC and prepares a consolidated monthly report for the public sector. The UHC statistician then aggregates reports in a monthly aggregated form from the GoB source and the partner NGOs and submits to the district. Private sector reports (currently where available) collected by the public sector field cadres (currently with support from partner NGOs) are incorporated in the aggregated form. Going forward, private sector reporting (monthly reporting from identified formal and informal providers subsequent to mapping and orientation) will be strengthened. Upazila level monthly reporting is completed by the 15<sup>th</sup> of the month. This process will transition to updated MMIS from Upazila level. Reports at Upazila level are verified by the MODC and authorized by the Upazila Health and Family Planning Officer (UHFPO).

*District level:* The Civil Surgeon's (CS) Office at district level compiles the reports of all respective Upazilas under that district. District Hospitals and Medical Colleges located at district level also submit their data into the web-based MMIS and send a copy of that report to the CS Office. The statistician at district level compiles an excel-based consolidated district report. The objective of preparing this report is to cross-check with reports that are submitted on the web-based system by the Upazila level statisticians. This compiled report is sent to the NMEP at central level. Reports at district level are verified by the Medical Officer and signed by the CS. During peak transmission season, malaria reports are collected and compiled weekly and transmitted upward from field level to central level for analysis at reporting levels and response. In 13 endemic districts, 'zero-reporting' is practiced by service delivery points/reporting units at every level, which will be progressively extended in other districts.

**The partner NGO** Upazila manager collects monthly reports from all NGO health workers and volunteers as well as reports from NGO laboratories. All monthly reports are consolidated and reported to UHC by the 10<sup>th</sup> of the following month. Likewise, partner NGO supporting programme implementation and M&E in FDMN camps submit data online by set timeline. A copy of the NGO consolidated report is submitted to the NGO district office. The NGO district office compiles the reports from their coverage areas and this compiled report is sent to the MIS department of partner NGO at central level. The NGOs report MIS and LMIS related malaria data to UHC monthly and consolidated data is entered on the malaria MIS by the UHC statistician. In Cox's Bazar, Statistician also consolidates the FDMN data into the excel-based consolidated district report. Reporting by selected international NGOs supporting health programme in FDMN camps has been initiated. Such data are compiled at Upazila level.

Efforts have been initiated for private sector reporting to public sector in selected districts, which will be expanded nationwide following implementation of private sector engagement strategy. The public sector health facilities staff (HI or other designated staff) in coordination with partner NGO staff (Upazila managers/PO/others) will collect data from collaborating private sector providers monthly. A consolidated monthly private sector report, based on data from the private clinics and private diagnostic centres will be submitted to the UHC statistician. Once private sector mapping and training are initiated and updated MMIS is functional, the private service providers (reporting units) will be encouraged to upload information directly on MMIS.

As regards **monthly reporting by other entities**, malaria case reporting (aggregated number) is currently submitted directly to the central PMU intermittently by Armed Forces and selected INGOs. Strengthening of systematic monthly reporting by all entities, viz., Armed Forces and other law enforcement agencies, INGOs and other national NGOs, Municipal Corporation/Municipality, development partners including those working in FDMN camps. A simple form will be used.

Efforts have been initiated for private sector reporting to public sector in selected districts, which will be expanded nationwide. The public sector health facilities staff (HI or other designated staff) in coordination with partner NGO staff (Upazila managers/PO/others) will collect data from collaborating private sector providers monthly. A consolidated monthly private sector report, based on data from the private clinics and private diagnostic centres will be submitted to the UHC statistician. Once private sector mapping and training are initiated and MMIS is functional, the service providers (reporting units) will be encouraged to upload information on the MMIS.

All reports are and will be cross-checked and verified by the central level of NMEP and partner NGO. A system for prompt feedback for any error, inconsistency, deviations exist and will be strengthened. Feedback from the central level to district and Upazila levels and below are/will be provided during the supportive supervision visits (mentioned in the sub-section on 'supervision') as well as through e-messages. The data analysis system at the central, district, and Upazila levels will inform about any unusual deviations in disease trend. The respective level/reporting unit will initiate appropriate response, as needed.

Indicator results (performance) are/will be published by the NMEP on the MMIS every 6 months or year dependent on frequency of reporting.

In all elimination districts, case-based surveillance is being rolled out and strengthened. Case investigation and focus investigation forms will be used for the purpose followed by updating the national malaria case register and focus register. The investigation forms, registers will be standardized and uploaded on MMIS. Capacity will be built at all levels regarding data entry, analysis, interpretation, and feedback. Monthly reporting including 'zero reporting' is expected from all reporting units/service delivery points. [Detailed surveillance related particulars, including but not limited to, case and focus investigation, classification, response actions and requisite forms, are described in the National Surveillance Manual, 2021].

**Routine Reporting in 51 'non-endemic' districts (and a few 'non endemic' areas within endemic districts) [418 Upazilas]:** In 'non-endemic' districts, the data flow to malaria MIS is currently very limited and episodic. Advocacy with senior health authorities at Division and District levels are ongoing in addition to trainings of all medical and paramedical personnel of public sector health facilities at district and Upazila levels. All civil surgeons, UHFPOs, MOs, statisticians, MTs, nursing cadres will be trained. Capacity building of HIs, AHIs, HAs, CHCPs is envisaged besides provision of RDTs and antimalarials. In addition, advocacy and orientation of Armed Forces and other security agencies is envisaged besides mapping and orientation of private sector.

In these districts, the data flow and feedback mechanisms will be initiated progressively, and the system will be similar to the elimination districts, i.e., public sector health facilities at district and Upazila levels will be responsible for malaria data collection, aggregation, analysis and reporting through malaria MMIS. Data recording and reporting forms, registers will be same as in elimination districts. Monthly reporting including 'zero reporting' is expected from all reporting units/service delivery points and access to MMIS will be given to all concerned. Case-based surveillance will also be initiated.

### **7.3 Malaria Management Information System**

A computerized web-based malaria MIS is fully functional that produces routine reports for every level and entity from Upazila level and upwards. Internet and computers are available at Upazila level and

above levels. Data entry is the responsibility of the Statisticians at Upazila level. In addition, an electronic copy of the aggregated report (in excel) is also prepared at Upazila level and transmitted upwards for data verification. The paper versions of aggregated forms/registers are available at Upazila level and below. Data checks/validation are/will be carried out during data aggregation and data entry. All efforts are/will be made to reconcile any issues related to delay in data reporting and or obvious data inconsistencies during data entry.

Drawing on the MMIS, reports, graphics are generated for onwards transmission to the higher levels and donor by the central level as well as for dissemination to and discussions with the reportees and relevant stakeholders regularly. Such reports are expected to be generated on weekly basis in elimination settings, going forward. Such data is incorporated in progress updates, annual reports.

The partner NGO also follows the similar MIS. A web-based project MIS is fully functional wherein data entry is carried out at Upazila level for upwards transmission of NGO data. A paper based monthly aggregated form is submitted to UHC by the designated date manually.

