

# MALARIA PROGRAM REVIEW 2019

## Sindh Thematic Review Report

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## Contents

Abbreviations.....	6
1. Introduction .....	9
1.1 Background.....	9
1.2 Objectives of the MPR.....	9
1.3 Methodology of the MPR.....	9
2. Context of Malaria Control .....	10
2.1 Historical Milestones in Malaria Control.....	10
2.2: Health Services Organization and Management .....	13
2.3 Organizational structure for malaria directorate.....	14
2.4 Key Strategies for Malaria Control .....	16
2.2.1. Goal:.....	16
2.2.2. Objectives: .....	16
2.2.3. Targets: .....	16
2.2.4. Indicators .....	17
2.5. Key partners in malaria .....	21
2.6 Linkages and coordination .....	21
2.7 Conclusions and Recommendations.....	22
Recommendations:.....	22
3. Epidemiology of malaria .....	22
4. Program performance by thematic areas.....	23
4.1 Program management .....	23
4.1.1 Introduction.....	23
4.1.2. Policy .....	23
4.1.3 Organization .....	23
4.1.4 Guidance.....	23
4.1.5 Human resources: training and capacity development .....	24
4.1.6 Strategic and annual planning.....	24
4.1.7 Financing.....	24
4.1.8. SWOT analysis.....	26
4.1.9. Conclusion and Recommendations .....	26
4.2 Procurement and Supply Chain Management.....	27
4.2.1 Policy .....	27
4.2.2 Guidelines.....	27
4.2.3 Registration of products.....	28

## Sindh Malaria Program Thematic Review 2019

4.2.4	Specifications .....	28
4.2.5	Quantifications .....	28
4.2.6	Procurement, storage and distribution .....	28
4.2.7	Inventory Management .....	28
4.2.8	Quality Control.....	28
4.2.9.	SWOT analysis.....	29
4.2.10.	Conclusion and recommendations .....	29
4.3	Vector Control .....	29
4.3.1	Introduction.....	29
4.3.2	Policy and guidance .....	29
4.3.3	Organizational structure of Vector control .....	29
4.3.4	Guidance.....	29
4.3.5	Human resources: training and capacity development .....	29
4.3.6	Annual planning.....	30
4.3.7	Service delivery outputs and outcomes .....	30
4.3.8.	Larval Source Management .....	30
4.3.9	Successes, best practices and facilitating factors.....	30
4.3.10.	SWOT analysis.....	30
4.3.11.	Conclusion and recommendations .....	31
4.4	Malaria: diagnosis and case management.....	31
4.4.1	Introduction.....	31
4.4.2	Policy and guidance .....	31
4.4.3	Organization of Case Management Services.....	31
4.4.4	Human resources: training and capacity development .....	31
4.4.6	Malaria Diagnosis.....	32
4.4.7	Malaria Treatment.....	32
4.4.8	Malaria Prophylaxis .....	32
4.4.9	Performance indicators and targets.....	32
4.4.11.	SWOT analysis.....	33
4.4.12.	Conclusion and recommendations .....	33
4.5	Advocacy, BCC, IEC and Social Mobilization.....	33
4.5.1	Introduction.....	33
4.5.2	Policy and Guidance .....	33
4.5.3	Organization .....	34
4.5.4	Human resources: training and capacity development .....	34

## Sindh Malaria Program Thematic Review 2019

4.5.5 Annual planning .....	34
4.5.6 Performance indicators and target .....	34
4.5.7 Service Delivery outputs and outcomes .....	34
4.5.8. SWOT analysis .....	34
4.5.9. Conclusion and recommendations .....	35
4.6 Malaria in Pregnancy.....	35
4.6.1 Introduction .....	35
4.6.2 Policy and Guidance .....	35
4.6.3 Organization of MIP service delivery .....	35
4.6.4 Human resources: training and capacity development.....	35
4.6.5 Annual Planning .....	35
4.6.6 Performance Indicators and Targets.....	35
4.6.7 Service delivery outputs and outcomes.....	35
4.6.8. SWOT analysis.....	36
4.6.9. Conclusion and recommendations .....	36
4.7. Surveillance, Monitoring and Evaluation .....	36
4.7.1 Introduction.....	36
4.7.2 Policy, Guidance, Coordination .....	36
4.7.3 Malaria profile, risk mapping and stratification .....	37
4.7.4 Human resources: training and capacity development .....	38
4.7.5 Routine Information Systems .....	38
4.7.6 Sentinel Surveillance Systems .....	39
4.7.7 Monitoring and Evaluation Plan .....	39
4.7.8 Malaria Surveys .....	39
4.7.9 Malaria Reporting.....	39
4.7.10 Malaria database and informatics System .....	39
4.7.11 Progress towards achievement of targets.....	39
4.7.12. SWOT analysis.....	40
4.7.13. Conclusion and recommendations .....	40
Provincial Malaria control Program Sindh - Key Issues and recommendations .....	41
<b>Annexes</b> .....	43
Table: 1. Sindh Malaria Epidemiology 2014-2018 .....	44
Table-2: Malaria Epidemiological Trends Overtime .....	44
Table-3: Malaria Epidemiological Data 2014.....	45
Table-4: Malaria Epidemiological Data 2015 .....	46

## Sindh Malaria Program Thematic Review 2019

Table-5: Malaria Epidemiological Data 2016 .....	47
Table-6: Malaria Epidemiological Data 2017 .....	48
Table-7: Malaria Epidemiological Data 2018 .....	49
Table- 8: List of the printed guidelines verified at Directorate of Malaria Control Sindh ..	50
Table - 9: Trainings by Malaria Control Program .....	50
Table -10: Trainings by PLYC .....	51
Table -11: Trainings by NRSP .....	51
Table -12 a: Malaria Control Program Sindh – Non development Budget (PKR Millions) .	52
Table -12 b: Malaria Control Program Sindh – Development Budget (PKR Millions).....	52
Table - 13: Indoor Residual Spray (IRS) by Malaria Control Program .....	52
Table - 14: LLINs distributed by Malaria Program Sindh (mass strategy).....	53
Table - 15: Long Lasting Insecticide treated Nets (LLINs) ANC Distribution by partners ...	54
Table - 16: Long Lasting Insecticide treated Nets (LLINs) mass distribution by PLYC.....	54
Table-17: Larvicidal activity by Malaria Control Program Sindh: .....	54
Table – 18: District wise details of Microscopy Centers .....	55
Table-19: Health facilities with Malaria treatment guidelines and trained human resources.....	56
Table -20. District wise Microscopy and RDT Centers in Sindh .....	57
Table – 21. Achievement in diagnosis and treatment GFATM districts 2014-18.....	58
Table - 22. Diagnosis and case management service delivery outputs and outcomes 2018 .....	58
Table – 23. Advocacy, BCC, IEC and social mobilization Service Delivery Outputs and Outcomes .....	59
Table -24. Gender wise distribution of malaria Positive Cases in GFATM districts 2018....	59
Table – 25. District wise disease burden: Confirmed cases, SPR and API 2014-2018 .....	60
Table – 26. Suspected Malaria cases as reported by DHIS .....	61
Table – 27. Monitoring Visits conducted by GFATM partners .....	62
Table – 28 a. Staff Position (Provincial) .....	63
Table – 28 b. Staff Position (Provincial and district) .....	64

## Abbreviations

<b>ACT</b>	Artemisinin-based combination therapy
<b>ANC</b>	Antenatal care
<b>AIDS</b>	Autoimmune disease syndrome
<b>API</b>	Annual parasite incidence
<b>BCC</b>	Behavior change communication
<b>BER</b>	Blood exam rate
<b>BHU</b>	Basic health unit
<b>CCM</b>	Community case management
<b>CBO</b>	Community based organization
<b>CPSP</b>	College of physicians and surgeons
<b>DDT</b>	Dichlorodiphenyltrichloroethane
<b>DHIS</b>	District health information system
<b>DHO</b>	District health officer
<b>DHPMT</b>	District health and population management team
<b>DHQ</b>	District headquarter
<b>DOMCP</b>	Directorate of malaria control program
<b>EPR</b>	Epidemic preparedness and response
<b>FP</b>	Plasmodium falciparum
<b>FP%</b>	Falciparum ratio
<b>GFATM</b>	Global fund for AIDS, tuberculosis and malaria
<b>HANDS</b>	Health and nutrition development society
<b>IEC</b>	Information education communication
<b>IHS</b>	Integrated health services
<b>IMNCI</b>	Integrated management of neonatal and child health
<b>Iptp-sp</b>	Intermittent preventive treatment in pregnancy with sulphadoxine + pyrimethamine
<b>IRS</b>	Indoor residual spraying
<b>ISTp-ACT</b>	Intermittent screening and treatment in pregnancy with ACT
<b>IVM</b>	Integrated vector management
<b>LLIN</b>	Long lasting insecticidal net
<b>LHW</b>	Lady health worker

## Sindh Malaria Program Thematic Review 2019

<b>LMIS</b>	Logistics management information system
<b>MAP</b>	Midwifery association of Pakistan
<b>MC</b>	Microscopy center
<b>MCH</b>	Mother and child health
<b>MCP</b>	Malaria control program
<b>MDG</b>	Millennium development goal
<b>MEAL</b>	Monitoring evaluation analysis and learning
<b>MERF</b>	Medical emergency resilience foundation
<b>M&amp;E</b>	Monitoring and evaluation
<b>MIP</b>	Malaria in pregnancy
<b>MIS</b>	Malaria information system
<b>MICS</b>	Multiple indicator cluster survey
<b>MNCH</b>	Maternal neonatal and child health
<b>MoU</b>	Memorandum of understanding
<b>MPR</b>	Malaria program review
<b>NPPRA</b>	National public procurement authority
<b>NRSP</b>	National rural support program
<b>NGO</b>	Nongovernmental organization
<b>OPD</b>	Out patient department
<b>OR</b>	Operations research
<b>PC1</b>	Planning commission performa-1
<b>PCPNC</b>	Pregnancy, childbirth postnatal and newborn care
<b>PDMA</b>	Provincial disaster management authority
<b>PEI</b>	Poverty eradication initiative
<b>PF%</b>	Plasmodium falciparum parasite rate
<b>PHC</b>	Primary health care
<b>PKR</b>	Pakistani rupee
<b>PPA</b>	Pakistan pediatrics association
<b>PPHI</b>	Peoples primary health care initiative
<b>PLYC</b>	Pakistan lions youth council
<b>PRM</b>	Program review mission

<b>QA</b>	Quality assurance
<b>RHC</b>	Rural health center
<b>RDT</b>	Rapid diagnostic test
<b>SDG</b>	Sustainable development goal
<b>SOGP</b>	Society of gynecologist and obstetricians of Pakistan
<b>SoP</b>	Standard operation procedure
<b>SPPRA</b>	Sindh public procurement authority
<b>SPR</b>	Slide positive rate
<b>sqM</b>	Squire meter
<b>SWOT</b>	Strength weakness opportunity threats
<b>TB</b>	Tuberculosis
<b>THQ</b>	Taluka headquarter
<b>TWG</b>	Technical working group
<b>UC</b>	Union council
<b>UHC</b>	Universal health coverage
<b>UNICEF</b>	United nations children fund
<b>USAID</b>	United states agency for international development
<b>WHO</b>	World health organization



## **1. Introduction**

### **1.1 Background**

Given the concerns for malaria burden and implementation of the new arrangements for the program, malaria control and elimination unit, in coordination with Directorate of Malaria Control, WHO country office and GFTAM, requested for a rapid assessment of the current situation of malaria control program in Pakistan. The findings of rapid assessment strongly suggested and recommended an in depth program review to identify gaps and issues with programs especially in wake of devolution and a national and provincial strategic document can be made as a way forward and mobilize resources on new funding model

### **1.2 Objectives of the MPR**

1. To review the epidemiological outlook of malaria disease in each province of Pakistan with particular reference to disease burden and trends,
2. To review the Malaria program structure, capacity and management in each province and at national level.
3. To assess the current program performance by intervention thematic areas and review progress, challenges and towards achievement of targets in each province and progress towards achieving goals.
4. To identify priority needs and gaps for improving program performance and coordination at provincial as well as federal level.
5. Define steps to improve program performance and redefine the strategic direction and focus, including revision of policies and strategic plans at national and provincial levels which can help tapping the available funds from various sources including the public sector and donors
6. To assess Global Fund grants supported projects in highly endemic districts of the country and to suggest ways and means for quality assured interventions following the principals of transparency, accountability and value for money.

### **1.3 Methodology of the MPR**

Malaria program review involved a mixture of methods, including desk reviews of technical thematic areas based on program data, reports, documents and published literature; updating country databases and country profiles; mapping of populations at risk; estimating burden and making projections; policy and management analyses; special studies; and group work, individual consultations, provincial and district field visits with interviews and observations.

The programmatic review conducted in four phases which will include”

Phase I: Planning,

Phase II: Desk review,

Phase III: Field review and

Phase IV: Final report and follow-up on recommendations.

**Phase II: Desk review: Thematic desk review-**

- Assembling information from reports and documents,
- Conducting a technical thematic desk review,
- Compiling a thematic desk review and
- Score achievement by thematic areas

The following thematic areas are discussed along with its SWOT analysis followed by recommendations.

1. Malaria Program Management
2. Malaria Commodities, Procurement and Supply Chain management
3. Malaria Vector Control
4. Malaria Diagnosis and Case Management
5. Advocacy, BCC, IEC (Information, Education, Communication) and Social Mobilization
6. Malaria in Pregnancy
7. Surveillance, Monitoring and Evaluation

**2. Context of Malaria Control**

**2.1 Historical Milestones in Malaria Control**

Year	Activities
1952-56	<p>A five year plan to extend the malaria control activities to other areas aside from selected areas since 1950.</p> <p>The main strategy was vector control using blanket spraying of DDT.</p> <p>The results were encouraging and marked decrease in the spleen rate was observed in children below 10 years.</p>
1960	<p>In 1960s, a pre-eradication malaria survey was completed.</p> <p>Results indicated highest malaria prevalence in Punjab, due to the network of irrigation canals and the extension of flooded areas.</p>
1961-69	<p>A nation-wide malaria eradication program was launched under the auspices of WHO and with the help of USAID and UNICEF.</p> <p><b>Strategy</b></p> <p>The main strategy was vector control using blanket spraying of DDT, with a transient temporary relief during late 60s &amp; early 70s</p> <p><b>Results</b></p> <p>As a result of this campaign the malaria was nearly eradicated from the country and a marked reduction in malaria cases was observed from an estimated 7 million cases in 1961 to 9,500 cases in 1967. An overall reduction from 15% to less than 0.01% was observed in the slide positivity rate.</p>

## Sindh Malaria Program Thematic Review 2019

Year	Activities
1969-74	<p>The malarial infection began resurgence in 1969 &amp; 1970s and included the increase of malaria in urban areas (a quarter of million cases were reported from Karachi alone). All this resulted in the program collapse, subsequently followed by explosive resurgence of malaria assuming epidemic proportion in 1972-73.</p> <p><b>Results</b>            USAID reports in Pakistan, there were 9,500 cases in 1968. In 1971 there 108,000 cases which rose to 10 million in 1974.</p> <p><i>The reasons of resurgence were :</i> the onset of vector resistance to Organochlorines (DDT &amp; Dieldrin/BHC), under estimation of <i>A. stephensi</i> in maintenance of urban malaria together with financial and administrative constraints, inadequate administration of programs, inadequate research, training, and supplies of chemicals and drugs, inadequate health services infrastructure, the lack of malaria control components in hydraulic development projects, and underdeveloped socioeconomic conditions generally. Premature withdrawal of donor support was also an important factor.</p>
1975-85	<p>The Malaria Program switched from Eradication to Control Program. Initiation of Five years National Malaria Control Program with support of WHO and USAID. Implementation handed over to provincial government and malaria control program was integrated with general health services.</p> <p>The main objective of the MCP was to reduce the disease incidence to less than 500 cases per million population.</p> <p><b>Strategy</b> Vector control by indoor residual spraying was the main strategy. In 1976 DDT (Organochlorines) was replace with Malathion (Organophosphate) insecticide with two rounds of spraying in most areas.</p> <p><b>Results</b>            Malaria decreased significantly in 1977-78. There has been a sharp decline in the slide positivity rate from 14% to 0.62% and API from 13 per 1000 population to 0.3 per 1000 population in 1978. Malaria Control program continued till 1985.</p>
1985-2002	<p>In 1985, Malaria Control program was merged with Health Department.</p> <p>In 2000-20012, Devolution of health and other services</p> <p>The execution and implementation of the Program went directly under the control of Executive District Officers (H).</p> <p>Under devolution the malaria staff were declared dying cadre and the MCP directorate was abolished, which further deteriorated the malaria situation in province.</p> <p>Same Malaria Control Policies and strategies continued.</p>