**Malaria MIS (MMIS):** Current malaria MIS will transition to an appropriate platform and linked to the national DHIS2 based HMIS. The MMIS will include case management data from all levels and sectors, including those from community health workers/volunteers with partner NGOs and private sector sites. The NMEP has already initiated the process with technical assistance from the WHO for pilot. The MMIS will include customization of the WHO malaria elimination dashboard with aggregated data reporting system, case-based tracking system with unique identifiers. The dashboard is envisaged to present outputs/outcomes/impact as well as important reports and graphics with a provision to go to a granular level (village) level, and analysis for action. User-friendly input/output forms, data entry and flow points and the nature of interface are being finalised. Installation and user manuals will be created in Bangla. Maintenance/any requisite update will be responsibility of the NMEP through technical assistance. The MMIS will also support all aspects of case investigation, case classification, focus investigation and focus classification and response in all elimination settings. Case-based surveillance related data will be entered on MMIS by means of App- or SMS-based by the reporting level. Spatial mapping using appropriate applications will also be linked to identify cases and foci. The legacy data of the existing reporting system will be imported to the updated MMIS. Necessary capacity building of concerned staff (including partner NGO and relevant others at all levels) will be carried out on software application, data reporting and analysis.

#### **7.4 Data use and Dissemination**

The NMEP takes overall responsibility for data analysis, synthesis, interpretation. Data is/will be used for strategic planning, necessary actions to maximize programme performance and impact. The NMEP (in coordination with partner NGO) will disseminate results, lessons learned to MoHFW, donors and partners (six-monthly and annual reports). Additional information products based on the reported data will be considered for dissemination as well. Data is and will be used for development of investment cases, concept notes, advocacy/media products targeting political leaders/administration, relevant ministries, donor and partner agencies and media, as appropriate.

#### **7.5 Data Storage**

At central level, all programmatic data is/will be stored on hard drives and 'cloud storage'. Such data (and logistics related data) will be maintained indefinitely. Paper based data (forms, registers, reports, etc.) are/will be maintained for 10 years at respective levels safely and securely. [All financial data are maintained for 10 years for review and audit purposes]. The paper-based data will be made available during supervision, review meetings, evaluations for quality check/assessment/ audit/ analysis as well as subnational elimination verification and at the time of WHO certification.

**National Health Data Warehouse:** The first fully functional component of Bangladesh's National Health Data Warehouse was rolled out in 2011. Since then, the system has been gradually expanded,

and eventually it will cover all areas of the health sector. With the support of the development partners, the MoHFW has initiated development of a central electronic data repository for national health data, called the National Health Data Warehouse. The system is based on the District Health Information System, version 2 ('DHIS2') – an open-source software platform for reporting, analysis, and dissemination of data for health programmes. The core development of the DHIS2 platform is supported by the GF (amongst others), the WHO and other UN agencies. So far, the move to the DHIS2 based HMIS has resulted in dramatically reducing administrative burden as more and more public sector health facilities now report most routine information through HMIS. It has also resulted in better services as health workers can now use individual records to track selected patients. The openly accessible electronic data repository, with multiple interoperable datasets from different departments and vertical programmes, has greatly supported policymakers. The system covers aggregated data (routine health facility data, staffing, equipment, infrastructure, population estimates), and event data (disease outbreaks, survey/audit data, patient satisfaction surveys, longitudinal patient records, etc.). HMIS can capture data linked to any level in an organisational hierarchy, any data collection frequency, and has high degree of customization at both the input and output side. The HMIS includes easy-to-use analytics through tailored dashboards, charts, pivot tables and maps, and can be extended with Apps or used by third-party software through an open Web-Application Programming Interface. The NMEP MMIS will be linked to the National Health Data Warehouse.

## **7.6 Data Quality Assurance**

Data quality assurance (DQA) system will verify and validate the quality of data and thereby provide information on possible needs to improve the recording/reporting system. DQA will focus on the quality of the recorded, reported, and aggregated data and will seek to identify and quantify any errors. The NMEP will continue to address different dimensions of data quality<sup>54</sup>, viz., completeness, timeliness, accuracy, reliability, precision, and integrity, to ensure strategic planning and targeting of interventions. Completeness focuses on all-inclusive and not partial recording/reporting. A special emphasis is/will be on complete data collection, aggregation and reporting in each month from various reporting units. Timeliness signifies up-to-date data and timely availability, as needed. Accuracy signifies that the data reflects the reality as designated to measure. Keeping data errors to the minimum at the time of recording, aggregation, reporting at different levels is emphasized to improve accuracy and entails thorough checks at all levels. Reliability signifies that the data does not change according to who is recording/collecting/using and when or how often data is used. Consistency in data recording/reporting with standardized tools such as, forms, registers, and manual/guidelines coupled with trainings are being continuously improved thereby ensuring reliability. Precision signifies that the data measures what is intended to be measured. Integrity signifies that data is protected from deliberate bias or manipulation besides maintaining confidentiality according to national and/or international standards.

Data will be thoroughly checked at every reporting level to ensure the above-mentioned data quality dimensions. Necessary clarifications will be sought, and corrections made as required and within the strict timeframes set out for reporting. The DQA system will consist of different components: logical cross-check of data off site; on site data verification at service delivery points and selected beneficiaries; supportive supervision visits; and built-in checks in MMIS (to identify any error and guide valid entry). In addition, the following activities will also support and inform DQA: performance review meetings at community, Upazila, district levels and at central level with participation by the NMEP and partner NGO, other partners and stakeholders, as appropriate.

## **7.7 Supportive Supervision**

The NMEP has established and strengthened supportive supervision as a key component of M&E over the years with feedback as integral part of this supervision, which will continue. Supportive supervision is carried out for process evaluation; to assess, motivate and guide personnel, health worker/volunteers; to strengthen knowledge and skills; and to provide feedback in relation to quality delivery of services; as well as logistics matters. A major focus is/will be on: identification and resolution of bottlenecks and challenges; ensuring timely collection and submission of quality reports and feedback; as well as

meeting various training, funding, logistics needs. Supervision from central and district level to public sector health facilities and community health care providers (health worker/volunteer) with CCs and partner NGOs as well as private sector will be strengthened to ensure analysis and use of data by local levels and follow-up of recommended actions. Both GoB/NMEP and partner NGOs follow a supervision calendar with a checklist. During visits to health facilities and district offices, central/district level supervisors check that malaria data/information registers are kept up to date, with all fields completed; data on reporting forms and data entry on web-based MIS correspond to the information in registers; graphs and tables are up to date; and discussions are held about interpretation of the trends and potential actions to be taken. Public sector health facility staff will be encouraged to investigate all inpatient malaria cases as well as any malaria related deaths. Joint review and supervision by NMEP and partner NGO will be further improved.

## 7.8 Programme Review, Evaluation, Survey

Programme review, evaluations, surveys and special studies are envisaged at periodic intervals to understand effectiveness of programme towards achievement of targeted outputs/coverage, outcomes and impact relative to plan, and efficiency in terms of resource utilization, integration/timeliness of activities. Programme reviews will also inform strategy development, update, and programme planning.

**Internal programme review:** Internal review meetings are held periodically at central, district and Upazila levels to monitor progress in programme implementation.

*Annual review and planning meeting at central level:* An annual review and planning meeting at central level is organized by the NMEP. The participants include Central NMEP Programme staff, SMOs, Civil Surgeons, UHFPOs and/or their designated representatives, MOCS, MODC, partner NGOs, the WHO, and representatives of other partner agencies. The key purpose of the meeting is to:

- review activities and reported data from public sector, partner NGOs as well as private sector (programmatic, and logistics related)
- share best practices, lessons learned; and identify gaps and strengthening measures
- review coordination and capacity building needs
- plan for the coming year.

*Quarterly review and planning meeting at central level.* Quarterly review meetings at central level are organized by the NMEP, which will continue. The participants include public health authorities/staff from various levels including selected Civil Surgeons, UHFPOs and/or their designated representatives, partner NGOs, and relevant stakeholders and partners. Programme activities like diagnosis and treatment and distribution of LLINs, BCC and trainings as well as disease trends at district/Upazila level are/will be discussed. Progress related to implementation of action plans is/will be reviewed. These meetings will support further streamlining of programme planning, implementation, M&E at field level.

In addition, the NMEP also conducts monthly review meetings at central level involving mainly SMOs, partner NGOs and selected district and Upazila level officials.

*Monthly review meeting at district level.* Monthly meetings at the Civil Surgeon's Office are held at district level, which will continue. These meetings are chaired by civil surgeon and attended by MOCS/MODC, UHFPO, SMO, Statistician, Nurse, and HI, besides NMEP and partner NGO and other relevant stakeholders. Progress related to the implementation of action plans is/will be reviewed for discussing way forward with actionable points.

*Monthly review meeting at Upazila level.* Monthly review meetings are held at Upazila level, which will continue. These meetings are chaired by UHFPO and attended by doctors, nurses, statisticians, HI, AHI, HA and CHCP as well as partner NGO representatives from Upazila level. Progress related to the implementation of action plans is/will be discussed and even sample reports are checked against registers. Direction is/will be given on issues, as required.

Monthly, quarterly and annual review meetings are held by partner NGOs at Upazila, district and central levels. These review meetings are attended by the collaborating NGOs, concerned NMEP staff including SMOs, district and Upazila health authorities, as appropriate. In these meetings, programmatic achievements of NGOs as well as challenges and gaps will be presented and analyzed. Partner NGO also organizes monthly meetings at Upazila level attended by Shasthya Shebika/Shasthya Kormi as well as the GoB representatives from various levels.

**External ‘Malaria Programme Review’:** A joint malaria programme review mission (JMM/MPR) comprising external experts (national, international) is organized with support by the WHO, the Global Fund and GoB. The JMM is facilitated by the NMEP, partner NGO and concerned stakeholders covering all aspects of the programme. The MPR is conducted every 3-4 years. An assessment of M&E is an important component, amongst others. Donors like the GF as well as partner agencies, place increasing emphasis on outcomes and impact achieved with domestic and external resources, through JMM. The findings of the evaluations will be shared with members of the National Malaria Elimination Task Force (NMETF), Malaria Technical Committee, as well as implementing partners, development partners, donors, national and international organizations, media, as appropriate.

**Surveys:** Surveys are and will be carried out periodically for gathering information about target populations of interest, which are not otherwise available through routine reporting or surveillance. Population-based surveys will continue to provide necessary data for many indicators, example, outcome indicators. Indicators measured by means of household/population-based surveys include: ‘insecticide treated net utilization’ (overall and amongst children and pregnant women) and ‘LLIN coverage rate’ as well as ‘treatment seeking preferences’, malaria related knowledge, attitudes, beliefs and practices (KABP) amongst beneficiaries. In addition, other surveys, example, health facility-based surveys will also be designed, as needed, by the NMEP in consultation and coordination with the WHO and partner NGO, individual experts and Malaria Technical Committee. The surveys are/will be conducted with technical assistance by the WHO and or contracted out to independent agencies with funding by the GF and/or GoB. Survey reports will be disseminated to key stakeholders and partners. Survey to elucidate/assess the role of the private sector in malaria case management is envisaged.

## **7.9 M&E Coordination Mechanisms**

M&E coordination mechanisms between the NMEP and partner NGO and others are in place (the implementation arrangements with coordination are appended as Annex-5). The mechanisms involve regular review and planning meetings at central, district, Upazila levels, joint supervision, coordinated surveys/studies, frequent communication for problem solving and sharing ideas and experiences, which will continue and improved.

Monthly, quarterly and annual review meetings are held by partner NGOs at Upazila, district and central levels. These review meetings are attended by the concerned NMEP staff including SMOs, district and Upazila health authorities.

*Malaria Technical Committee.* The Malaria Technical Committee guides, oversees and reviews strategy implementation, development of/updating policy, strategy, guidelines related to various technical aspects as well as M&E. The committee meets once a quarter and more, if required.

*Country Coordination Mechanism (CCM).* The Bangladesh-CCM (BCCM) with the Honorable Minister for Health and Family Welfare in chair, is the key partnership and coordination mechanism in relation to the GF funding for malaria. BCCM plays an oversight role for review of progress of programme implementation by the NMEP and partner NGO.

*National Malaria Elimination Task Force (NMETF).* A National Malaria Elimination Task Force (NMETF) with the top political level in chair is envisaged for high-level advocacy for sufficient and sustained resource mobilisation for malaria elimination and prevention of re-establishment of malaria

transmission. This NMETF is expected to provide strategic direction drawing on oversight and M&E feedback from various stakeholders, partners.

#### **7.10 M&E Capacity development**

Capacity development of staff, community health worker/volunteer at various levels on M&E is an ongoing activity. The national training plan includes capacity building particulars for all levels using comprehensive curricula. M&E capacity is/will be reviewed periodically through rapid capacity needs assessment (for NMEP and partner NGO), and the findings will inform a need-based M&E training plan for various cadres/volunteers to institutionalize M&E capacity. The plan will be updated including learning objectives, agenda, modules, facilitator guides, pre- and post-tests, checklists for overall assessment of training and trainers and disseminated for use at district and Upazila levels. Necessary technical assistance will be sought from the WHO and other partner agencies, as appropriate. The M&E training/re-training sessions will be tailored for specific groups drawing on need assessment. Overall, the learning areas will focus on the following: M&E fundamentals; Indicator framework; Data sources and data collection/reporting tools; Routine data recording, aggregation, analysis (computer assisted data entry and analysis); Data flow (vertical, lateral) within and across the public, partner NGO, private sector, others; Data quality assurance; Data dissemination and use (generation and use of information products, reports) for planning, decision making and resource mobilization; Evaluation, studies, and research; National HMIS and MMIS. Coordination between NMEP and partners will be strengthened to ensure that training activities are not duplicated.

## **7.11 M&E Budget**

Resource requirements for the NSP 2024-2030 is estimated that includes M&E budget estimate. The estimation of the requirements will remain dynamic. Current NMEP budget, current GF budget, previous estimations, actual expenditures, the GoB/the GF and market rates provided the basis for estimations. The estimates do not include costs for infrastructure and its maintenance, health workforce across all levels fully, which are covered by GoB sources.