## Sindh Malaria Program Thematic Review 2019

Year	Activities
2003	RBM Strategy adopted in Pakistan as a signatory with Global partners The key objective was to reduce the disease burden by 50% by 2010.
2004	GF and strategic plans and rounds
2007-13	<p>PC-1 of 329.954 million rupees.</p> <p><b>Main strategies:</b> Early Diagnosis and Rapid treatment, Multiple Prevention, Epidemic Preparedness, Monitoring, Evaluation and Surveillance, BCC, Operational research besides staff component.</p> <p><b>Results</b> Fail to achieve the targets because of lack of financial and administrative constraints</p>
2013-15	<ul style="list-style-type: none"> <li>• A total of 90.0 million were calculated as KP share of National RBM Program fund. (PSDP GRANT NO; 23 (2012-13))</li> <li>• Rs.8.025 million was utilized in FY 2011-12 on purchase of goods. The remaining Rs.81.975 million are available as capital cost for this PC-I.</li> <li>• The Project Cost Estimates have been prepared in January, 2013 and will continue till 2015.</li> </ul> <p><b>Strategies</b> The main components include Early Diagnosis and Rapid treatment, Multiple Prevention, Institutionalization and Monitoring, Evaluation and Surveillance.</p>
2014-18	

## 2.2: Health Services Organization and Management

Health services in Sindh are organized as Tertiary Care: offered by teaching hospitals and specialized hospitals, Secondary Care: offered by District and Taluka Hospitals, First referral Care: offered at RHCs and First level care facilities (FLCF): offered through a network of BHUs supported by MCH centers and Dispensaries. OPDs of all levels of care including tertiary, secondary, district, taluka and RHCs.

Teaching and district hospital by large are managed by public sector through Secretary Health. Selected DHQs and THQs are managed by partners under Public Private Partnership.

Majority of RHCs is managed by partners under Public Private Partnership.

Majority of BHUs, MCH canters and Dispensaries is contracted out to a public sector company named PPHI.

Some health facilities and priority program are managed by District Health Offices.

Malaria is a full directorate which serves as a technical unit for the province and implementation unit for development and partner funding through GFATM. It also serves as coordinating unit between public sector, development partners, bilateral partners, federal directorate of malaria control program and NGOs working in the province. Directorate also serves as coordinating unit between provincial health and district as well with line department and other priority programs.

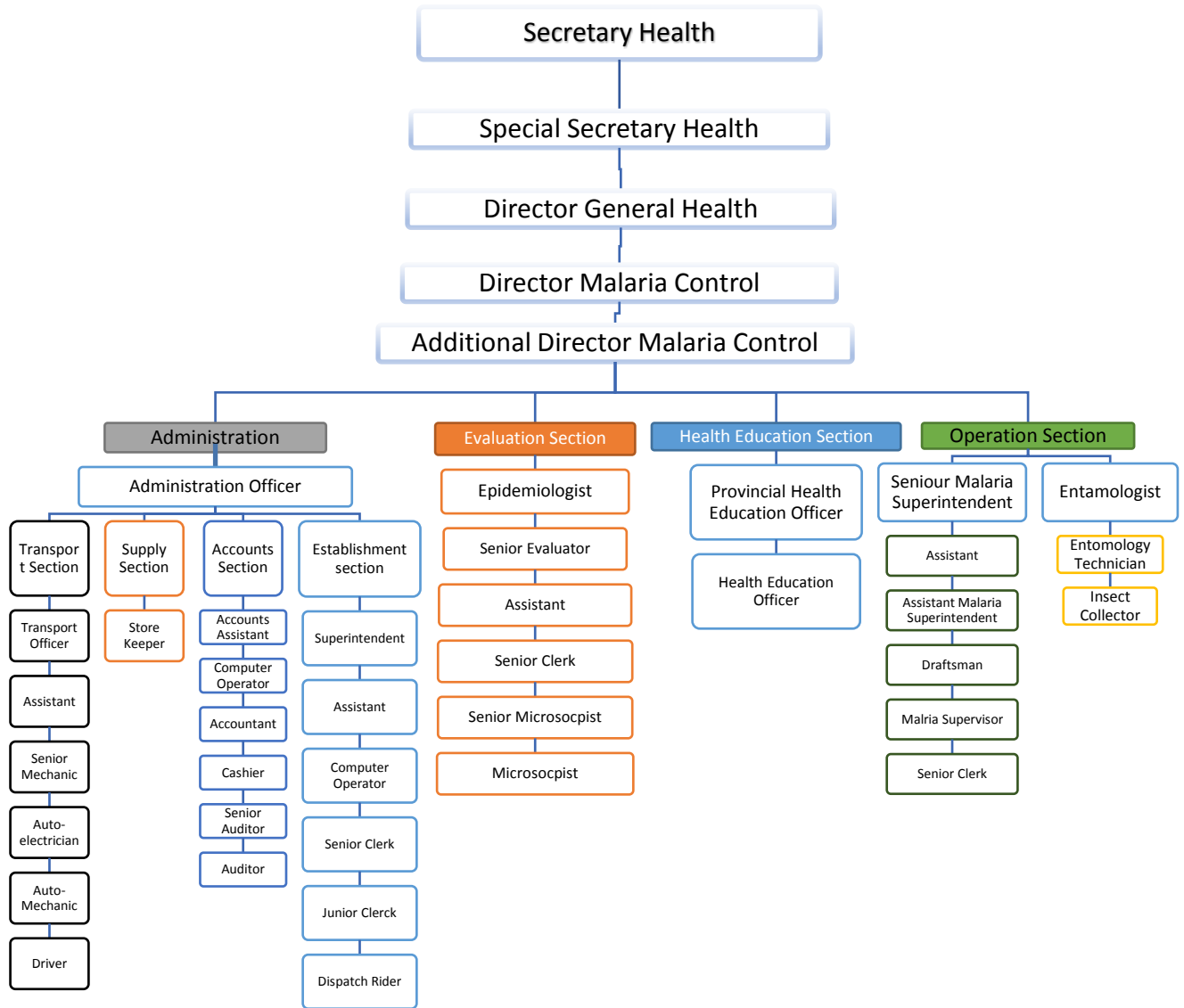
Total number of health facilities in Sindh is 2473<sup>1</sup>

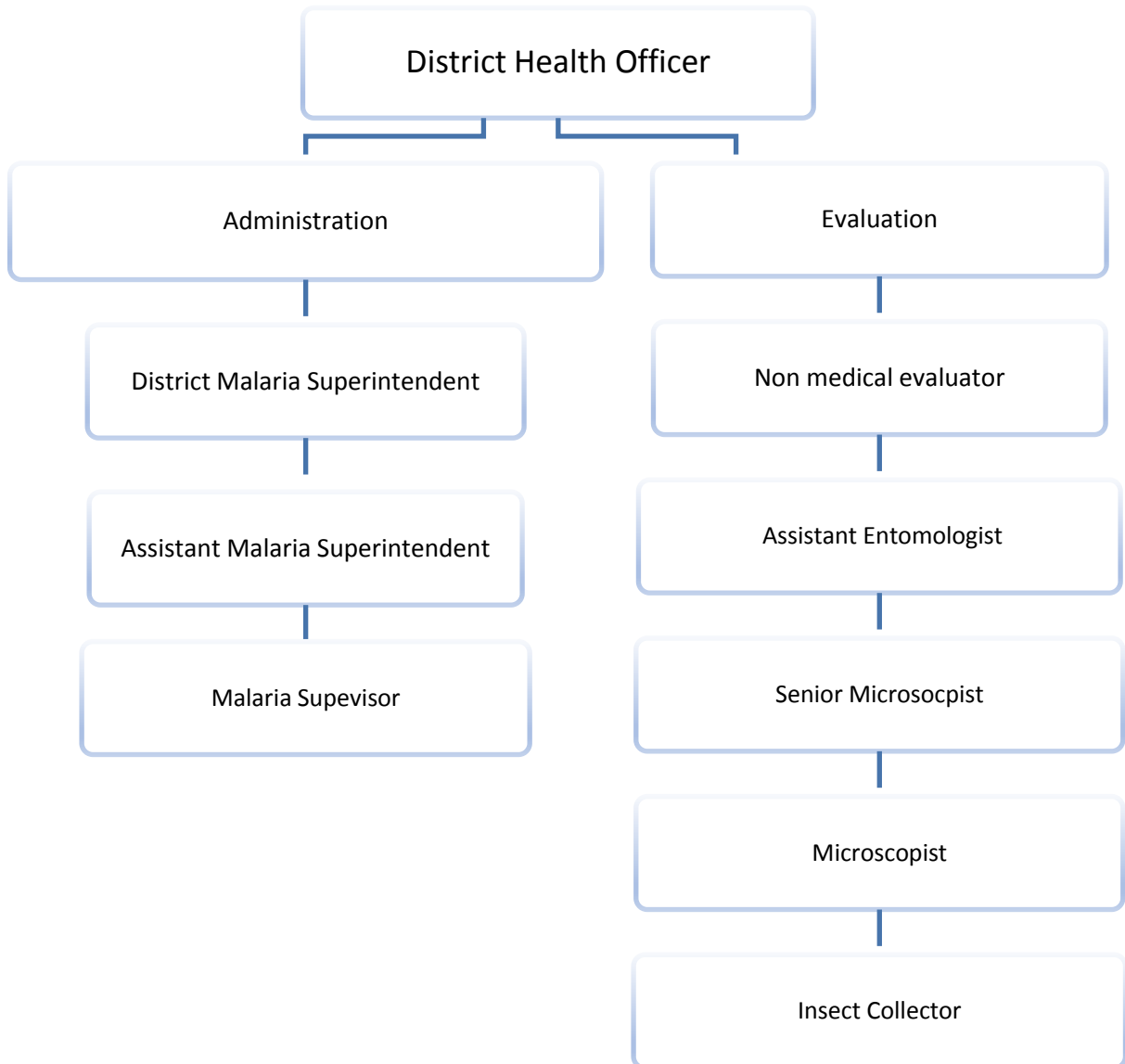
• Teaching Hospitals	8
• Autonomous Hospitals	6
• Services Hospitals	2
• Major Hospitals	17
• Specialized Hospitals	7
• Other Hospitals	22
• Civil/DHQ Hospitals	15
• THQ Hospitals	52
• Trauma/Emergency Hospitals	33
• Rural Health Centers	133
• Basic Health Units	1085
• MCH Centers/Maternity Homes	115
• Dispensaries	103
• others	875

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<sup>1</sup> Sindh DHIS 2019

2.3 Organizational structure for malaria directorate





## **2.4 Key Strategies for Malaria Control<sup>2</sup>**

### **2.2.1. Goal:**

Reduce malaria specific morbidity by 75% (API <1) through quality assured diagnostic, treatment and prevention services accessed by all

### **2.2.2. Objectives:**

1. More than 80% of suspected Malaria cases are parasitological confirmed using microscopy or RDT and all confirmed Malaria cases received prompt and affective treatment with an appropriate anti-malarial drug within 24 Hours of onset of fever
2. To ensure and sustain 80% coverage of multiple prevention interventions in the target population (High endemic UCs) as per national guidelines by 2020
3. To increase community awareness up to 80% on the benefits of early diagnosis, prompt treatment and malaria prevention measures using health promotion, advocacy and BCC interventions by 2020
4. To enhance technical and managerial capacity in planning, implementation, management and MEAL (Monitoring, Evaluation, Accountability and Learning) of malaria prevention and control interventions by 2016
5. To ensure and sustain availability of quality assured strategic information (epidemiological, entomological and operational) from all public sector health facilities for informed decision making by 2018
6. To ensure provision of malaria prevention, treatment and control services in humanitarian crises and emergencies by 2016

### **2.2.3. Targets:**

1. More than 80% suspected malaria cases are diagnosed using MC and or RDT and received correct treatment in public facilities within 24 hours of fever onset
2. 100% of confirmed Plasmodium Falciparum cases are treated with ACTs.
3. 100% of pregnant women with malaria received Quinine for treatment.
4. More than 80% of households in each target union council own at least two LLINs.
5. More than 80% of pregnant women slept under LLIN previous night.
6. More than 80% of children under 5 years slept under a LLIN previous night
7. 100% of houses in high endemic UCs (hot spots) sprayed one month before peak transmission.
8. More than 80% of mothers/care givers, know that LLINs and IRS are main methods of preventing malaria.

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<sup>2</sup> Sindh Malaria Strategic Plan 2015-20



9. More than 80% of mothers/care givers know that children under 5 years with fever should be seen by care provider.
10. More than 80% of household representatives know that malaria should be diagnosed with Microscopy or RDT
11. 100% of malaria epidemics responded to within two weeks of onset.
12. 100% of all partners delivering health services in Sindh who have updated case management (diagnosis and treatment) according to national guidelines.
13. More than 80% of other sectors actively involved on malaria activities
14. 100% of public sector health facilities receiving standardized supervision per quarter
15. 100% of laboratories in public sector undergoing quality control
16. 100% of health facilities in public sector submitting reports in a timely manner
17. 100% of operational research studies planned conducted within time.
18. 100% of health facilities (2 care providers per facility) in public sector and selected care providers from private sector (20 per district) trained on malaria case management.
19. Adequate Number of management level staff, at provincial and district level received training on project cycles, performance indicators and reporting
20. 100% of health facilities in public sector have trained malaria diagnosis and management staff.