## CHAPTER-8: COST OF NSP 2024-2030

### 8. COST OF NSP 2024-2030

The NSP 2024-2030 will be implemented under the MoHFW flagship programme HNPSP. The resource requirements for NSP 2024-2030 will be USD 242,865,543 (1 USD = 100.1 BDT). Most of the resource need is expected to be covered under the current GoB HNPSP OP July 2017-Jun 2023 and upcoming OP for the next period. In addition, support by external partners, especially the GF will remain extremely crucial. Technical assistance by the WHO will also be vital. The NMEP/GoB will continue to explore resources from all sectors to fulfil the total resource needs for NSP 2024-2030.

Table-17 presents summary of objective-wise resource requirements for NSP 2024-2030.

Estimation of resource requirements for malaria is challenging especially due to the complex malaria epidemiology as well as numerous multi-dimensional considerations and assumptions keeping in mind the elimination and prevention of re-establishment. Therefore, the estimation of resource requirements will remain dynamic. Current NMEP budget (OP budget), current GF budget, previous estimations, actual expenditures, the GoB/the GF and market rates provided the basis for various estimations. Effort is also made for efficiencies, cost-effectiveness, and value for money. The estimates do not include costs for infrastructure and its maintenance, health workforce across all levels fully, which are covered by GoB sources.

Table-17: Year-wise estimated resource (budget) requirements for NSP 2024-2030

| Objectives/<br>Strategy  | Sum of<br>Total<br>Amount<br>Year-1<br>(USD) | Sum of<br>Total<br>Amount<br>Year-2<br>(USD) | Sum of<br>Total<br>Amount<br>Year-3<br>(USD) | Sum of<br>Total<br>Amount<br>Year-4<br>(USD) | Sum of<br>Total<br>Amount<br>Year-5<br>(USD) | Sum of<br>Total<br>Amount<br>Year 6<br>(USD) | Sum of<br>Total<br>Amount<br>Year 7<br>(USD) | Sum of<br>Total<br>Amount<br>Year 1-7<br>(USD) |
|--|--|--|--|--|--|--|--|--|
| <i>Objective-1:<br/>Ensure<br/>universal<br/>coverage by<br/>early case<br/>detection<br/>using quality<br/>assured<br/>parasitologic<br/>al test and<br/>prompt and<br/>effective<br/>treatment of<br/>all<br/>confirmed<br/>malaria<br/>cases<br/>according to<br/>national<br/>treatment<br/>guidelines<br/>through<br/>2030.</i> | 29,702,080                                   | 20,912,194                                   | 21,982,688                                   | 24,046,759                                   | 25,325,991                                   | 28,461,677                                   | 30,149,898                                   | 80,581,288                                     |

| <b>Objectives/<br/>Strategy</b>   | <b>Sum of<br/>Total<br/>Amount<br/>Year-1<br/>(USD)</b> | <b>Sum of<br/>Total<br/>Amount<br/>Year-2<br/>(USD)</b> | <b>Sum of<br/>Total<br/>Amount<br/>Year-3<br/>(USD)</b> | <b>Sum of<br/>Total<br/>Amount<br/>Year-4<br/>(USD)</b> | <b>Sum of<br/>Total<br/>Amount<br/>Year-5<br/>(USD)</b> | <b>Sum of<br/>Total<br/>Amount<br/>Year 6<br/>(USD)</b> | <b>Sum of<br/>Total<br/>Amount<br/>Year 7<br/>(USD)</b> | <b>Sum of<br/>Total<br/>Amount<br/>Year 1-7<br/>(USD)</b> |
|---|---|---|---|---|---|---|---|---|
| <b><i>Objective 2:<br/>Ensure<br/>universal<br/>coverage of<br/>population at<br/>risk in<br/>targeted<br/>areas with<br/>appropriate<br/>preventive<br/>interventions<br/>through<br/>2030.</i></b>  | 588,116   | 371,225   | 5,562,996   | 529,174   | 444,831   | 5,769,565   | 404,064   | 13,669,972  |
| <b><i>Objective 3:<br/>Strengthen<br/>context-<br/>specific<br/>surveillance<br/>in all<br/>malaria<br/>settings and<br/>outbreak<br/>preparedness<br/>and response<br/>through<br/>2030.</i></b>   | 690,780   | 659,399   | 658,709   | 606,932   | 778,683   | 693,254   | 741,674   | 4,829,431   |
| <b><i>Objective-4:<br/>Enhance<br/>Social and<br/>Behaviour<br/>Change<br/>Communication (SBCC)<br/>with special<br/>emphasis on<br/>community<br/>engagement<br/>and<br/>mobilisation,<br/>context-<br/>specific<br/>communication<br/>and<br/>advocacy for<br/>enabling<br/>environment</i></b> | 1,049,307   | 875,668   | 919,451   | 812,758   | 1,034,070   | 999,975   | 1,207,502   | 6,898,731   |

| <b>Objectives/<br/>Strategy</b>  | <b>Sum of<br/>Total<br/>Amount<br/>Year-1<br/>(USD)</b> | <b>Sum of<br/>Total<br/>Amount<br/>Year-2<br/>(USD)</b> | <b>Sum of<br/>Total<br/>Amount<br/>Year-3<br/>(USD)</b> | <b>Sum of<br/>Total<br/>Amount<br/>Year-4<br/>(USD)</b> | <b>Sum of<br/>Total<br/>Amount<br/>Year-5<br/>(USD)</b> | <b>Sum of<br/>Total<br/>Amount<br/>Year 6<br/>(USD)</b> | <b>Sum of<br/>Total<br/>Amount<br/>Year 7<br/>(USD)</b> | <b>Sum of<br/>Total<br/>Amount<br/>Year 1-7<br/>(USD)</b> |
|--|---|---|---|---|---|---|---|---|
| <i>through<br/>2030.</i>   |   |   |   |   |   |   |   |   |
| <b><i>Objective-5:<br/>Ensure<br/>strengthened<br/>program<br/>management<br/>, monitoring<br/>&amp; evaluation<br/>and<br/>partnership<br/>and<br/>coordination<br/>through<br/>2030.</i></b> | 4,595,782   | 4,738,526   | 4,897,822   | 5,210,457   | 5,388,736   | 5,781,333   | 5,721,160   | 36,333,815  |
| <b><i>Objective-6:<br/>Carry out<br/>research to<br/>guide<br/>strategy and<br/>policy to<br/>address<br/>programme<br/>gaps and<br/>challenges<br/>through<br/>2030.</i></b>                  | 43,105  | 104,739   | 47,523  | 15,475  | 52,394  | 27,311  | 57,764  | 548,311   |
| <b><i>Objective-7:<br/>Prevent re-<br/>establishmen<br/>t of malaria<br/>transmission<br/>in malaria-<br/>free areas.</i></b>  | 3,996   | -   | -   | -   | -   | -   | -   | 3,996   |
| <b>Grand Total</b>   | <b>36,673,165</b>                                       | <b>27,661,751</b>                                       | <b>34,069,188</b>                                       | <b>31,321,555</b>                                       | <b>33,024,706</b>                                       | <b>41,833,115</b>                                       | <b>38,282,062</b>                                       | <b>242,865,543</b>  |

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## Annex-2: Assessment report of malaria upsurge in 2022

Epidemiological and Entomological Analysis in Lama, Alikadam and Thanchi upazilla of Bandarban district.