## 2.2.4. Indicators

### 2.2.4.1. Impact Indicators<sup>3</sup>

Indicator of population coverage	Target	Source	Frequency	Responsible
Annual Parasite Incidence (API)	<1 per 1000	MIS	Monthly	DOMC/ District
Malaria prevalence in screened population	SPR<2%	Household survey	Cross-sectional survey in 2020	DOMC
Proportion of admissions attributed to severe malaria	<5% in secondary care facilities	DHIS	Monthly	DOMC/ District

<sup>3</sup> As per Sindh Malaria Strategy 2015-20

**2.2.4.2. Outcome Indicators<sup>4</sup>****1. Malaria Program Management**

<b>Indicator of population Coverage</b>	<b>Target</b>	<b>Source</b>	<b>Frequency</b>	<b>Responsible</b>
Number and proportion of health facilities staff who are providing treatment according to national guidelines.	100% of health facilities staff who are providing treatment according to national guidelines.	Operations Research/ Indicator Survey	Annual / Three years	DOMC
Number and proportion of health facilities submitting reports in timely manner	100% of the health facilities submitting reports in the timely manner	MIS/DHIS	Monthly	Health facilities in charge
Number and proportion of health facilities where trained malaria diagnostic and management staff is available	In 100% of health facilities trained malaria diagnostic and management staff is available	DOMC reports	Quarterly	DHO/DOMC
Number of operational research studies conducted	At least 3 operational studies conducted every two years	DOMC reports	Every two years	DOMC
Number and proportion of health facilities undergoing quality control	100% of health facilities undergoing quality control	Monitoring reports	Quarterly	DOMC
Number of coordination meetings held with other departments such as PMDA, Irrigation department and metrological department.	4 meetings per year PDMA	DOMC reports	Quarterly	DOMC

**2. Malaria Commodities, Procurement and Supply Chain management**

No indicators suggested in Strategy

<sup>4</sup> As per Sindh Malaria Strategy 2015-20

### 3. Malaria Vector Control

Indicator of population Coverage	Target	Source	Frequency	Responsible
Proportion of houses in endemic UCs (hotspots) sprayed one month before peak transmission	100% houses in endemic UCs (hotspots) sprayed one month before peak transmission	MICS	Every three years / Five years	DOMC
Percentage of household in each high risk UC who own at least two LLINs	More than 80% of households in each UC own at least one LLIN	MICS	After every three years	DOMC
Percentage of children under 5 years of age who slept under LLIN the previous night the target areas	100% of children under 5 slept under LLIN the previous night	MICS	Every three years/	DOMC
Percentage of pregnant women in target UCs who slept under LLIN the previous night	100% of pregnant women in target UCs slept under LLIN the previous night	MICS	Every three years	DOMC

### 4. Malaria Diagnosis and Case Management

Indicator of population Coverage	Target	Source	Frequency	Responsible
Proportion of suspected malaria cases diagnosed using microscopy/RDT within 24 hours of fever onset	>80% suspected malaria cases diagnosed by microscopy / RDT in public facilities within 24 hours of onset of fever	MIS/DHIS	Monthly	DOMC/DHO
Proportion of confirmed falciparum malaria cases treated with ACT	100% of confirmed <i>FP</i> cases are treated with ACT	MIS/DHIS	Monthly	DOMC/DHO
Proportion of confirmed PV cases receiving Chloroquine and radical treatment according to malaria guidelines	100% of confirmed PV cases received chloroquine + primaquine according to national guidelines.	MIS/DHIS	Monthly	DOMC/DHO

## 5. Advocacy, BCC, IEC (Information, Education, Communication) and Social Mobilization

Indicator of population Coverage	Target	Source	Frequency	Responsible
Proportion of mothers/care givers who know that LLINs and IRS are methods of preventing malaria	>90% of mothers/care givers who know that LLINs and IRS are methods of preventing malaria	IMICS	Every three years	DOMC
Percentage of mothers/care givers who know that children under 5 years with fever should be seen by a health care provider	>90% of mothers/care givers who know that children under 5 years with fever should be seen by health care providers	MICS	Every three years	DOMC
Percentage of household representative who know that malaria should be diagnosed with Microscopy or RDT	>90% of households representatives know that malaria should be diagnosed with MIC/RDT	Indicator survey/ MICS	Every three years	DOMC

## 6. Malaria in Pregnancy

No indicators suggested in strategy

## 7. Surveillance, Monitoring and Evaluation

No indicators suggested in strategy

### 2.2.4.3. Process Indicators

#### Procurement

- No of RDT kits procured
- No of anti-malarial drugs procured
- No of microscopes procured
- No of LLINs procured
- No of KGs insecticides procured
- No of vehicles procured
- No of equipment procured

#### Distribution

- No of RDT kits distributed
- No of anti-malarial drugs distributed
- No of microscopes distributed
- No of LLINs distributed
- No of KGs insecticides distributed
- No of equipment distributed

**Personnel trained**

- No of public sector doctors trained (initial training)
- No of public sector doctors trained (refresher training)
- No of microscopist trained (initial training)
- No of microscopist trained (refresher training)
- No of GPs (private sector doctors) trained
- No of managerial staff trained
- No of Entomologist trained (refresher course)

**Research Studies**

- No of operational research studies carried out

**Advocacy Communication and Behaviour Change**

- No of TV and Radio spots broadcast / telecast
- No of IEC material developed and distributed
- No of community gathering conducted

**Monitoring and Evaluation**

- No of monitoring visits conducted
- No of monitoring reports documented

**2.5. Key partners in malaria**

The partners of Malaria Control Program Sindh<sup>5</sup>

The Principal Recipients and Sub Recipient of GFATM working in Sindh:

National rural Support Program is working in five districts namely Thatta, Sujawal, Badin, Umerkot and Tando Muhammad Khan.

Pakistan Lions Youth Council is working in eight districts namely Tando Allahyar, Mirpurkhas, Noshero Feroze, Tharparkar, Kumbar /Shahdadkot, Larkana, Sukkar and Khairpur.

Key interventions are:

- Diagnosis and Case management,
- BCC activities,
- Public Private Partnership,
- Trainings of health care providers and health technicians
- Distribution of LLIN to pregnant women during ANC
- Mass distribution of LLINs in October 2018

**2.6 Linkages and coordination**

The Directorate of Malaria Control Program Sindh does not have collaborator and/or coordination with other priority health program in the province like MNCH Program, Child Survival Program, Sindh LHW Program, Sindh AIDS Control Program and Accelerated Action Plan for Malnutrition. The MNCH Program implements the Integrated Management of Childhood Illness (IMNCI) strategy which includes Malaria in Under 5 children and PCPNC as part of the focused antenatal care package which includes

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<sup>5</sup> As per information shared by Directorate of Malaria Control Sindh.

Malaria In Pregnancy (MIP). There are no joint plans with several line ministries that include Local Government, Agriculture, Tourism, Environment, Education, Public Works, Housing, Fisheries, etc. These sectors have access to populations that are affected by malaria but are usually not targeted by interventions delivered through the health sector.

In Sindh BHUs and selected RHCs are under management control of PPHI a public sector company under Contracting Out mechanism.

RHCs, selected THQs, DHQs and major hospitals are under the management control of INS, MERF, HANDS, Indus Hospital, PEI under Public private partnership Initiative.

There are five public sector medical universities, five medical colleges, five public health schools and a good number of nursing/midwifery schools.

There is not a single memorandum signed with any of these partners for malaria diagnosis and treatment as per national guidelines

Coordination with PPHI, MoU has been signed with PPHI by Pakistan Lions Youth Council in 2019<sup>6</sup>

## **2.7 Conclusions and Recommendations**

The program should adapt a mechanisms for malaria control issues to be discussed on a regular basis at the Provincial, Divisional, District and Institutional level using planned and instituted partnership coordination mechanisms.

### **Recommendations:**

- There is coordination between partners and Directorate of Malaria Control, but not the Program Managers therefore coordination among stakeholders need to formalized and improved.
- Unavailability of guidelines and manuals at 100% health facilities reflects weak coordination between Province and National Directorate of Malaria.
- PCPNC guidelines need to be updated on Management of Malaria in Pregnancy in line with national guidelines.

## **3. Epidemiology of malaria**

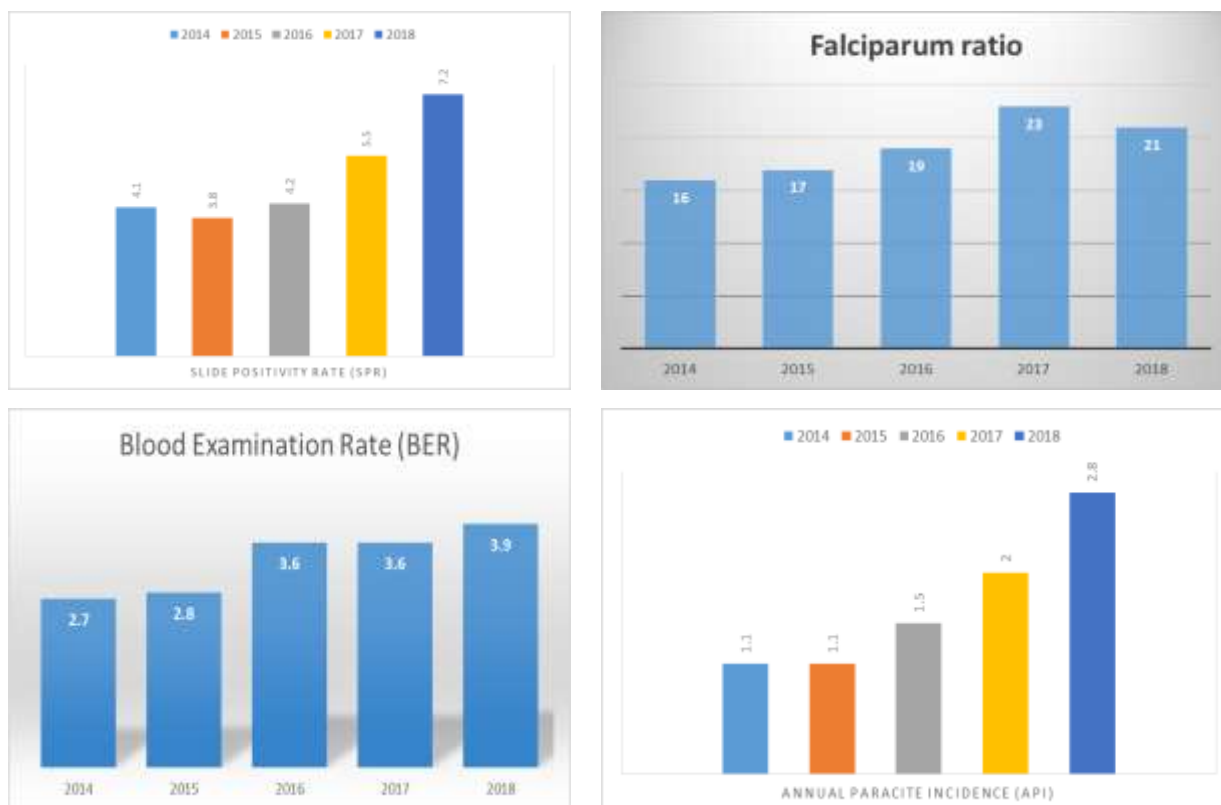
### **Sindh 2014-2018<sup>7</sup>**

During the five year period total 7,115,562 clients were screened for malaria out of which 365,939 tested positive with SPR of 5.14%. Slide positivity rate has increased from 4.1% in 2014 to 7.2% in 2018. Annual Parasite Incidence is on rise from 1.1% in 2014 to 2.8% in 2018 and 72,641 cases were tested Falciparum positive making FP ratio of 19.85. FP Ratio is also on rise from 16% in 2014 to 21% in 2018. (Details are in Annex Tables 1-7)

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<sup>6</sup> Verbal information shared by Directorate of Malaria Control Sindh

<sup>7</sup> As per information derived from different hard copies of the Malaria Directorate Sindh



## 4. Program performance by thematic areas

### 4.1 Program management

#### 4.1.1 Introduction

Sindh does not have a Health policy and Malaria policy. In 2005 a Health policy was developed and approved by the concerned authorities but no implementation followed. Sindh developed a health sector strategy in 2012 on the basis of situation analysis done in 2011. Malaria strategic plan for Sindh 2015-20 was developed following Sindh Health Sector Strategy 2012-2019 which includes Malaria as important communicable disease.

The Sindh malaria strategy was base for the development of a series of PC1 and development funding by Government of Sindh.

#### 4.1.2. Policy

There is neither health nor malaria policy of the province in place

#### 4.1.3 Organization

Directorate of Malaria Control Program is headed by a general cadre B-20 officer. Organogram of the DOMCP is in section 2.3

Total sanctioned positions of the staff at provincial office are 156 out of which 99 are vacant. In districts 281 positions are vacant out of 1,185 sanctioned strength. Out of these 281 vacancies 271 are technical positions (details are in Annex Table 28)

#### 4.1.4 Guidance

There are National guideline for following

- Malaria Case Management
- Malaria in Pregnancy
- Malaria Microscopy Desk Guide
- LLIN distribution strategy
- Malaria Microscopy Training manual
- How to use a RDT
- Malaria BCC strategy
- Malaria Information System
- Counselling cards for LHWs
- Training manual for early detection of malaria outbreaks, malaria surveillance, M&E statistics and Data management
- Supervision and external quality assurance of Malaria Laboratory Services

#### **4.1.5 Human resources: training and capacity development**

Malaria program through public sector funding has trained 1109 health personnel in 24 health districts during period of 2014-18 with achievement of more than 100% (details are in Annex-Table- 9)

Pakistan Lions Youth Council in eight assigned districts have trained 3235 health personnel during period of 2015-18 with achievement 93% (details are in Annex-Table-10)

National rural support Program in five assigned districts have trained 1387 health personnel during period of 2014-18 with achievement exceeding 100% (details are in Annex-Table-11)

#### **4.1.6 Strategic and annual planning**

Provincial Strategic plan 2015-20 includes M &E Plan which is never converted in annual plan. Annual planning is not in practice

#### **4.1.7 Financing**

Financing sources of malaria control program in Sindh are Regular Budget, development support from Government of Sindh and vertical funding by GFATM

Public Sector Budget includes the current budget (non-development) and development budget.

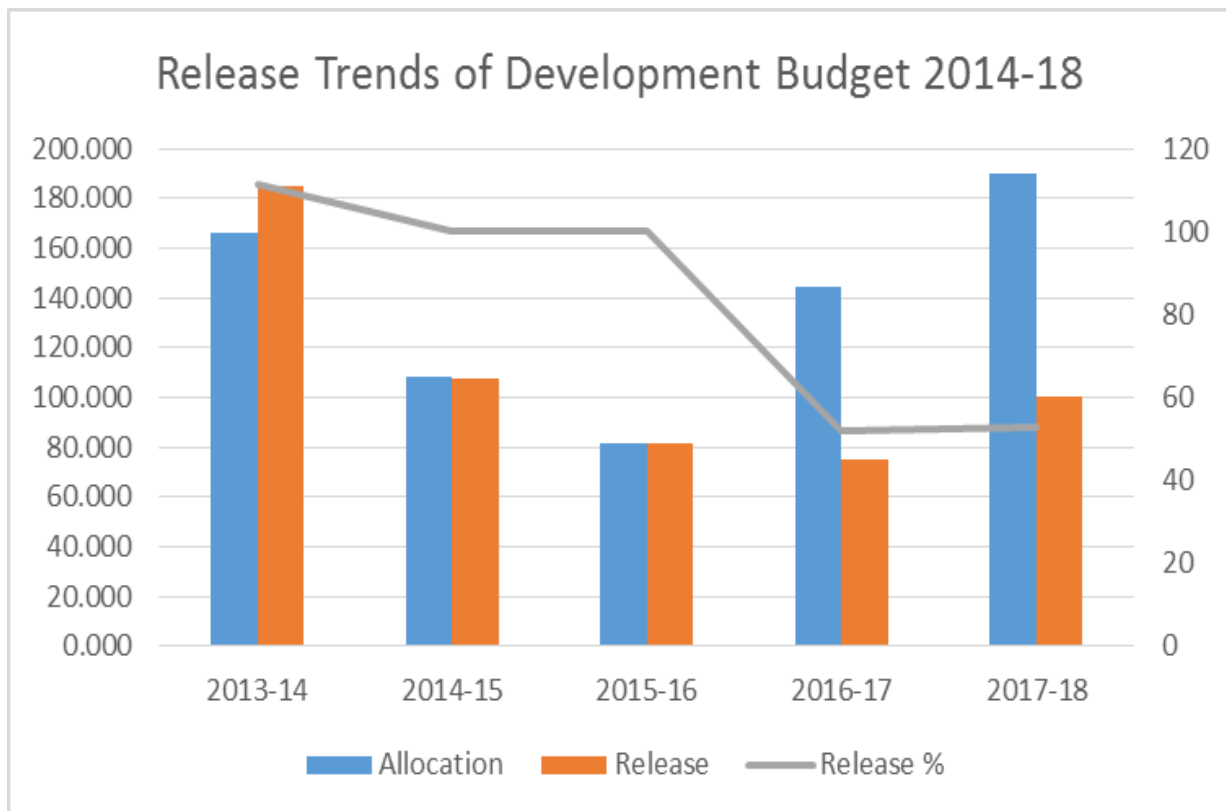
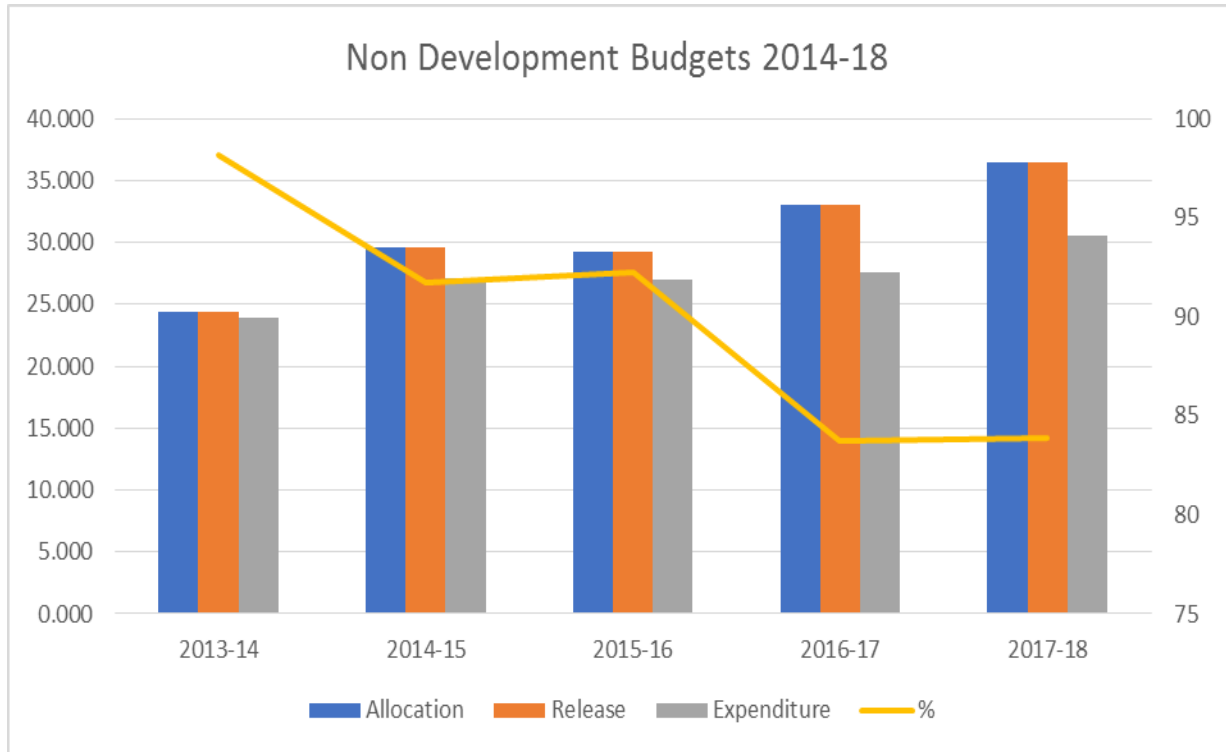
- a. Current Budget: The current budget mainly comprises of salary component (98%) and the remainder is allocated for utilities and services referred as Regular/non development component.
- b. Development Budget: The financing of operational cost of the Malaria Control Program is from the provincial development budget. It included budget for purchases of Anti Malaria Drugs insecticides, bed net, equipment, training, surveillance, social mobilization, health care research, monitoring and evaluation.

Total non-development (current) allocations during five years was Pak Rupees 152.738 million with 100% releases and expenditure of PKR 136.313 million. Utilization rate during financial years 2013-14 and 2017-18 was 89% (details are in Annex Table – 12a)



## Sindh Malaria Program Thematic Review 2019

Total development allocations during five years was Pak Rupees 690.518 million with 80 % (42-100) releases and expenditure of PKR 551.310 million. Utilization rate during financial years 2013-14 and 2017-18 was 100% (details are in Annex Table – 12b)



#### 4.1.8. SWOT analysis

<p><b>Strengths</b></p> <ul style="list-style-type: none"> <li>• There are sanctioned positions financed through regular health budget.</li> <li>• Strategic plan with clear indicators for all levels is approved and available.</li> </ul>	<p><b>Weakness</b></p> <ul style="list-style-type: none"> <li>• Converting strategic plan in annual and implementation plans.</li> <li>• Human resource policy.</li> </ul>
<p><b>Opportunity</b></p> <ul style="list-style-type: none"> <li>• Develop a clear strategic plan with annual and quarterly frameworks.</li> </ul>	<p><b>Threats</b></p> <p>Capacity</p>

#### 4.1.9. Conclusion and Recommendations

Program management needs to be structured with clear roles and responsibilities among different staff posted at directorate and districts. Vacancy position needs to be reviewed every 3 months to ensure availability of required human resources.

Allocation trends of development budget are not health coupled with poor release patterns, even though utilization rate is healthy.

##### Recommendations

- The DOMCP should conduct annual review and planning meetings to deliberate and document progress made and outline priorities and milestones for the following year.
- It will be necessary to critically review all factors that led to under-achievement of strategy implementation across all objectives, as identified in this MPR. Removing the identified barriers will lead to better achievements under the next malaria strategy.
- There is need to clarify and utilize the mechanisms of engagement between the national level and district levels, including a way to report district level implementation of activities.
- Coordination and collaboration of different priority programs of health department and units and relevant partners should be enhanced through TWGs and during implementation and review of strategies and activities.
- Interventions beyond “event/one-off” activities should be conceptualized to ensure sustained achievement of expected outcomes
- Ensure that provincial governments include malaria in their annual program-based budget.
- Increase budgetary allocations.
- Advocate for more resources from all sources, including the UHC initiative and the private sector, to move towards financial sustainability.
- Develop a domestic resource mobilization strategy through a consultative process incorporating innovative financing mechanisms.
- Prepare program-based budgets and conduct expenditure reviews and analyses that can be used as advocacy and resource mobilization tools at high levels.
- Develop a sustainable financing framework for malaria control interventions.

- Provide technical assistance to DHMTs for planning, budgeting, and advocating resource allocation.
- At national, provincial and district levels, promote the expansion of existing prepayment mechanisms (e.g., the Health Card) and support the establishment of new prepayment mechanisms to reduce the financial burden on malaria services and the barriers to accessing those services.
- Systematically and routinely track financial data pertaining to allocation and spending on malaria at provincial and district levels to provide information on indicators, including the proportion of malaria budget to total health budget and the proportion of total malaria budget contributed by partners.
- Generate evidence for resource mobilization purposes that is appropriately packaged for targeted audiences.
- Develop guidelines for the mandate and membership of the Malaria Coordination Committees and malaria TWGs to strengthen program and partner coordination at provincial and district level
- Develop and implement guidelines for engagement between program implementation at the provincial and district levels.
- Develop and implement capacity building, advocacy, and resource mobilization strategies.
- Anchor the program implementation monitoring and information repository tool at the program management level for tracking implementation of malaria activities.
- Ensure that malaria services are well articulated within the PHC standards, protocols and norms in the context of universal health coverage.
- Support gender mainstreaming and human rights approaches to malaria programming to ensure an inclusive reach that targets vulnerable and marginalized populations.
- Job descriptions of all cadres may be updated if available or developed and notified by Health Department.

### **4.2 Procurement and Supply Chain Management**

#### **4.2.1 Policy**

There is no written policy for Procurement and supply chain management for provincial program. However National Procurement guide are available with GFATM funded section but not in practice by provincial program.

There are neither Quality Assurance guidelines nor a Quality Control Plan

There are no SoPs on good storage practices.

There are no guidelines and /or SoPs for specifications and quantities of these products

There are no written specifications of antimalarial drugs including ACTs, LLINs, equipment and supplies .

#### **4.2.2 Guidelines**

Sindh: Government of Sindh has established a Sindh Public Procurement Regulatory Authority (SPPRA) and adopted the procurement rules of National Public Procurement Regulatory Authority of Federal Government of Pakistan. The SPPRA public procurement guidelines outline the procurement of different services, goods and

consultancies. All public sector procurement is made according to SPPRA rules and guidelines. All procurement of Malaria Control Program including drugs, equipment, vehicles, insecticides, bed nets and services of seasonal labor is done in accordance with SPPRA rules. All procurement tenders of Malaria Control Program are advertised through national newspapers and placed on SPPRA website. SPPRA monitors all steps of procurement process and retains copies of important procurement documents.

#### **4.2.3 Registration of products**

There is no Mechanisms for registration of the malaria products

#### **4.2.4 Specifications**

There are no written specifications for the procurement of following items:

- Antimalarial drugs
- Rapid Diagnostic Tests: Technical Specification
- Long Lasting Insecticide Impregnated Nets
- IRS Insecticides and Pumps
- Insecticides For Indoor residual spraying
- Specifications for Microscopes

#### **4.2.5 Quantifications**

There are no written guidelines and/or SoPs for Antimalarial Drugs, RDTs, LLIN, spraying equipment, spraying chemicals, microscopes and microscopy supplies

#### **4.2.6 Procurement, storage and distribution**

After allocation of funds in the budget, a requisition paper is prepared by Malaria Directorate which contains specification, quantity of the required items. The approval is obtained from Secretary Health department Government of Sindh. Procurement committee is constituted comprising of Chair and four members. Usually two third of members are from outside of health department, the Director General Health services chairs the committee. Tenders are floated according to SPPRA rules, and bids are invited. Bids are opened in the presence of committee members and the bidders. After opening of bids, offers are examined in terms of technical requirements and the comparative costs. The contracts are awarded on competitive basis. After specified time, the delivery of goods is received, which are examined by inspection committee notified by secretary health. After examination of inspection committee, goods are entered in the stock registers and payments orders are issued. There is no availability of a proper warehouse however three rooms are available for storage purpose, two rooms are used for storage of insecticide, LLINs, and ULV - third room is used for storage of medicines and laboratory reagents and microscopes. There are no Storage guidelines and distribution guidelines available in writing

Procurement Process is documented as per SPPRA rules

#### **4.2.7 Inventory Management**

There are no written Inventory management guidelines available.

Inventories are managed through public sector stock register.

#### **4.2.8 Quality Control**

There are no quality control guidelines and/or mechanisms

#### 4.2.9. SWOT analysis

<p><b>Strengths</b> SEPAR rules</p>	<p><b>Weakness</b> No documented procurement Policy. No storage guidelines No warehouse</p>
<p><b>Opportunity</b> Program review may provide technical support Development of Procurement guidelines with clear specification, quantification process for malaria commodities and supplies.</p>	<p><b>Threats</b> Inadequate funding for malaria commodities Capacity</p>

#### 4.2.10. Conclusion and recommendations

Procurements and supply chain management needs to be revisited and aligned with current developments and requirements of UHC.

##### Recommendations

- Introduce malaria procurement and supply management system at the provincial level for effective management of all commodities.
- Adapt, develop and print procurement and supply management guidelines.
- Introduce logistic management information system for commodity data analysis and visualization to ensure end-to-end visibility of the supply chain.
- Establish a malaria commodity logistics and inventory control system.
- Build capacity in commodity management at the provincial and district levels.

#### 4.3 Vector Control

##### 4.3.1 Introduction

There is neither any mechanism for vector surveillance in program nor a mechanism to record of the Vector density reports

There are two Insect and entomology reference laboratories at Khairpure and Mirpurkhas, both are currently non-functional.

There is no mechanism and/or guidelines form Insecticide susceptibility testing

##### 4.3.2 Policy and guidance

National LLNI distribution strategy and IRS manual are available. There is neither a written Integrated Vector Management policy nor an IVM guidelines available adapted by Sindh.

##### 4.3.3 Organizational structure of Vector control

There is no section titled VECTOR CONTROL in organogram

##### 4.3.4 Guidance

There are no national or provincial Vector Control Guidelines.

##### 4.3.5 Human resources: training and capacity development

No trainings in vector management and/or control has been conducted during 2014-18

#### 4.3.6 Annual planning

There are no Integrated Vector Management plans available in records

There are no Indoor Residual spray targets. Indoor Residual Room spray is conducted without any target on availability of the supplies and budget.

#### 4.3.7 Service delivery outputs and outcomes

##### 4.3.7.1. Indoor Residual Spray by Malaria Control Program

Indoor residual Spray during this period of five years has been only done by Malaria Control Program through public sector financing. In 24 health districts 16% of target houses and 13 % of target rooms were covered (details are in Annex- Table – 13)

##### 4.3.7.2. Long Lasting Insecticide treated Nets

For distribution of the LLIN in community there has been two strategies mass and pregnant mothers attending ANC clinics at health facility.

Malaria Control Program Sindh through public sector financing has distributed 157,554 units of LLNI in 24 health districts during financial year 2013-14 to 2017-18 through mass distribution strategy (details are in Annex- Table – 14)

Under the strategy of pregnant mothers attending ANC clinics at health facility NRSP distributed 30,394 LLNI in target districts and PLYC distributed 241,754 LLNI in target districts during period of 2014-18. (Details are in Annex Table-15)

Under the strategy of mass distribution PLYC distributed 1,146,887 units in target districts during period of 2014-18 (Details are in Annex Table-16).

#### 4.3.8. Larval Source Management

There is national policy which is adapted as part of Sindh strategy. Generic guidelines by WHO are used, which requires adaptation at local level.

Malaria Control Program Sindh has sprayed 657,402,800 square meters of area using 30,930 liters of Temphos 50% EC in 618,600,000 sqM and 97,007 liters of Fenethion 2% G +Temphos 1%G combination in 38,802,800 sqM (Details are in Annex Table-17)

#### 4.3.9 Successes, best practices and facilitating factors

There is none to be mentioned

#### 4.3.10. SWOT analysis

<p><b>Strengths</b></p> <p>SEPAR rules</p>	<p><b>Weakness</b></p> <p>No documented procurement Policy.</p> <p>No storage guidelines</p> <p>No warehouse</p>
<p><b>Opportunity</b></p> <p>Program review may provide technical support</p> <p>Development of Procurement guidelines with clear specification, quantification process for malaria commodities and supplies.</p>	<p><b>Threats</b></p> <p>Inadequate funding for malaria commodities</p> <p>Capacity</p>

#### **4.3.11. Conclusion and recommendations**

Vector control is a neglected part of the program.

##### **Recommendations:**

- Prioritize investment in epidemiological and entomological surveillance in line with the requirements of the Global Technical Strategy and WHO malaria surveillance monitoring and evaluation reference manual (WHO, 2018).
- Use stratification for targeting interventions. At a minimum, this should be done by district, although it is best to do this by facility.
- Incorporate relevant entomological indicators (vector species diversity, ecology, and bionomics) to enable updating of the malaria transmission map.
- Include entomological impact indicators in the performance framework of the next strategy.
- Strengthen the capture and reporting of outpatient and inpatient morbidity and mortality information to monitor the impact of interventions.
- Ensure the routine conduct of susceptibility testing for insecticides and fast-track the registration of new vector control products for managing insecticide resistance.

#### **4.4 Malaria: diagnosis and case management**

##### **4.4.1 Introduction**

Access to diagnostic testing

Access to treatment

##### **4.4.2 Policy and guidance**

National Malaria Case Management guide for Uncomplicated as well as complicated cases in English and urdu are available. No Sindhi version and/or provincial guidelines are available. Malaria in pregnancy is part of the earlier guidelines. No separate guidelines are available. National Malaria Microscopy Training manual in Urdu and English and provincial in Urdu are available. No Sindhi version.

National Malaria Microscopy Desk Guide in English is available.

National LLIN distribution strategy in English is available.

##### **4.4.3 Organization of Case Management Services**

In 2,473 health facilities reporting through DHIS in the province, there are 345 microscopy sites in 24 health districts (details are available in Annex Table 18). These sites are located at 07 teaching hospitals, 23 DHQ level, 44 THQ level, 87 RHC level, 127 BHU level and 57 other health facilities below BHU level.

##### **4.4.4 Human resources: training and capacity development**

Out of 2,473 health facilities reporting through DHIS in the province, 34% health facilities have Malaria treatment guidelines and at least one health care provider trained on guidelines.

In 13 GFATM covered districts the coverage is 62%. (details are available in Annex Table 19).

##### **4.4.5 Annual planning**

Annual plans for BCC /IEC /Advocacy and social mobilization are not available

#### 4.4.6 Malaria Diagnosis

In 2,473 public sector health facilities reporting through DHIS in the province, 928 have malaria diagnostic capacity (345 microscopy and 583 RDT) which constitutes 38% in 24 health districts.