Out of 64 districts 13 districts are malaria endemic. In 2020, out of 13 districts, Bandarban reported 68% of the total reported cases (Total cases reported in 2020: 6,130). In 2021, out of total 7,294 reported cases, Bandarban reported 71.7% cases. In 2022 January to April monthly total malaria cases (both Pv, Pf and severe malaria) increased comparing to January to April 2021. It was found that cases mainly increased in Bandarban during this January to April 2022. In Bandarban, cases and deaths are on the downward trend (in 2014 total cases and deaths were 24,208 and 12 respectively whereas in 2021 total cases and deaths were 4,166 and 2 respectively). Not all upazilla under Bandarban district reported equal number of cases. Lama, Alikadam and Thanchi reported 75% of the total reported cases from 2019-2021. In 2022 from January to April the total contribution of malaria cases from Bandarban to total National cases ranges from 69 – 94%. As mentioned above cases reported from January to April 2022 are on increase comparing to January to April 2021. In 2022 in Lama, Alikadam and Thanchi reported 218%, 193% and 68% increase in the number of cases comparing to January to April 2021.

Based on this situation above, a team comprising NMEP and district health authorities were constituted.

**Objective:** To carry out a detailed mapping of the malaria cases and epidemiological and entomological analysis in Lama, Alikadam, and Thanchi Upazila of Bandarban Hill Districts.

Activities done (with timeline)

- 26 May 2022: Dialogue with field health workers in Lama (GO-NGO)
- 27 May 2022: Field visit (Lama)–
- Vill - Chingcum Jiri Mro Para, Union – Rupashi para, Ward 6
- Merakhola Muslim Para, Lama Sadar, Ward 2
- 28 May 2022:
- Field Visit (Alikadam)– Vill - Adu Karbari Para, Union – Chykhong, Ward – 9 (Alikadam)
- Dialogue with field health workers in Alikadam (GO-NGO)
- 29 May 2022: Field visit – Repar Para Bazar Marma Para, Union – Chykhong, Ward 1 (Alikadam)
- 31 May 2022:
- Field visit – Vill – Rumbek, Union – Thanchi, Ward – 5
- Dialogue with field health workers in Thanchi (GO-NGO)

Field visit sites with number of population, active LLIN and reported cases in 2021 and 2022 (up to May)

- Lama: Vill - Chingcum Jiri Mro Para: Total Population – 315; Active LLIN – 130; Case 29 (2021); Case 8 (2022)
- Lama: Vill: Merakhola Muslim Para: Total Population – 848; Active LLIN – 458; Case 6 (2021); Case 5 (2022)
- Alikadam: Vill - Adu Karbari Para; Total Population – 120; Active LLIN – 97; Case – 16 (2021); Case 11 (2022)
- Alikadam: Vill - Repar Para Bazar Marma Para; Population – 147; Active LLIN – 91; Case – 0 (2021); Case 13 (2022)
- Thanchi: Vill – Rumbek; Total Population – 66; Active LLIN – 57; Case – 31 (2021); Case 7 (2022)

From the analysis it was found that in Lama monthly cases from January to April 2022 has crossed the epidemic threshold (Mean+2SD, C-Sum and 3rd quartile). It was evident from the above that cases are highly endemic in the three upazillas. Most of the people are either Jhum cultivators or famers. There are adequate number of LLINs available in the 3 upazillas.

### **Summary findings**

- >95% cases are from Jhum cultivators/forest goers
- Mro population mostly affected. Contributing factors are -
  - Low education, less aware about malaria including prevention
  - Language barrier
  - Very little or no dress
- Use of LLINs – low (Jhum cultivators have extra LLIN but don't carry, negligence of using LLIN). Hang LLIN late)
- Different types of housing – High floor made of bamboo (spaces in between)
- Incomplete dose of antimalarials
- Difficult to reach areas
- Feel suffocated under LLIN
- Low socioeconomic condition
- Sometimes not willing to test and treat as they don't think fever is due to malaria
- Many breeding sites with full of larva
- Mosquito bite during day time in Jhum cultivation areas
- Students staying in hostel are being affected

### **Recommendations**

- Orientation to Jhum cultivators/forest goers – in festive mode (innovative way)
- Involvement of headman/karbari – Organize monthly vill/para level meeting in the affected areas (Mro areas specifically). Formation of village committee
- Special camping/crash programme – Mass Screening and treatment, awareness meeting and distribution of LLINs as needed
- Entomological survey in Jhum cultivator areas – to understand day time biting behaviour
- Use of mosquito coils/repellant (may be tried)
- Intersectoral collaboration – to organize meeting with Upazila administration, members, chairman and headman
- Non-compliance issue: Modified DOTs (involvement of karbari/family members)
- Orientation of project people to take appropriate health measures before start of the project
- Provide malaria prophylaxis to Jhum cultivators/forest goers (?)
- Vector bionomic study – routine works in sentinel sites
- Hostel based LLIN distribution
- Volunteer (recruited with the support of WHO)/palli Chikitshak training
- Meetings with teachers/students

### **Actions taken**

- Letter sent to concerned Civil Surgeon and UHFPOs by LD CDC and Director DC to alert them about the situation and to take appropriate actions
- Orientations to field staff (HIs, AHIs, HAs and CHCPs) in 3 upazillas done
- Distribution of drugs, diagnostics and LLINs to Bandarban. So far, the following total amount distributed -
  - LLINs 53,500 pcs; RDTs 52,000 tests; ACTs 12,840 courses; CQ 26,000 tabs; PQ 10,700 tabs
- No reported stock out of drugs and diagnostics
- All newly appointed doctors have been trained on malaria EDPT
- RRT training-completed
- Staff nurse training – completed
- Para Karmi (UNICEF) training- completed

### Annex-3: List of research topics

A tentative list of research topics is presented below.