There are 196 private providers who are using RDT at clinics in 13 GFATM covered districts (details are available in Annex Table 20)

None of the private hospitals in 24 health districts have microscopy or RDT service in collaboration with Malaria Control Program

#### 4.4.7 Malaria Treatment

In 13 GFATM target districts at first level care Facilities (FLCFs) and private clinics 1,673,691 RDTs used to diagnose 195,019 malaria cases. 100% of the 68,725 confirmed PF cases treated with ACT as the first line treatment in 13 target districts (details are available in Annex Table- 21)

#### 4.4.8 Malaria Prophylaxis

There are no Malaria Prophylaxis guidelines

#### 4.4.9 Performance indicators and targets

##### Performance Indicators:

- Uncomplicated malaria getting correct treatment at health facility
- Uncomplicated malaria getting correct treatment at community levels
- Patients with severe/complicated malaria correctly managed at health facility
- Public health facilities with adequate antimalarial drugs
- Public health facilities with adequate diagnostic supplies
- Diagnosed P. Falciparum cases treated with ACTs
- Private sector health care providers involved in malaria case management
- Sentinel sites reporting on antimalarial drug resistance
- There are no set targets for these indicators

#### 4.4.10 Service Delivery outputs and outcomes

- Uncomplicated malaria getting correct treatment at health facility - 104,568
- Uncomplicated malaria getting correct treatment at community levels - 0
- Patients with severe/complicated malaria correctly managed at health facility - 249
- Public health facilities with adequate antimalarial drugs - 866
- Public health facilities with adequate diagnostic supplies - 866
- Diagnosed P. Falciparum cases treated with ACTs – 27,119
- Private sector health care providers involved in malaria case management- 196
- Sentinel sites reporting on antimalarial drug resistance - 0

(Details are available in Annex Table -22)



#### 4.4.11. SWOT analysis

<p><b>Strengths</b> SPPRA rules</p>	<p><b>Weakness</b> No documented procurement Policy. No storage guidelines No warehouse</p>
<p><b>Opportunity</b> Program review may provide technical support Development of Procurement guidelines with clear specification, quantification process for malaria commodities and supplies.</p>	<p><b>Threats</b> Inadequate funding for malaria commodities Capacity</p>

#### 4.4.12. Conclusion and recommendations

**Microscopy capacity of the program has declined over the time with addition of the RDT technology.**

##### Recommendations

- Enhance capacity in case management at both the provincial and district levels, including pre- and in-service training.
- Incorporate evidence-based behavior change components in the curriculum and improve tracking of trained health workers.
- Introduce mechanisms for monitoring of the quality of care for improvement of malaria case management at provincial and district levels both in the public and private sectors.
- Strengthen private sector engagement involved in malaria case management to sustain the achievements and engage private sector medical universities, colleges, midwifery schools and paramedical institutes and their teaching hospital.
- Ensure use of the approved guidelines for malaria case management and parasitological diagnosis for safe, evidence based, and harmonized practice in the public and private sector and at the community level.
- Plan community case management for malaria through LHWs in priority areas, and integrate it with other community-level interventions.

#### 4.5 Advocacy, BCC, IEC and Social Mobilization

##### 4.5.1 Introduction

The National Malaria Control Program recognizes that effective advocacy, communication and social mobilization forms the foundation of any efforts to effectively change service-providers ability, community behavior and overall demand for effective service utilization. Every planning document whether it is PC-I or strategic plan has included BCC as one of the key component for disease control through behavior change.

##### 4.5.2 Policy and Guidance

National BCC, SoPs and flipcharts are available but not in knowledge of the health education section responsible for the activities in program.

#### 4.5.3 Organization

Advocacy/BCC/IEC unit under the heading of Health Education Unit has two Health Education Officers at provincial level. There is no coordination mechanism between program and GFATM human resource in writing.

#### 4.5.4 Human resources: training and capacity development

No training data available from partners and Malaria Program

#### 4.5.5 Annual planning

No annual plans for the program are available.

#### 4.5.6 Performance indicators and target

To be documented every 3 years from data printed in MICS Sindh by DOMC

Indicator of population coverage	Target
Proportion of mothers/care givers who know that LLINs and IRS are methods of preventing malaria	More than 90% of mothers/care givers who know that LLINs and IRS are methods of preventing malaria
Percentage of mothers/care givers who know that children under 5 years with fever should be seen by a health care provider	More than 90% of mothers/care givers who know that children under 5 years with fever should be seen by health care providers
Percentage of household representative who know that malaria should be diagnosed with Microscopy or RDT	More than 90% of households representatives know that malaria should be diagnosed with microscopy/RDT

#### 4.5.7 Service Delivery outputs and outcomes

- Advocacy events with community based activists including lady health workers - 5,573
- Community awareness session at community and facility level by LHWs - 30,171
- Community awareness sessions at community and facility level by CBOs/NGOs - 85,073  
(Details are available in Annex Table- 23)

#### 4.5.8. SWOT analysis

<p><b>Strengths</b></p> <p>SEPAR rules</p>	<p><b>Weakness</b></p> <p>No documented procurement Policy.</p> <p>No storage guidelines</p> <p>No warehouse</p>
<p><b>Opportunity</b></p> <p>Program review may provide technical support</p> <p>Development of Procurement guidelines with clear specification, quantification process for malaria commodities and supplies.</p>	<p><b>Threats</b></p> <p>Inadequate funding for malaria commodities</p> <p>Capacity</p>

#### **4.5.9. Conclusion and recommendations**

Office of health education officer requires a good support to look after the intervention from public sector and partners in area of behavior change with documented advocacy plan. Processes to develop IEC materials and organize BCC activities.

Recommendations

- Scale up malaria advocacy at the provincial and district levels for increased use of malaria interventions.
- Strengthen community-specific social behavior change communication planning and implementation.
- Build the capacity of healthcare providers in social behavior change communication at all levels.
- Leverage the community strategy to deliver community-based malaria control activities.
- Update provider knowledge on new guidelines at all levels, while rolling out interpersonal communication to address behavioral barriers to attaining targets.
- Develop standard messages for adaptation and contextualization by the counties and other stakeholders.
- Enhance private and non-health sector engagement to undertake advocacy, communication and social mobilization for malaria with clear mandate and guidelines.
- Support community engagement for social accountability for malaria.
- Adapt, Develop and print IEC materials in local languages

#### **4.6 Malaria in Pregnancy**

##### **4.6.1 Introduction**

Malaria in pregnancy focuses on intermittent prophylactic treatment of malaria in pregnancy during ANC at health facility and community levels.

##### **4.6.2 Policy and Guidance**

There are no separate Guidelines for Malaria in pregnancy, it is part of malaria treatment guidelines for health care providers.

##### **4.6.3 Organization of MIP service delivery**

No organizational arrangement for the thematic area

##### **4.6.4 Human resources: training and capacity development**

No separate training planned

##### **4.6.5 Annual Planning**

No Annual plans for MIP are available

##### **4.6.6 Performance Indicators and Targets**

No performance indicators set for MIP

##### **4.6.7 Service delivery outputs and outcomes**

No separate service delivery targets

#### 4.6.8. SWOT analysis

<p><b>Strengths</b></p> <p>SEPAR rules</p>	<p><b>Weakness</b></p> <p>No documented procurement Policy.</p> <p>No storage guidelines</p> <p>No warehouse</p>
<p><b>Opportunity</b></p> <p>Program review may provide technical support</p> <p>Development of Procurement guidelines with clear specification, quantification process for malaria commodities and supplies.</p>	<p><b>Threats</b></p> <p>Inadequate funding for malaria commodities</p> <p>Capacity</p>

#### 4.6.9. Conclusion and recommendations

Malaria in pregnancy is neglected area needs proper attention and planning for successful execution

##### Recommendations

- Ensure availability of updated policies and guidelines for implementation of MIP at all levels including pre-service.
- Introduce ISTp in ANC protocol at all levels including community level by promoting its use through LHW structures.
- Align medicine and LLIN provision with the PCPNC guidelines.
- Strengthen the partnership between the DOMCO, MNCH Program, LHW program, PPHI, IHS, HANDS, MERF, Indus, SOGP and teaching institutions for ease of scaling up and sustaining MIP interventions

#### 4.7. Surveillance, Monitoring and Evaluation

##### 4.7.1 Introduction

The Malaria surveillance system incorporates data from only public sector health facilities and is fragmented. It is a passive surveillance system, where, data is collected from patients who report to health facilities. Malaria is not a notifiable disease, data from private sector is not included.

##### 4.7.2 Policy, Guidance, Coordination

There are multiple MIS systems in practice in the province like:

- Program MIS of DOMCP
- Malaria MIS used by GFATM
- DHIS (provincial)
- LHW program
- MNCH program
- Nutrition Programs

There are no Policy, guidelines or coordination mechanisms are documented at provincial level on processes to get relevant information from these sources.

Last coordination meeting held is DHO/DMU coordination held on March 19, 2019 / Indus Hotel Hyderabad

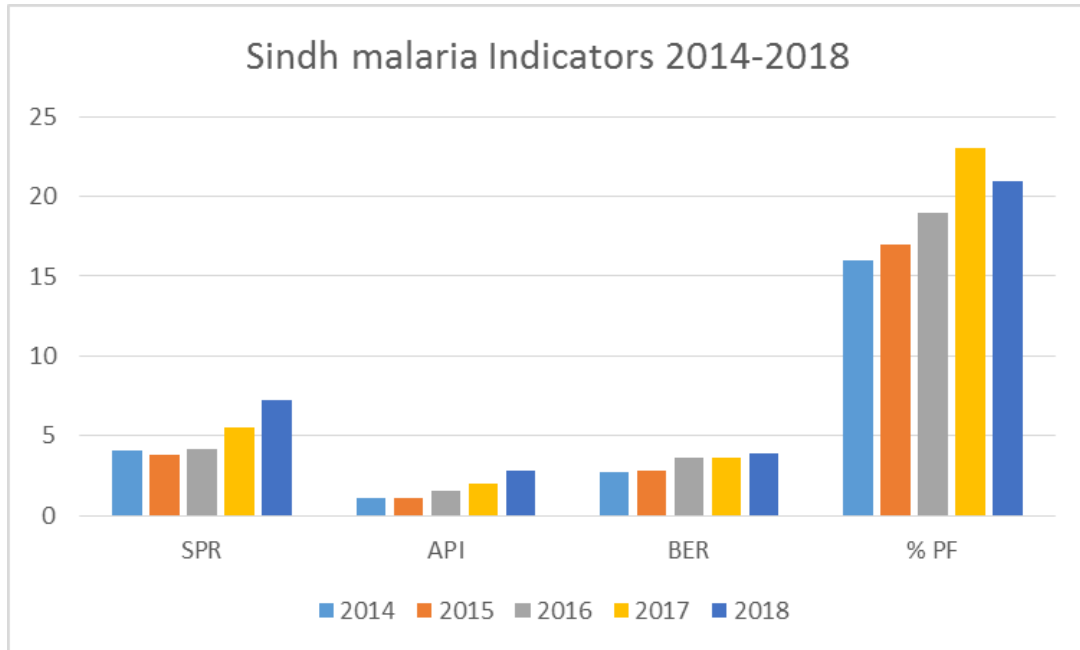
**4.7.3 Malaria profile, risk mapping and stratification**

Slide positivity rate has increased from 4.1% in 2014 to 7.2% in 2018.

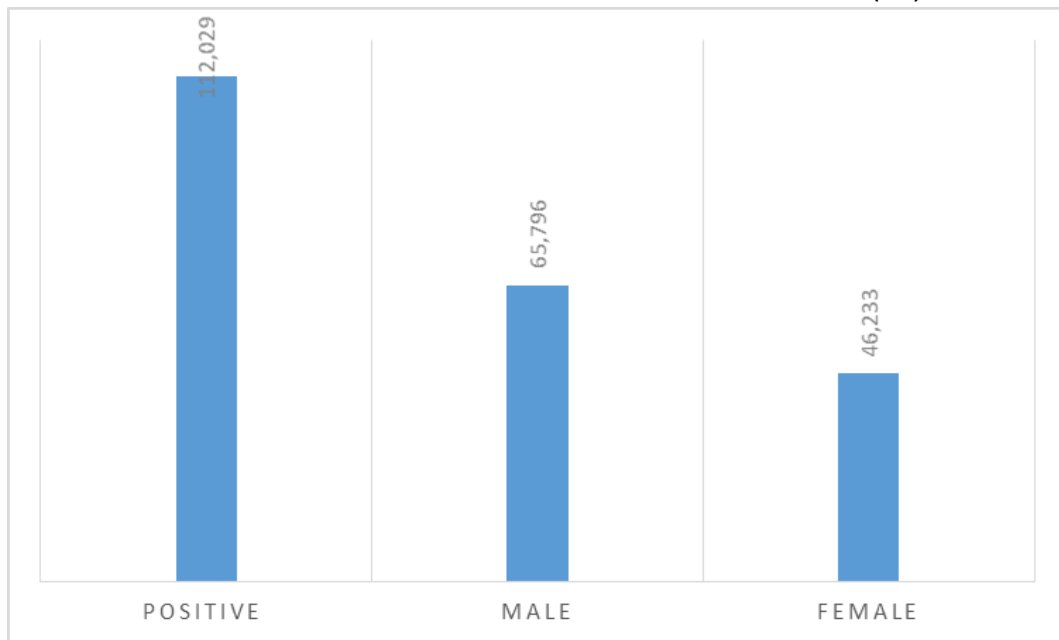
Annual Parasite Incidence is on rise from 1.1% in 2014 to 2.8% in 2018.

Falciparum Ration is also on rise from 16% in 2014 to 21% in 2018.

(District wise details are in Annex Table -24 and 25)



Gender distribution of Malaria Positive case in GFATM districts (13) in 2018

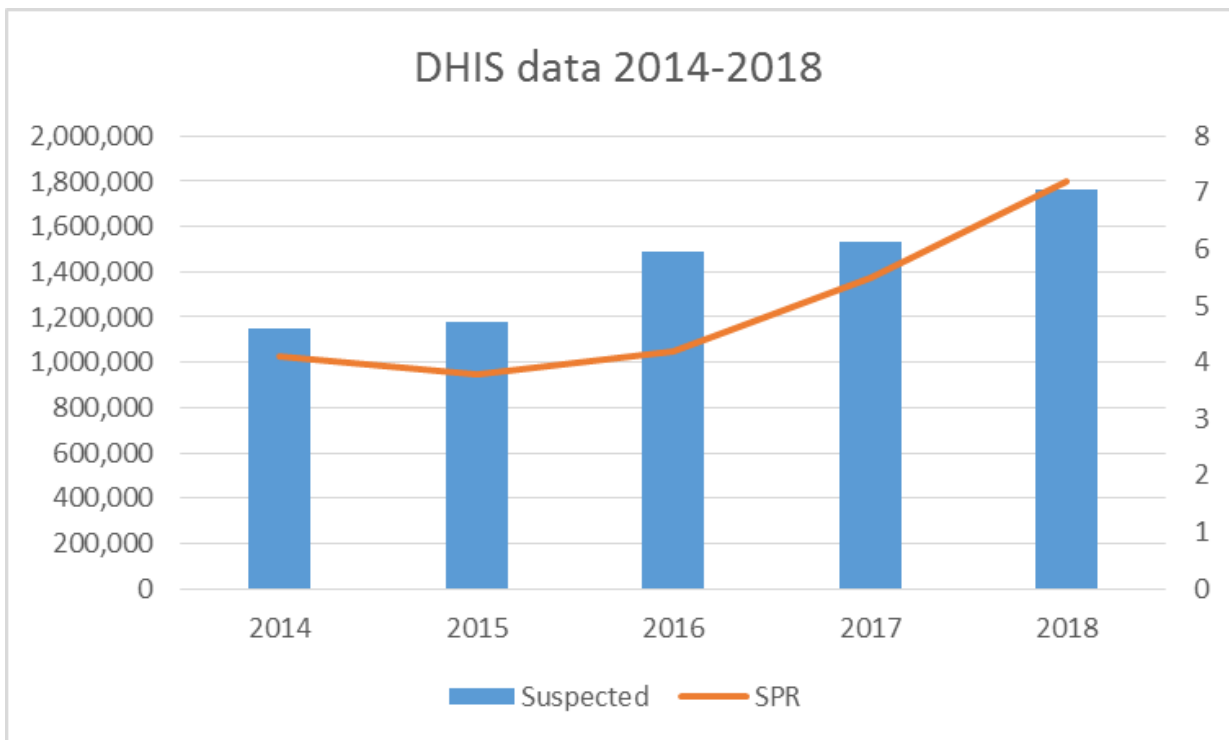
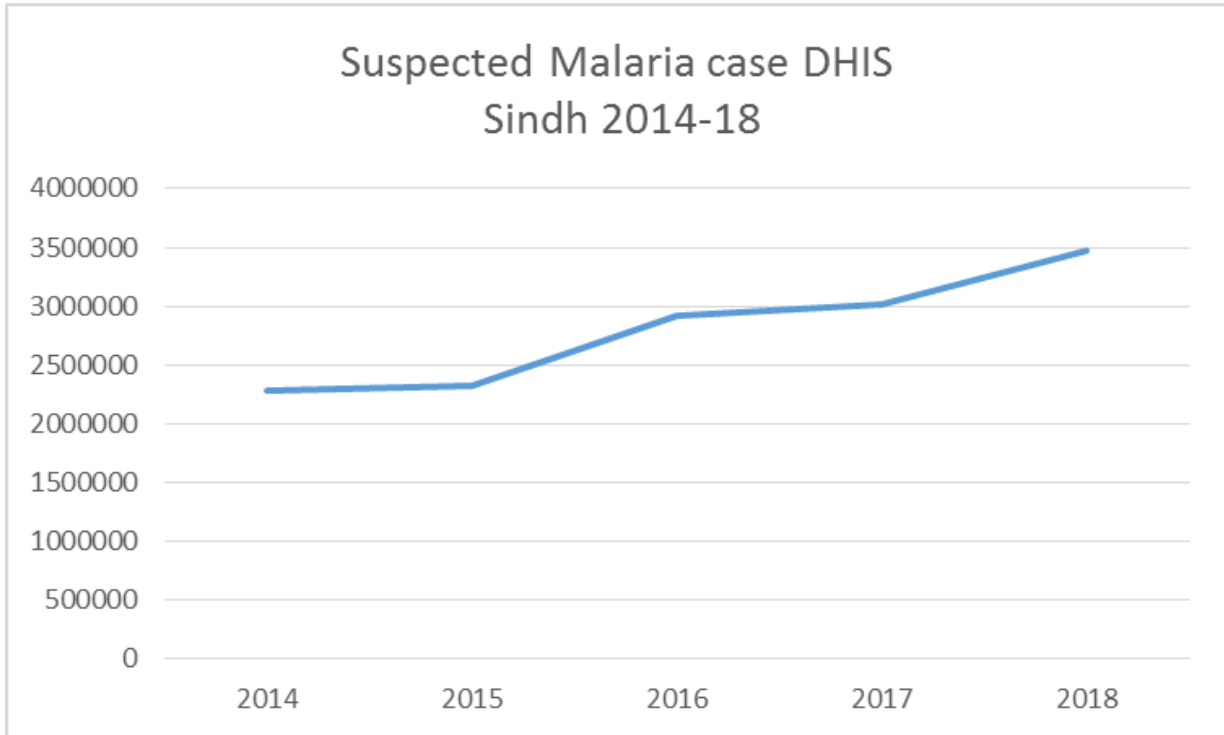


**4.7.4 Human resources: training and capacity development**

No Surveillance training conducted during 2014- 2018

**4.7.5 Routine Information Systems**

Suspected malaria cases reported from 2,473 health facilities reporting through DHIS in the province were 2,274,734 in 2014. The total reported cases in 2018 are 3,469,701. There is increase of 1,194,967 cases from 2014 and 460,100 cases from 2017 (details are in Annex Table-26)



#### **4.7.6 Sentinel Surveillance Systems**

In 2,473 health facilities reporting through DHIS in the province, there are 345 microscopy sites in 24 health districts (details are available in Annex Table 18). All these sites are assumed as Sentinel Surveillance sites even though there is no official notification for the same.

These sites are located at 07 teaching hospitals, 23 DHQ level, 44 THQ level, 87 RHC level, 127 BHU level and 57 other health facilities below BHU level.

#### **4.7.7 Monitoring and Evaluation Plan**

There are no M&E plans and /or monitoring plans and /or reports available at directorate.

In 2018 PLYC conducted 3,328 monitoring visits in 8 assigned district achieving 100% as planned.

In 2018 NRSP conducted 415 monitoring visits in 5 assigned district achieving 282% against planned 147. (Details are available in Annex Table-27)

#### **4.7.8 Malaria Surveys**

No operations research has been conducted during 2014-2018

No survey has been conducted during 2014-18

#### **4.7.9 Malaria Reporting**

The Malaria data is collected and recorded under the following programs.

- Malaria Program Information System (DOMCP)
- Malaria MIS (GFATM)
- DHIS and
- LHW-MIS

There is no coordination mechanism to avoid duplication and ensure data quality from different independent sources.

#### **4.7.10 Malaria database and informatics System**

There is not a single MIS system for malaria.

DHIS2 is in practice by GFATM

There is neither human resource nor consumable supplies database software available.

Directorate records all information in registers manually.

#### **4.7.11 Progress towards achievement of targets**

Public sector health facilities with malaria testing capability – 929 (38%)

Health care providers trained on national case management guidelines in public and private sectors – 425 (79%)

Confirmed PF cases treated with ACT as the first line treatment- 26,516 (100%)

**4.7.12. SWOT analysis**

<p><b>Strengths</b> SEPAR rules</p>	<p><b>Weakness</b> No documented procurement Policy. No storage guidelines No warehouse</p>
<p><b>Opportunity</b> Program review may provide technical support Development of Procurement guidelines with clear specification, quantification process for malaria commodities and supplies.</p>	<p><b>Threats</b> Inadequate funding for malaria commodities Capacity</p>

**4.7.13. Conclusion and recommendations**

Surveillance needs a strong framework for positive results towards malaria control

**Recommendations**

- Integrate malaria Epidemic preparedness and response (EPR) with surveillance at the provincial and district levels.
- Develop TWG terms of reference, surveillance manuals, and guidelines to include EPR functions.
- Strengthen the capacity of the sentinel health facilities to improve functionality and to routinely provide timely, accurate, and reliable information, including threshold monitoring.
- Include EPR activities in all national, provincial and district annual work plans.
- Regularly conduct epidemiological and entomological stratification to guide the targeting of intervention deployment.
- Strengthen malaria surveillance, including the development of guidelines and revision of available DHIS tools to guide implementation in the context of changing epidemiology.
- Advocate for increased investments in surveillance at both the provincial and district levels to achieve better quality information for decision making for impact.
- Enhance data ownership and use of information for decision making at the provincial and district levels.
- Establish a network of health facilities to enhance the availability of inpatient morbidity and mortality data.
- Strengthen collaboration between the program and the research community to allow sharing of research findings for public health use.
- Develop capacity at national and subnational levels for data demand and use to inform programmatic decisions



**Provincial Malaria control Program Sindh - Key Issues and recommendations**

Key Issues	Recommendations
Management	<p>Improve efficiency in use of existing resources and advocate for increased sustainable investment for malaria interventions.</p> <p>Increase visibility and prioritization of the malaria agenda through innovative and sustained advocacy and communication at all levels to support the universal access and coverage of malaria interventions.</p> <p>Improve malaria commodity security through end-to-end supply chain visibility and promotion of data use for supply chain decision making.</p>
Annual Plans	<p>Annual plans to be developed with clear framework for data documentation based on objectives, targets, indicators as agreed in Sindh Strategic Framework 2015-20</p>
Guidelines	<p>Sindh Malaria Control Program should adapt available National as well as WHO guidelines for different trainings, case management, microscopy, RDT, procurement, LLNI distribution, Integrated Vector Management, Indoor Residual Spray, BCC, counselling, procurement, specification, quantification, quality assurance, MIS at provincial level and print with Government of Sindh logo for use in public as well as private sector health outlets.</p> <p>There should be Urdu and Sindh version of the guidelines.</p>
Annual reports	<p>Annual reports may be prepared using strategic framework Indicators</p>
Training and Database	<p>There should be an integrated training and human resource development plan with a computerized Human resource database.</p> <p>Strengthen capacity-building initiatives for enhanced skills and competencies for quality delivery of interventions.</p>
Consumable and Supplies database	<p>There should be a integrated computer based logistic management information system (LMIS) for malaria commodities</p>
Partnership and Coordination	<p>There should be written policy and guidelines for development of institutional partnerships and forums to coordinate with clear frequency of the meetings with priority program in health department, Medical Universities, CPSP, Nursing/Midwifery Schools and Colleges, Public Health Schools, Health Technicians Schools, Paramedical Institutes and line departments specially local government, public health, education, agriculture, family planning and environment.</p>
Program Coordination	<p>Annual calendar of coordination meetings with districts, partners, technical committee and steering committee should be developed as part of the annual plan.</p>

## Sindh Malaria Program Thematic Review 2019

Malaria Diagnosis and Microscopy Centers	Number of Microscopy centers is sliding down overtime. Being gold standard for malaria diagnosis and management. There should be a clear plan and annual target along with human resource induction and development plan to cover the following 1,495 health outlets (up to the level of MCH centers) in next 5 years and 2,473 health outlets with either of microscopy or RDT service to ensure Universal Health Coverage of public sector service outlets
Malaria in Pregnancy (MIP)	The most neglected area at present should be comprehensively planned with professional bodies like SOGP, MAP and PPA. Teaching Institutes like Medical Universities, CPSP, Nursing/Midwifery Schools and Colleges, Public Health Schools, Health Technicians Schools, Paramedical Institutes to integrate MIP in antenatal care services across the board.
Behavior Change Communication (BCC)	<p>BCC should be organized scientifically right from:</p> <ul style="list-style-type: none"> <li>• Behavior mapping</li> <li>• Behavior sorting</li> <li>• Behavior short listing</li> <li>• Behavior change strategies</li> <li>• Behavior development protocol</li> </ul>
IEC materials	IEC materials should be adapted at provincial level and printed in Sindhi and Urdu (bilingual)
Advocacy	Annual advocacy plant with clear targets and verifiable indicators
Data Management	<p>Data recording, reporting and report writing should be documented clearly.</p> <p>Hard copies of the following should be ensured signed by Director Malaria Control Program Sindh</p> <ul style="list-style-type: none"> <li>• Monthly Reports</li> <li>• Quarterly Reports</li> <li>• Annual Reports</li> </ul> <p>All reports should be formulated based on indicators agreed in strategic framework.</p>

# Annexes

**Table: 1. Sindh Malaria Epidemiology 2014-2018**

Year	Population	Slides / RDTs examined					Indicators			
		Total Screened	Positive	PV	PF	Mix	SPR	API	BER	% PF
2014	42,922,727	1,151,001	47,640	38,320	7,626	1,694	4.1	1.1	2.7	16
2015	41,364,005	1,177,981	44,728	34,996	7,738	1,994	3.8	1.1	2.8	17
2016	41,364,005	1,486,997	63,109	45,840	11,688	5,581	4.2	1.5	3.6	19
2017	42,849,534	1,534,598	84,210	62,685	19,073	2,452	5.5	2.0	3.6	23
2018	45,009,349	1,764,985	126,252	98,351	26,516	1,385	7.2	2.8	3.9	21

**Table-2: Malaria Epidemiological Trends Overtime**

Year	No of Slides	Total Positive	Plasmodium Vivax	Plasmodium Falciparum	Mix (PV+PF)	SPR	FR%
2001	705,126	24,502	11,988	12,532	18	3.47	51
2002	731,038	23,215	12,938	10,282	05	4.17	44
2003	902,021	38,231	20,445	17,795	09	4.23	47
2004	1,521,648	40,697	27,326	13,371	0	2.67	33
2005	1,313,818	27,845	17,490	10,359	04	2.12	37
2006	1,376,923	34,609	19,051	15,558	0	2.51	45
2007	1,021,822	25,260	16,534	8,726	0	2.47	34
2008	954,028	26,093	17,682	8,415	04	2.73	32
2009	1,113,765	27,476	19,112	8,364	0	2.46	30
2010	1,275,732	57,075	34,304	22,289	482	4.50	39
2011	1,290,835	87,607	48,119	34,499	4,989	6.7	39
2012	1,785,499	114,651	79,511	31,083	4,057	6.4	27
2013	1,275,543	70,269	51,094	14,273	4,902	5.5	20
2014	1,151,001	47,640	38,320	7,626	1,694	4.1	16
2015	1,177,981	44,728	34,996	7,738	1,994	3.8	17
2016	1,486,997	63,109	45,840	11,688	5,581	4.2	19
2017	1,534,598	84,210	62,685	19,073	2,452	5.5	23
2018	1,764,985	126,252	98,351	26,516	1,385	7.2	21

**Table-3: Malaria Epidemiological Data 2014**

District	Population	Slides	PV	PF	Mix	Total	BER	SPR	PI	FP%
Hyderabad	1,847,106	27,268	180	20	1	201	1.5	0.7	0.1	10.0
Tando Allahyar	595,370	20,570	653	96	76	825	3.5	4.0	1.4	11.6
Matiari	655,066	20,196	555	41	0	596	3.1	3.0	0.9	6.9
Tando Muhammad Khan	624,222	10,949	453	54	4	511	1.8	4.7	0.8	10.6
Badin	1,355,629	55,855	1,710	465	0	2,175	4.1	3.9	1.6	21.4
Khairpur	2,123,193	121,410	7,972	1,986	395	10,353	5.7	8.5	4.9	19.2
Shaheed Benazirabad	1,311,240	70,653	1,678	112	9	1,799	5.4	2.5	1.4	6.2
Naushehro Feroz	1,325,646	62,268	2,567	337	0	2,904	4.7	4.7	2.2	11.6
Mirpurkhas	1,574,873	50,790	2,531	422	445	3,398	3.2	6.7	2.2	12.4
Umerkot	967,012	69,832	1,571	189	31	1,791	7.2	2.6	1.9	10.6
Tharparkar	1,291,133	51,854	2,419	193	72	2,684	4.0	5.2	2.1	7.2
Sanghar	1,857,803	69,269	1,022	86	0	1,108	3.7	1.6	0.6	7.8
Sukkur	1,269,424	23,267	678	263	0	941	1.8	4.0	0.7	27.9
Shikarpur	1,158,611	48,552	1,028	361	0	1,389	4.2	2.9	1.2	26.0
Ghotki	1,412,594	39,765	1,595	250	0	1,845	2.8	4.6	1.3	13.6
Jacobabad	1,002,407	48,776	2,016	199	0	2,215	4.9	4.5	2.2	9.0
Kashmore	858,082	20,839	377	147	0	524	2.4	2.5	0.6	28.1
Larkana	1,486,865	41,219	1,742	260	6	2,008	2.8	4.9	1.4	12.9
Kamber	1,138,401	18,260	1,200	163	0	1,363	1.6	7.5	1.2	12.0
Dadu	1,508,823	123,623	1,482	431	66	1,979	8.2	1.6	1.3	21.8
Jamshoro	793,809	11,960	674	131	0	805	1.5	6.7	1.0	16.3
Karachi	15,309,905	79,965	1,602	142	0	1,744	0.5	2.2	0.1	8.1
Thatta	1,455,513	63,861	2,615	1,278	589	4,482	4.4	7.0	3.1	28.5
TOTAL :-	42,922,727	1,151,001	38,320	7,626	1,694	47,640	2.7	4.1	1.1	16.0