- Assessment of systemic preparedness for elimination and POR.
- Understanding socio-demographic and disease dynamics, the vector within transmission hotspots with special emphasis on forest-based transmission.
- Epidemiological and entomological assessment of the impact of halting LLIN distribution in communities that have not had any malaria cases for 3 years or more [LLINs will need to be kept on standby in case of resumption of transmission].
- Introduction of innovative tools for vector control and personal protection (Topical insect repellent; Insecticide treated hammock nets; Permethrin treated clothing/bed sheets, Screening of forest-based dwellings with insecticide treated netting).
- Integrated vector management including source reduction measures through multi-sector participation (local authorities, community, others).
- Assess the benefits of attractive toxic sugar bait (ATSB) for vector control; larval source management.
- LLIN Retention and LLIN Utilization survey and overall KABP among different risk groups.
- Study bio efficacy of LLINs.
- Pfhrp2/3 deletions and way forward.
- Impact evaluation of Targeted drug administration, IPT, AFS.
- Quantify importation and local spread of malaria (collection of travel data from confirmed cases, collection of dried blood spots and parasite genetic analysis from confirmed cases; and travel and genetic analysis to identify imported cases and local clusters of transmission for action plan to limit importation and reduce local spread.
- Genetic surveillance across endemic areas to identify parasites imported from other countries, in particular to: identify and quantify parasites with genetic markers of artemisinin and ACT-resistant *P. falciparum* from Myanmar in the CHT districts and Cox's Bazar. Where high prevalence of resistance markers is found, follow up with TES in the same location.
- Determine the prevalence of asymptomatic malaria infection. Molecular surveillance for asymptomatic malaria transmission in elimination areas.
- Assessment of 3-day course compliance of ACT; and tracking repeated malaria infection on same person even after taking full course.
- Assessment of delayed clinical response from field level to get early indications if ACT is adequately working or not.
- Assessment of 14-day course compliance of primaquine in *P. vivax* patients; and tracking relapses on same person even after taking full course.
- Conduct population-based surveys with PCR in selected sites in elimination settings.
- Assess treatment seeking behaviour and adherence to National Treatment Guidelines by health care providers and patients; and gender-related dynamics, decision-making, resource allocation and financial authority within households.
- New diagnostic technologies; new antimalarial regimens.
- G6PD testing in sentinel sites and map G6PD status; and validation of G6PD test kit use at community level.
- Detection of suspected *P. knowlesi* cases with PCR among jhum cultivators, forest goers/settlers/other mobile and migrant populations with proximity to monkeys (macaques).
- Assessment of risk of future malaria epidemics in the FDMN camps in Cox's Bazar district to design package of interventions for response.
- Assessment of implementation of different interventions at community health worker and health volunteer and its impact on malaria service delivery and surveillance. [Profile and work hour allocation, challenges & barriers].
- Evaluation of distribution and frequency of infections in the asymptomatic population in areas with intensified case management and vector control besides others will also be considered.
- Assessment of risk exposure beyond the peri-domestic setting.

- Assessment of residual malaria transmission.
- Patterns of antibiotic prescription for undiagnosed fevers at district and sub-district healthcare facilities (DH, UHC, USC, CC) and its implications for case detection of malaria.
- Assessment of measures to effectively address HR issues especially in under-serviced areas to inform policy/strategy to attract and retain skilled healthcare professionals in such settings.
- Understanding the functioning of HAs, CHCPs, MHVs, their competence levels, and the workforce management and training needs of this cadre.
- Elucidate the role of the private sector in malaria case management; determine the appropriate approaches and incentives to improving case management and surveillance in private sector.
- Ways to strengthen MMIS to capture data from private sector and others and document use of data.
- Comprehensive analysis of mobile and migrant populations and other risk groups to design specific intervention packages.
- Assessment of travel information from people with confirmed malaria to identify routes of importation of malaria and to identify likely transmission hotspots and sources and sinks of spread of malaria.
- Malaria-relevant cross-border population movements with emphasis on adapting innovative strategies for improved coverage.
- Remote sensing to assess risk for difficult to reach populations and barriers to access for high-risk groups.
- mHealth applications (mobile apps for health).
- Anthropological study on health seeking behavior and formative research for appropriate SBCC.
- KABP study with special attention to risk groups (ethnic/occupational groups) in 03 CHT districts for developing/updating NSP, other strategy/guidelines/manual (viz., surveillance, SBCC).
- Impact assessment of SBCC.
- Status of involvement of community to bolster community systems strengthening, coordination and community led monitoring.
- Assessment of impact of COVID-19 on malaria service delivery, surveillance, and M&E.

#### **Annex-4: Outline of subnational malaria elimination report**

Drawing from the WHO guidance on preparing a national elimination report, the tentative outline of subnational malaria elimination report will be as under:

Executive summary

Background and introduction: District information

- Geography and ecological details

- Demographic details

- Economy

- Health profile

- Health systems and organization of health services

Malaria situation

- History

- Epidemiology

- High-risk populations and hard-to-reach areas

- Last indigenous malaria cases and foci

- Entomological aspects of malaria transmission

Organizational structures at district and sub district levels

- Implementation and other partner organizations

Strategies and activities for malaria elimination

- Stratification by receptivity and risk of importation (ward/village/para level) and targeted strategies

  - Diagnosis

  - Case management

  - Vector control

  - Surveillance and response

  - Monitoring and evaluation

  - Operational research (related to the district)

  - SBCC and community engagement

  - Multi-sector collaboration

  - Cross-border coordination and collaboration

  - Legislation and regulations relevant to malaria elimination

  - Programme structures

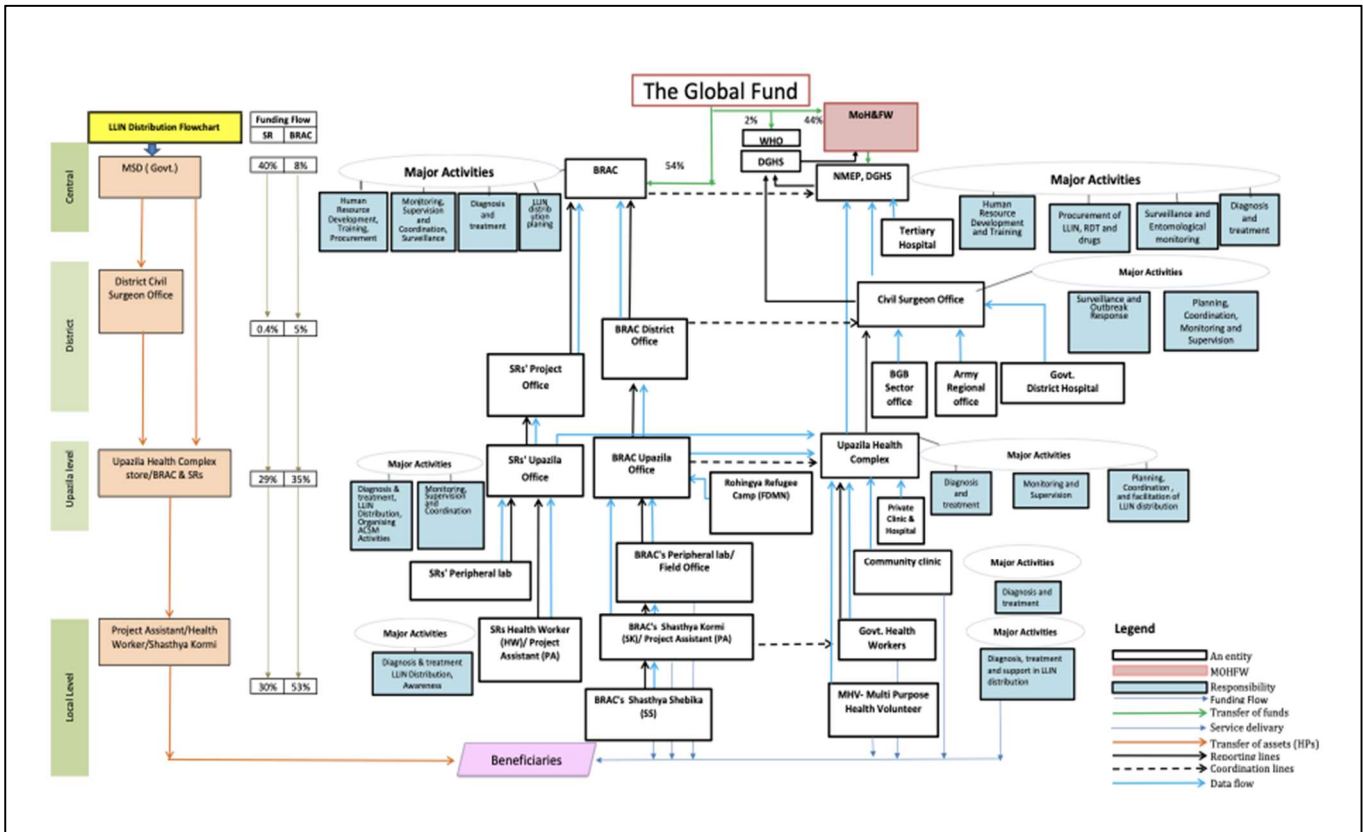
Steps taken prevention of re-establishment of malaria transmission

Budget

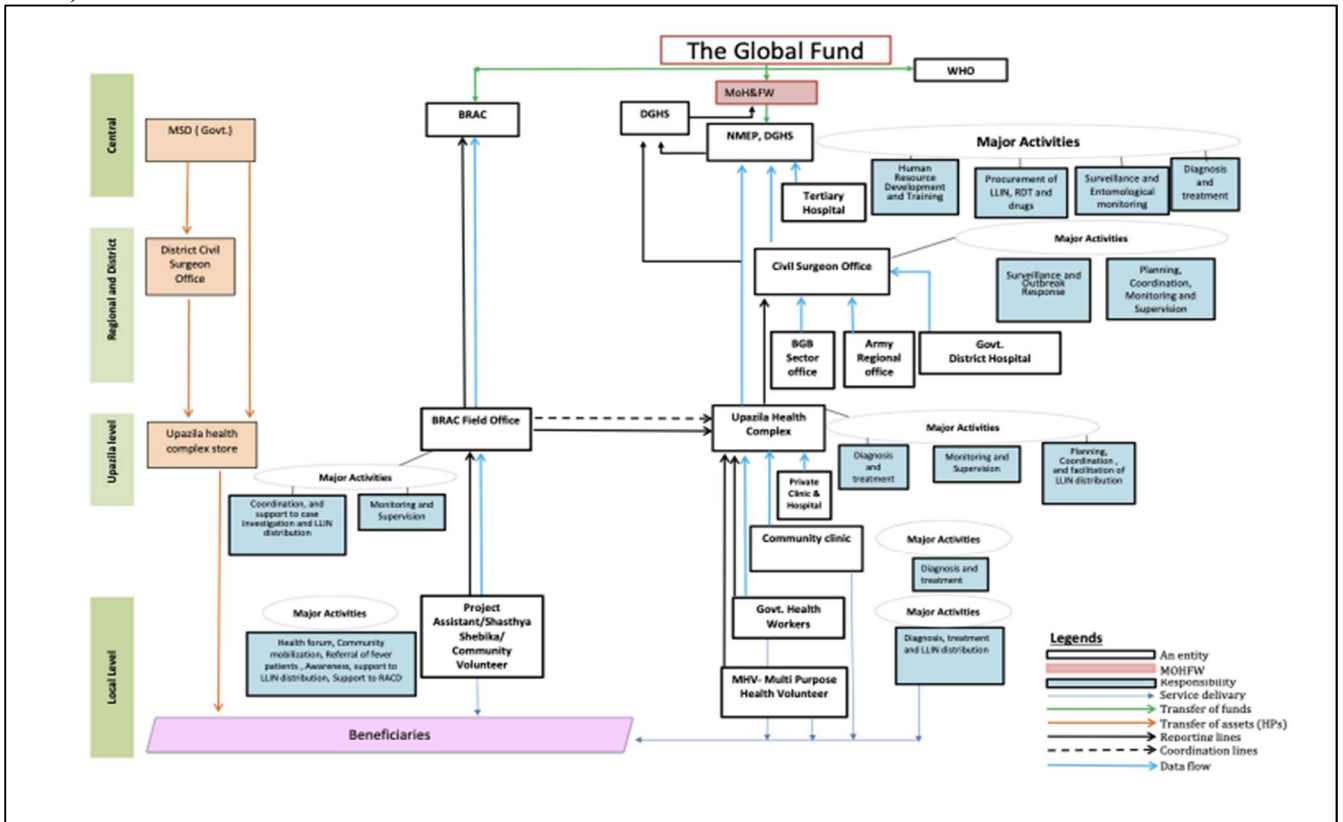
Annexes

References

**Annex-5a: Implementation arrangements in 03 CHT districts and Chattogram, Cox's Bazar**



**Annex-5b: Implementation arrangements in 08 elimination districts (in Mymensingh and Sylhet zones)**



## Annex-6: Indicator Framework

This is being further updated.

<sup>1</sup> Confirmed by population-based reporting from facilities with known catchment areas, very high and reliable case notification and, ideally, full participation of the private sector.

<sup>2</sup> Population and Housing Census 2022. Bangladesh Bureau of Statistics. 2022.

<sup>3</sup> Health Bulletin (2018). Management Information System (MIS), Directorate General of Health Services (DGHS), MoHFW, GoB.

<sup>4</sup> Assessment of Private Sector's Role, Readiness and Performance for Malaria Elimination. NMEP, GoB, Bangladesh. 2019. [Unpublished report].

<sup>5</sup> <https://datacatalog.worldbank.org/dataset/world-development-indicators>;

<sup>6</sup> DGHS (2018). Health Bulletin 2016. Management Information System (MIS), DGHS, Mohakhali, Dhaka-1212. [www.dghs.gov.bd](http://www.dghs.gov.bd)

<sup>7</sup> Bangladesh Health System Review (2015). Health Systems in Transition, Vol. 5 No. 3, 2015; Asia Pacific Observatory on Public Health Systems

and Policies. World Health Organization Regional Office for the Western Pacific.

<sup>8</sup> Geographic Resource Allocation in Bangladesh. Health Economics Unit, MoHFW, Research Paper 21, March 2001

<sup>9</sup> The GDP growth was 2.38% in 2020.

<sup>10</sup> <https://dashboards.sdindex.org/profiles/bangladesh/indicators>

<sup>11</sup> [apps.who.int/nha/database](https://apps.who.int/nha/database)

<sup>12</sup> World Bank (2018). Bangladesh Continues to Reduce Poverty but at Slower Pace. The World Bank. Retrieved 11 April 2018.

<sup>13</sup> Chaudhury, Dipanjan Roy (3 November 2018). "At current pace, Bangladesh to end extreme poverty by 2021". *The Economic Times*. Retrieved 6 November 2018.

<sup>14</sup> Rural poverty in Bangladesh", Rural Recovery Portal.