Table-4: Malaria Epidemiological Data 2015

District	Population	Slides	PV	PF	Mix	Total	BER	SPR	PI	FP%
Hyderabad	1,827,399	34,629	179	36	1	216	1.9	0.6	0.1	16.7
Tando Allahyar	603,311	18,217	319	99	49	467	3.0	2.6	0.8	21.2
Matiari	604,188	19,501	880	14	0	894	3.2	4.6	1.5	1.6
Tando Muhammad Khan	499,801	14,092	203	21	5	229	2.8	1.6	0.5	9.2
Badin	1,428,472	56,798	1,282	255	0	1,537	4.0	2.7	1.1	16.6
Khairpur	2,049,908	137,707	6,298	2,302	550	9,150	6.7	6.6	4.5	25.2
Shaheed Benazirabad	1,251,053	73,562	2,173	234	6	2,413	5.9	3.3	1.9	9.7
Naushehro Feroz	1,266,783	52,140	2,308	136	0	2,444	4.1	4.7	1.9	5.6
Mirpurkhas	1,196,560	54,480	1,953	709	565	3,227	4.6	5.9	2.7	22.0
Umerkot	939,242	69,154	1,054	131	0	1,185	7.4	1.7	1.3	11.1
Tharparkar	1,272,658	45,842	1,114	191	52	1,357	3.6	3.0	1.1	14.1
Sanghar	1,932,662	60,710	784	51	0	835	3.1	1.4	0.4	6.1
Sukkur	1,228,126	28,419	797	256	0	1,053	2.3	3.7	0.9	24.3
Shikarpur	1,114,991	46,729	1,367	186	0	1,553	4.2	3.3	1.4	12.0
Ghotki	1,371,545	33,644	1,685	167	0	1,852	2.5	5.5	1.4	9.0
Jacobabad	909,084	35,050	1,559	127	0	1,686	3.9	4.8	1.9	7.5
Kashmore	837,741	25,584	1,032	306	0	1,338	3.1	5.2	1.6	22.9
Larkana	1,397,446	84,284	2,652	389	0	3,041	6.0	3.6	2.2	12.8
Kamber	1,288,080	20,904	1,301	190	0	1,491	1.6	7.1	1.2	12.7
Dadu	1,456,637	91,359	1,051	167	3	1,221	6.3	1.3	0.8	13.7
Jamshoro	766,139	10,601	450	64	0	514	1.4	4.8	0.7	12.5
Karachi	14,722,438	69,093	1,444	223	0	1,667	0.5	2.4	0.1	13.4
Thatta	731,734	76,734	2,619	1,230	688	4,537	10.5	5.9	6.2	27.1
Sujawal	668,007	18,748	492	254	75	821	2.8	4.4	1.2	30.9
Total	41,364,005	1,177,981	34,996	7,738	1,994	44,728	2.8	3.8	1.1	17.3

Table-5: Malaria Epidemiological Data 2016

District	Population	Slides	PV	PF	Mix	Total	BER	SPR	PI	FP%
Hyderabad	1,827,399	50,255	347	47	0	394	2.8	0.8	0.2	11.9
Tando Allahyar	603,311	40,342	1,063	280	245	1,588	6.7	3.9	2.6	17.6
Matiari	604,188	20,388	1,012	65	0	1,077	3.4	5.3	1.8	6.0
Tando Muhammad Khan	499,801	8,528	151	54	14	219	1.7	2.6	0.4	24.7
Badin	1,428,472	79,937	1,755	428	0	2,183	5.6	2.7	1.5	19.6
Khairpur	2,049,908	188,369	7,305	2,405	842	10,552	9.2	5.6	5.1	22.8
Shaheed Benazirabad	1,251,053	68,843	1,953	138	3	2,094	5.5	3.0	1.7	6.6
Naushehro Feroz	1,266,783	70,739	2,557	219	0	2,776	5.6	3.9	2.2	7.9
Mirpurkhas	1,196,560	86,167	4,559	1,304	1,820	7,683	7.2	8.9	6.4	17.0
Umerkot	939,242	69,475	1,122	178	0	1,300	7.4	1.9	1.4	13.7
Tharparkar	1,272,658	79,303	2,749	1,824	212	4,785	6.2	6.0	3.8	38.1
Sanghar	1,932,662	66,233	988	62	0	1,050	3.4	1.6	0.5	5.9
Sukkur	1,228,126	33,844	728	260	0	988	2.8	2.9	0.8	26.3
Shikarpur	1,114,991	47,705	1,128	190	0	1,318	4.3	2.8	1.2	14.4
Ghotki	1,371,545	44,445	1,720	160	0	1,880	3.2	4.2	1.4	8.5
Jacobabad	909,084	64,982	2,310	201	0	2,511	7.1	3.9	2.8	8.0
Kashmore	837,741	24,687	970	307	0	1,277	2.9	5.2	1.5	24.0
Larkana	1,397,446	95,602	3,243	379	0	3,622	6.8	3.8	2.6	10.5
Kamber	1,288,080	26,152	1,968	122	0	2,090	2.0	8.0	1.6	5.8
Dadu	1,456,637	108,122	1,076	179	0	1,255	7.4	1.2	0.9	14.3
Jamshoro	766,139	12,247	572	79	0	651	1.6	5.3	0.8	12.1
Karachi	14,722,438	87,023	1,991	284	1	2,276	0.6	2.6	0.2	12.5
Thatta	731,734	72,771	2,945	1,633	1,968	6,546	9.9	9.0	8.9	24.9
Sujawal	668,007	40,838	1,628	890	476	2,994	6.1	7.3	4.5	29.7
Total	41,364,005	1,486,997	45,840	11,688	5,581	63,109	3.6	4.2	1.5	18.5

Table-6: Malaria Epidemiological Data 2017

District	Population	Slides	PV	PF	Mix	Total	BER	SPR	PI	FP%
Hyderabad	1,827,399	59,595	890	93	0	983	3.3	1.6	0.5	9.5
Tando Allahyar	603,311	65,327	2,082	570	66	2,718	10.8	4.2	4.5	21.0
Matiari	604,188	15,640	689	67	0	756	2.6	4.8	1.3	8.9
Tando Muhammad Khan	499,801	16,755	1,639	334	95	2,068	3.4	12.3	4.1	16.2
Badin	1,428,472	55,956	2,419	808	37	3,264	3.9	5.8	2.3	24.8
Khairpur	2,049,908	197,245	6,752	1,884	283	8,919	9.6	4.5	4.4	21.1
Shaheed Benazirabad	1,251,053	69,974	1,982	153	2	2,137	5.6	3.1	1.7	7.2
Naushehro Feroz	1,266,783	68,470	2,140	202	1	2,343	5.4	3.4	1.8	8.6
Mirpurkhas	1,196,560	97,079	7,167	2,913	483	10,563	8.1	10.9	8.8	27.6
Umerkot	939,242	66,130	2,787	553	109	3,449	7.0	5.2	3.7	16.0
Tharparkar	1,272,658	88,667	5,379	1,288	116	6,783	7.0	7.6	5.3	19.0
Sanghar	1,932,662	60,174	984	50	0	1,034	3.1	1.7	0.5	4.8
Sukkur	1,228,126	23,838	608	295	67	970	1.9	4.1	0.8	30.4
Shikarpur	1,114,991	43,662	1,106	141	0	1,247	3.9	2.9	1.1	11.3
Ghotki	1,371,545	44,293	1,262	65	0	1,327	3.2	3.0	1.0	4.9
Jacobabad	909,084	75,999	3,145	182	0	3,327	8.4	4.4	3.7	5.5
Kashmore	837,741	15,565	981	158	3	1,142	1.9	7.3	1.4	13.8
Larkana	1,397,446	95,584	2,888	230	3	3,121	6.8	3.3	2.2	7.4
Kamber	1,288,080	19,669	1,224	119	8	1,351	1.5	6.9	1.0	8.8
Dadu	1,456,637	109,857	1,154	204	0	1,358	7.5	1.2	0.9	15.0
Jamshoro	766,139	12,611	557	73	0	630	1.6	5.0	0.8	11.6
Karachi	14,722,438	88,154	2,602	284	4	2,890	0.6	3.3	0.2	9.8
Thatta	731,734	92,325	8,269	6,373	898	15,540	12.6	16.8	21.2	41.0
Sujawal	668,007	52,029	3,979	2,034	277	6,290	7.8	12.1	9.4	32.3
Total	42,849,534	1,534,598	62,685	19,073	2,452	84,210	3.6	5.5	2.0	22.6



Table-7: Malaria Epidemiological Data 2018

District	Population	Slides	PV	PF	Mix	Total	BER	SPR	PI	FP%
Hyderabad	1,988,451	60,269	1,548	83	0	1,631	3.0	2.7	0.8	5.1
Tando Allahyar	656,482	48,969	1,857	340	10	2,207	7.5	4.5	3.4	15.4
Matiari	657,437	18,061	688	55	0	743	2.7	4.1	1.1	7.4
Tando Muhammad Khan	543,849	55,993	8,910	1,725	40	10,675	10.3	19.1	19.6	16.2
Badin	1,554,366	87,289	8,324	1,946	94	10,364	5.6	11.9	6.7	18.8
Khairpur	2,230,570	194,572	6,236	1,120	98	7,454	8.7	3.8	3.3	15.0
Shaheed Benazirabad	1,361,311	64,666	1,527	133	0	1,660	4.8	2.6	1.2	8.0
Naushehro Feroz	1,378,427	123,833	3,806	161	39	4,006	9.0	3.2	2.9	4.0
Mirpurkhas	1,302,015	105,081	8,501	2,806	117	11,424	8.1	10.9	8.8	24.6
Umerkot	1,022,020	103,735	7,781	1,522	121	9,424	10.1	9.1	9.2	16.2
Tharparkar	1,384,820	70,419	4,753	597	19	5,369	5.1	7.6	3.9	11.1
Sanghar	2,102,991	57,488	941	35	0	976	2.7	1.7	0.5	3.6
Sukkur	1,336,363	44,612	1,856	381	372	2,609	3.3	5.8	2.0	14.6
Shikarpur	1,213,148	39,825	1,323	133	0	1,456	3.3	3.7	1.2	9.1
Ghotki	1,492,422	43,420	1,114	31	0	1,145	2.9	2.6	0.8	2.7
Jacobabad	989,203	92,420	3,294	189	0	3,483	9.3	3.8	3.5	5.4
Kashmore	911,540	17,810	1,182	186	0	1,368	2.0	7.7	1.5	13.6
Larkana	1,520,605	92,857	6,084	391	18	6,493	6.1	7.0	4.3	6.0
Kamber	1,401,601	45,005	2,596	300	68	2,964	3.2	6.6	2.1	10.1
Dadu	1,585,013	94,429	1,168	142	0	1,310	6.0	1.4	0.8	10.8
Jamshoro	833,661	14,600	549	23	0	572	1.8	3.9	0.7	4.0
Karachi	16,019,952	93,488	2,606	215	0	2,821	0.6	3.0	0.2	7.6
Thatta	816,078	128,912	13,775	10,309	295	24,379	15.8	18.9	29.9	42.3
Sujawal	707,024	67,232	7,932	3,693	94	11,719	9.5	17.4	16.6	31.5
Total	45,009,349	1,764,985	98,351	26,516	1,385	126,252	3.9	7.2	2.8	21.0

**Table- 8: List of the printed guidelines verified at Directorate of Malaria Control Sindh**

Name	National guidelines	Copy available	Adapted by Sindh	Copy available	Sindhi Version
Malaria Case Management	Yes	Yes	No <sup>8</sup>	No	No
Malaria in Pregnancy	Yes <sup>9</sup>	Yes	No	No	No
Malaria Microscopy Desk Guide	Yes	Yes	No	No	No
LLIN distribution strategy	Yes	Yes	No	No	No
Malaria Microscopy Training manual	Yes	Yes	No	No	No
How to use a Rapid Diagnostic Test (RDT)	Yes	Yes	No	No	No
Malaria BCC strategy	Yes	Yes	No	No	No
Malaria Information System (MIS)	Yes	Yes	No	No	No
Counselling cards for LHWs	Yes	Yes	No	No	No
Training manual for early detection of malaria outbreaks, malaria surveillance, M&E statistics and Data management	Yes	Yes	No	No	No
Supervision and external quality assurance of Malaria Laboratory Services	Yes	Yes	No	No	No
Operational guidelines for DLS	No	No	No	No	No
Prophylaxis guidelines	No	No	No	No	No

**Table - 9: Trainings by Malaria Control Program**

Type of training / target participants/level	2015		2016		2017		2018	
	Target	Progress	Target	Progress	Target	Progress	Target	Progress
Refresher training on Microscopy 20 days	09	09	0	0	30	34	0	0
Refresher training on Microscopy 10 days	0	0	0	0	18	18	0	0
uncomplicated malaria case management / public & private sector health care providers / FLCF	0	0	140	71	249	264	151	141
Use of RDTs / Public & Private sector HCP / FLCF	0	0	0	0	200	212	93	92
Severe and complicated malaria case management/ public sector health care providers/ FLCF	0	0	0	0	40	40	22	23
Public & private sector health care providers trained on MIS tools and outbreak response(2 days)	0	0	0	0	248	295	0	0

<sup>8</sup> General guidelines are being used<sup>9</sup> Part of Malaria Case management guidelines

**Table -10: Trainings by PLYC**

Type of training / target participants/level	2016		2017		2018	
	Target	Progress	Target	Progress	Target	Progress
Malaria Case Management /healthcare provider/Facility	217	202	575	531	384	284
Severe Malaria Case Management/healthcare provider/Facility	47	46	51	50	48	46
Training on Rapid Diagnostic Test/ Paramedic/Health facility	120	109	462	443	254	236
Training on Malaria Information System/ Paramedic/Facility	176	170	720	714	224	217
Microscopy Training/ Microscopist/Facility	38	26	112	106	60	55

**Table -11: Trainings by NRSP**

Type of training / target participants/level	2014		2015		2016		2017		2018	
	Target	Progress	Target	Progress	Target	Progress	Target	Progress	Target	Progress
Malaria Case Management /healthcare provider/Facility	55	58	30	30	20	22	249	264	151	141
Severe Malaria Case Management/healthcare provider/Facility	0	0	0	0	10	10	40	40	22	23
Training on Rapid Diagnostic Test/ Paramedic/Health facility	35	35	20	20	10	11	200	212	93	92
Training on Malaria Information System/ Paramedic/Facility	53	53	25	25	13	13	248	295	0	0
Microscopy Training/ Microscopist/Facility			9	9			30	34	0	0

**Table -12 a: Malaria Control Program Sindh – Non development Budget (PKR Millions)**

Financial year	Allocation	Release	Expenditure	Utilization %
2013-14	24.403	24.403	23.951	98
2014-15	29.579	29.579	27.137	92
2015-16	29.248	29.248	26.987	92
2016-17	33.035	33.035	27.653	84
2017-18	36.473	36.473	30.585	84
<b>Total</b>	<b>152.738</b>	<b>152.738</b>	<b>136.313</b>	<b>89</b>

**Table -12 b: Malaria Control Program Sindh – Development Budget (PKR Millions)**

Financial Year	Allocation	Release	Release %	Expenditure	Utilization %
2013-14	166.302	185.000	111	185.920	100
2014-15	108.000	107.963	100	107.963	100
2015-16	81.884	81.884	100	81.884	100
2016-17	144.265	75.000	52	75.000	100
2017-18	190.067	100.572	53	100.543	100
<b>Total</b>	<b>690.518</b>	<b>550.419</b>	<b>80</b>	<b>551.310</b>	<b>100</b>

**Table - 13: Indoor Residual Spray (IRS) by Malaria Control Program**

Year	Districts	Output				outcome	
		Houses		Rooms		Houses	Rooms
		Target	Covered	Target	Covered		
2013-14	23	1,153,837.0	431,974.0	3,718,055.0	1,252,321.0	37.44	33.68
2014-15	0	1,084,219.0	0.0	3,625,656.0	0.0	0.00	0.00
2015-16	24	1,019,080.0	252,461.0	3,442,517.0	647,064.0	24.77	18.80
2016-17	7	1,124,308.0	72,347.0	3,509,189.0	167,307.0	6.43	4.77
2017-18	20	1,076,626.0	113,730.0	3,333,474.0	310,650.0	10.56	9.32