<sup>15</sup> <https://knoema.com/atlas/Bangladesh/topics/Poverty/Income-Inequality/GINI-index>

<sup>16</sup> [http://hdr.undp.org/sites/all/themes/hdr\\_theme/country-notes/BGD.pdf](http://hdr.undp.org/sites/all/themes/hdr_theme/country-notes/BGD.pdf)

<sup>17</sup> Report of Community consultations on human rights and gender-related barriers to access in the context of malaria in Bangladesh. NMEP. 2020. (Unpublished).

<sup>18</sup> [http://hdr.undp.org/sites/all/themes/hdr\\_theme/country-notes/BGD.pdf](http://hdr.undp.org/sites/all/themes/hdr_theme/country-notes/BGD.pdf)

<sup>19</sup> <https://covid19.who.int/region/searo/country/bd>

<sup>20</sup> GBD (2010). The Global Burden of Diseases Study 2010: Generating Evidence and Guiding Policy. Institute of Health Metrics and Evaluation, University of Washington. [www.healthmetricsandevaluation.org](http://www.healthmetricsandevaluation.org)

<sup>21</sup> Data anomalies due to the misinterpretation of Pf/Pan-specific rapid diagnostic tests in Bangladesh between 2014 and 2016. Annex 2. National Strategic Plan for Malaria Elimination 2017-2021. NMEP, Bangladesh.

<sup>22</sup> Confirmed by population-based reporting from facilities with known catchment areas, very high and reliable case notification and, ideally, full participation of the private sector.

<sup>23</sup> [http://www.communityclinic.gov.bd/admin/content\\_uploads/CHW%20strategy.pdf](http://www.communityclinic.gov.bd/admin/content_uploads/CHW%20strategy.pdf)

<sup>24</sup> WHO Guidelines for malaria, 14 March 2023. Geneva: World Health Organization; 2023 (WHO/UCN/GMP/ 2023.01). License: CC BY-NC-SA 3.0 IGO..

<sup>25</sup> Ley B, Kibria MG, Khan WA, Auburn S, Phru CS, Jahan N, et al. (2020) Wide range of G6PD activities found among ethnic groups of the Chittagong Hill Tracts, Bangladesh. *PLoS Negl Trop Dis* 14(9): e0008697. <https://doi.org/10.1371/journal.pntd.0008697>.

<sup>26</sup> Report of LLIN utilisation survey. NMEP, BRAC (unpublished).

<sup>27</sup> Utilization of LLIN, knowledge and practices on malaria among the people in malaria endemic districts of Bangladesh and Forcibly Displaced Myanmar Nationals (FDMN) study report 2021. icddr.b.

<sup>28</sup> IVM is 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 [[http://www.who.int/neglected\\_diseases/vector\\_ecology/ivm\\_concept/en/](http://www.who.int/neglected_diseases/vector_ecology/ivm_concept/en/)].

<sup>29</sup> A framework for malaria elimination. Geneva: World Health Organization; 2017. Licence: CC BY-NC-SA 3.0 IGO.

<sup>30</sup> Sinha et al. Mapping the travel patterns of people with malaria in Bangladesh. *BMC Medicine* (2020) 18:45 <https://doi.org/10.1186/s12916-020-1512-5>.

<sup>31</sup> Report of TES. NMEP, 2019 (unpublished).

<sup>32</sup> TRAC study (reference?).

<sup>33</sup> Malaria surveillance, monitoring & evaluation: a reference manual. Geneva: World Health Organization; 2018. Licence: CC BY-NC-SA 3.0 IGO

<sup>34</sup> Report of Insecticide Resistance Monitoring. NMEP, 2021 (unpublished).

<sup>35</sup> Insecticides Resistance monitoring by susceptibility test in Alikadam upazila of Bandarban District and Rajasthali upazila of Rangamati District. Report dated 06/04/2022-12/04/2022 [unpublished].

<sup>36</sup> Global plan for insecticide resistance management in malaria vectors (GPIRM). World Health Organization; 2012.

<sup>37</sup> Framework for a national plan for monitoring and management of insecticide resistance in malaria vectors. Geneva: World Health Organization; 2017. Licence: CC BY-NC-SA 3.0 IGO.

<sup>38</sup> <https://www.who.int/publications/i/item/9789241512978>

<sup>39</sup> <https://www.comminit.com/polio/content/defining-social-and-behavior-change-communication-sbcc-and-other-essential-health-commun>

<sup>40</sup> <https://www.usaidrdw.org/resources/tools/sbcc-guidebook>

<sup>41</sup> <https://endmalaria.org/sites/default/files/RBM%20SBCC%20Framework%202018-2030%20English.pdf>

<sup>42</sup> Global framework for the response to malaria in urban areas. Geneva: World Health Organization; 2022. Licence: CC BY-NC-SA 3.0 IGO.

<sup>43</sup> Bangladesh and India share a 4,156-kilometre-long international border, the fifth-longest land border in the world, including 262 km in Assam, 856 km in Tripura, 180 km in Mizoram, 443 km in Meghalaya, and 2,217 km in West Bengal. Six Bangladesh divisions of Mymensingh, Khulna, Rajshahi, Rangpur, Sylhet, and Chittagong are situated along the border. A number of pillars mark the border between the two states. Small demarcated portions of the border are fenced on both sides. [https://en.wikipedia.org/wiki/Bangladesh%E2%80%93India\\_border](https://en.wikipedia.org/wiki/Bangladesh%E2%80%93India_border).

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- <sup>44</sup> A framework for malaria elimination. Geneva: World Health Organization; 2017. Licence: CC BY-NC-SA 3.0 IGO
- <sup>45</sup> Second focused review meeting of the Malaria Elimination Oversight Committee (MEOC): report of a virtual meeting, 28 June–1 July 2021. Geneva: World Health Organization; 2021. Licence: CC BY-NC-SA 3.0 IGO.
- <sup>46</sup> Malaria surveillance, monitoring & evaluation: a reference manual. Geneva: World Health Organization; 2018. Licence: CC BY-NC-SA 3.0 IGO.
- <sup>47</sup> WHO Guidelines for malaria, 25 November 2022. Geneva: World Health Organization; 2022 (WHO/UCN/GMP/2022.01 Rev.3). License: CC BY-NC-SA 3.0 IGO.
- <sup>48</sup> Preparing for certification of malaria elimination, second edition. Geneva: World Health Organization; 2022. Licence: CC BY-NC-SA 3.0 IGO.
- <sup>49</sup> *ibid.*
- <sup>50</sup> *ibid.*
- <sup>51</sup> *ibid.*
- <sup>52</sup> *ibid.*
- <sup>53</sup> [http://www.communityclinic.gov.bd/admin/content\\_uploads/CHW%20strategy.pdf](http://www.communityclinic.gov.bd/admin/content_uploads/CHW%20strategy.pdf)
- <sup>54</sup> Data Quality Audit Tool: guidelines for implementation. Chapel Hill, NC, MEASURE Evaluation, 2008 (<http://www.cpc.unc.edu/measure/tools/monitoring-evaluation-systems/data-quality-assurance-tools/dqa-auditing-tool-implentation-guidelines.pdf>).