**Table - 14: LLINs distributed by Malaria Program Sindh (mass strategy)**

District	2013-14	2014-15	2015-16	2016-17	2017-18	Total
1. Hyderabad	3,209	525	530	1,050	3,530	<b>8,844</b>
2. Tando Allahyar	500	800	500	600	400	<b>2,800</b>
3. Matiari	800	500	300	500	500	<b>2,600</b>
4. Tando Muhammad Khan	500	400	500	300	2,500	<b>4,200</b>
5. Badin	1,700	1,000	1,400	3,300	4,500	<b>11,900</b>
6. Khairpur	500	1,100	100	4,700	2,500	<b>8,900</b>
7. Shaheed Benazirabad	1,100	1,700	1,900	2,950	6,700	<b>14,350</b>
8. Naushehro Shehroferoz	1,700	1,000	700	2,000	800	<b>6,200</b>
9. Mirpurkhas	0	800	800	200	1,000	<b>2,800</b>
10. Umerkot	1,000	800	1,600	1,200	1,700	<b>6,300</b>
11. Tharparkar	500	1,000	600	400	0	<b>2,500</b>
12. Sanghar	500	1,000	500	1,000	1,300	<b>4,300</b>
13. Sukkur	1,000	500	1,000	700	300	<b>3,500</b>
14. Shikarpur	1,000	1,300	500	500	300	<b>3,600</b>
15. Ghotki	1,700	1,500	1,000	1,000	4,000	<b>9,200</b>
16. Jacobabad	2,700	1,000	900	2,000	2,600	<b>9,200</b>
17. Kashmore	1,000	1,500	500	2,300	5,100	<b>10,400</b>
18. Larkanna	4,700	3,500	1,200	2,300	5,100	<b>16,800</b>
19. Kamber	1,200	1,700	500	1,500	3,500	<b>8,400</b>
20. Dadu	500	1,000	1,050	1,000	50	<b>3,600</b>
21. Jamshoro	800	1,400	400	60	1,350	<b>4,010</b>
22. Karachi	2,500	50	200	1,300	0	<b>4,050</b>
23. Thatta	1,000	1,000	500	600	2,000	<b>5,100</b>
24. Sujawal	0	500	500	1,500	1,500	<b>4,000</b>

**Table - 15: Long Lasting Insecticide treated Nets (LLINs) ANC Distribution by partners**

District	Partner	Year				Total
		2015	2016	2017	2018	
Thatta	NRSP	0	5,600	0	0	5,600
Sujawal		0	0	0	5,605	5,605
Umerkot		0	0	0	6,792	6,792
Badin		0	0	0	13,000	13,000
Khairpure	PLYC	0	21,707	30,316	17,234	69,257
Tharparkar		0	16,515	21,922	11,825	50,262
Mirpure Khas		0	20,144	14,925	10,794	45,863
Tando Allah Yar		0	14,123	13,488	5,999	33,610
Sukkur		0	0	0	10,665	10,665
Larkano		0	0	0	10,927	10,927
Kumbar/Shahdadkot		0	0	0	9,613	9,613
Naushehro Feroz		0	0	0	11,557	11,557

**Table - 16: Long Lasting Insecticide treated Nets (LLINs) mass distribution by PLYC**

District	Year				Total
	2015	2016	2017	2018	
Khairpure Mirs	278,124	482,368	106,829	0	936,578
Tharparkar	136,155	235,224	158,701	0	580,342
Mirpure Khas	0	0	0	616,807	662,670

**Table-17: Larvicidal activity by Malaria Control Program Sindh:**

Chemical / Area Covered	2014	2015	2016	2017	2018	Total
Temphos 50% EC (Litres)	17,858	8,546	4,266	260	0	30,930
Cover Area (SqM)	357,160,000	170,920,000	85,320,000	5,200,000	0	618,600,000
Fenethion 2% G + Temephos 1% G (Liters)	47,046	27,685	11,856	7,146	3,274	97,007
Cover Area (SqM)	18,818,400	11,074,000	4,742,400	2,858,400	1,309,600	38,802,800

**Table – 18: District wise details of Microscopy Centers**

District	Total Health Facilities <sup>10</sup>	Microscopy Centers						
		DHQ	THQ	RHC	BHU	GD/other	MCHC	Total
1. Karachi All districts	172	3	0	2	3	8	0	16
2. Tharparkar	327	1	3	1	10	3	0	18
3. Thatta	60	1	1	6	1	0	0	9
4. Sujawal	58	0	3	2	4	0	0	9
5. Badin	143	1	3	9	2	1	1	17
6. Umerkot	153	1	4	3	4	0	0	12
7. Tando Mohammad Khan	40	1	1	1	2	0	0	5
8. Mirpurkhas	146	2	2	5	7	1	0	17
9. Tando allah yar	66	1	1	2	2	0	0	6
10. Hyderabad	67	2	1	2	5	4	0	14
11. Matyari	57	0	2	4	1		0	7
12. Shaheed Benazirabad	122	0	1	8	14	12	0	35
13. Naushehro Feroz	132	1	2	11	8	0	0	22
14. Jamshoro	58	0	1	1	0	1	0	3
15. Dadu	85	2	2	0	7	3	0	14
16. Larkano	97	3	3	2	3	2	2	15
17. Kumbar/Shahdadkot	77	0	4	2	1	1	0	8
18. Khairpure Mirs	202	2	0	10	19	0	2	33
19. Sukkur	70	1	2	1	8	1	2	15
20. Shikarpure	74	1	1	5	7	7	0	21
21. Jacobabad	48	2	1	2	0	0	1	6
22. Kashmore/Kandhkot	54	0	0	2	2	0	0	4
23. Ghotki	61	2	3	1	5	1	0	12
24. Sanghar	104	3	3	5	12	4	0	27
<b>Total</b>	<b>2473</b>	<b>30</b>	<b>44</b>	<b>87</b>	<b>127</b>	<b>49</b>	<b>8</b>	<b>345</b>

<sup>10</sup> Number of health facilities reporting as per DHID 2019

**Table-19: Health facilities with Malaria treatment guidelines and trained human resources**

District	Total Health Facilities	Health facilities							
		Treatment Guidelines		Healthcare provider trained		Guidelines and trained provider			
						Yes		No	
		#	%	#	%	#	%	#	%
1. Thatta	60	37	62	37	62	37	62	23	38
2. Sujawal	58	34	62	34	62	34	62	23	38
3. Badin	143	71	62	71	62	71	62	23	38
4. Tharparkar	327	69	62	69	62	69	62	23	38
5. Umerkot	153	58	62	58	62	58	62	23	38
6. Mirpurkhas	146	84	62	84	62	84	62	23	38
7. Tando allah yar	66	47	62	47	62	47	62	23	38
8. Tando Mohammad Khan	40	22	62	22	62	22	62	23	38
9. Naushehro Feroz	132	96	62	96	62	96	62	23	38
10. Larkano	97	89	62	89	62	89	62	23	38
11. Kumbar/Shahdadkot	77	63	62	63	62	63	62	23	38
12. Khairpure Mirs	202	143	62	143	62	143	62	23	38
13. Sukkur	70	69	62	69	62	69	62	23	38



**Table -20. District wise Microscopy and RDT Centers in Sindh**

District	Partner	Microscopy Centre		RDT Centre		Private Practitioners	Total
		Public	Private	Public	Private		
Karachi (6 districts)	Health department	16	0	0	0	0	16
Hyderabad		14	0	0	0	0	14
Matyari		7	0	3	0	0	10
Shahedd Benazirabad		35	0	0	0	0	35
Jamshoro		3	0	2	0	0	5
Dadu		14	0	4	0	0	18
Shikarpure		21	0	0	0	0	21
Jacobabad		6	0	0	0	0	6
Kashmore/Kandhkot		4	0	0	0	0	4
Ghotki		12	0	0	0	0	12
Sanghar		27	0	0	0	0	27
Thatta	NRSP	9	0	27	0	15	51
Sujawal		9	0	25	0	15	49
Badin		17	0	54	0	15	86
Umerkot		12	0	46	0	15	73
Tando Mohammad Khan		5	0	17	0	15	37
Tharparkar	PLYC	18	0	37	0	14	69
Mirpurkhas		17	0	54	0	13	84
Tando allah yar		6	0	30	0	11	47
Naushehro Feroz		22	0	60	0	14	96
Larkano		15	0	54	0	20	89
Kumbar/Shahdadkot		8	0	45	0	10	63
Khairpure Mirs		33	0	85	0	25	143
Sukkur		15	0	40	0	14	69
<b>Total</b>		<b>345</b>	<b>0</b>	<b>583</b>	<b>0</b>	<b>196</b>	<b>1,124</b>

**Table – 21. Achievement in diagnosis and treatment GFATM districts 2014-18**

Indicator	NRSP		PLYC		Total		Progress %
	Target	Result	Target	Result	Target	Result	
Confirmed PF cases treated with ACT as the first line treatment	32,893	35,390	35,577	33,335	68,470	68,725	100
Number of RDTs used at FLCFs including private clinics	625,983	704,256	969,435	969,435	1,595,418	1,673,691	105
Total malaria positive cases treated	108,965	115,902	84,215	79,117	193,180	195,019	101

**Table - 22. Diagnosis and case management service delivery outputs and outcomes 2018**

Indicator	NRSP		PLYC		Total	
	Target	Status	Target	Status	Target	Status
Uncomplicated malaria getting correct treatment at health facility	0	61,375	0	42,532	0	104,568
Uncomplicated malaria getting correct treatment at community levels	0	0	0	0	0	0
Patients with severe/complicated malaria correctly managed at health facility	0	249	0	0	0	249
Public health facilities with adequate antimalarial drugs	454	221	1,040	645	1,494	866
Public health facilities with adequate diagnostic supplies	454	221	1,040	645	1,494	866
Diagnosed P. Falciparum cases treated with acts	20,475	20,475	6,810	6,644	27,119	27,119
Private sector health care providers involved in malaria case management	75	75	121	121	196	196
Sentinel sites reporting on antimalarial drug resistance	0	0	0	0	0	0

**Table – 23. Advocacy, BCC, IEC and social mobilization Service Delivery Outputs and Outcomes**

Indicator	Partner	Target				Status			
		2015	2016	2017	2018	2015	2016	2017	2018
Advocacy events with community based activists including lady health workers	PLYC	1,057	5,280	14,852	3,992	802	3,001	15,769	3,881
	NRSP	0	11,400	5,550	1,700	0	11,439	5,549	1,692
Community awareness session at community and facility level by LHWs	PLYC	11,700	43,600	108,600	18,000	12,000	36,391	96,195	18,928
	NRSP	0	0	49,300	11,250	0	0	49,295	11,243
Community awareness sessions at community and facility level by CBOs/NGOs	PLYC	8,233	76,000	192,600	61,868	9,233	32,987	225,349	62,403
	NRSP	0	0	68,950	22,670	0	0	68,954	22,670

**Table -24. Gender wise distribution of malaria Positive Cases in GFATM districts 2018**

District	Partner	Male	Female	Pregnant
1. Thatta	NRSP	15,684	11,645	173
2. Sujawal		7538	4186	46
3. Badin		6,189	4,177	38
4. Umerkot		5623	3801	53
5. Tando Mohammad Khan		6144	4510	43
6. Tharparkar	PLYC	3376	1994	4
7. Mirpurkhas		6597	4826	110
8. Tando Allah Yar		1304	903	28
9. Naushehro Feroze		2231	1775	78
10. Larkano		3772	2721	57
11. Kumbar / Shahdadkot		1647	1317	1
12. Khairpure Mirs		4274	3180	3
13. Sukkur		1417	1198	13

**Table – 25. District wise disease burden: Confirmed cases, SPR and API 2014-2018**<sup>11</sup>

District	2014			2015			2016			2017			2018		
	Positive	SPR	API	Positive	SPR	API	Positive	SPR	API	Positive	SPR	API	Positive	SPR	API
Hyderabad	201	0.7	0.1	216	0.6	0.1	394	0.8	0.2	983	1.6	0.5	1,631	2.7	0.8
Tando Allahyar	825	4.0	1.4	467	2.6	0.8	1,588	3.9	2.6	2,718	4.2	4.5	2,207	4.5	3.4
Matiari	596	3.0	0.9	894	4.6	1.5	1,077	5.3	1.8	756	4.8	1.3	743	4.1	1.1
TM Khan	511	4.7	0.8	229	1.6	0.5	219	2.6	0.4	2,068	12.3	4.1	10,675	19.1	19.6
Badin	2,175	3.9	1.6	1,537	2.7	1.1	2,183	2.7	1.5	3,264	5.8	2.3	10,364	11.9	6.7
Khairpur	10,353	8.5	4.9	9,150	6.6	4.5	10,552	5.6	5.1	8,919	4.5	4.4	7,454	3.8	3.3
Shaheed Bnazirabad	1,799	2.5	1.4	2,413	3.3	1.9	2,094	3.0	1.7	2,137	3.1	1.7	1,660	2.6	1.2
Naushehro Feroz	2,904	4.7	2.2	2,444	4.7	1.9	2,776	3.9	2.2	2,343	3.4	1.8	4,006	3.2	2.9
Mirpurkhas	3,398	6.7	2.2	3,227	5.9	2.7	7,683	8.9	6.4	10,563	10.9	8.8	11,424	10.9	8.8
Umerkot	1,791	2.6	1.9	1,185	1.7	1.3	1,300	1.9	1.4	3,449	5.2	3.7	9,424	9.1	9.2
Tharparkar	2,684	5.2	2.1	1,357	3.0	1.1	4,785	6.0	3.8	6,783	7.6	5.3	5,369	7.6	3.9
Sanghar	1,108	1.6	0.6	835	1.4	0.4	1,050	1.6	0.5	1,034	1.7	0.5	976	1.7	0.5
Sukkur	941	4.0	0.7	1,053	3.7	0.9	988	2.9	0.8	970	4.1	0.8	2,609	5.8	2.0
Shikarpur	1,389	2.9	1.2	1,553	3.3	1.4	1,318	2.8	1.2	1,247	2.9	1.1	1,456	3.7	1.2
Ghotki	1,845	4.6	1.3	1,852	5.5	1.4	1,880	4.2	1.4	1,327	3.0	1.0	1,145	2.6	0.8
Jacobabad	2,215	4.5	2.2	1,686	4.8	1.9	2,511	3.9	2.8	3,327	4.4	3.7	3,483	3.8	3.5
Kashmore	524	2.5	0.6	1,338	5.2	1.6	1,277	5.2	1.5	1,142	7.3	1.4	1,368	7.7	1.5
Larkana	2,008	4.9	1.4	3,041	3.6	2.2	3,622	3.8	2.6	3,121	3.3	2.2	6,493	7.0	4.3
Kamber	1,363	7.5	1.2	1,491	7.1	1.2	2,090	8.0	1.6	1,351	6.9	1.0	2,964	6.6	2.1
Dadu	1,979	1.6	1.3	1,221	1.3	0.8	1,255	1.2	0.9	1,358	1.2	0.9	1,310	1.4	0.8
Jamshoro	805	6.7	1.0	514	4.8	0.7	651	5.3	0.8	630	5.0	0.8	572	3.9	0.7
Thatta	4,482	7.0	3.1	4,537	5.9	6.2	6,546	9.0	8.9	15,540	16.8	21.2	24,379	18.9	29.9
Sujawal	0	0	0	821	4.4	1.2	2,994	7.3	4.5	6,290	12.1	9.4	11,719	17.4	16.6
Karachi (division)	1,744	2.2	0.1	1,667	2.4	0.1	2,276	2.6	0.2	2,890	3.3	0.2	2,821	3.0	0.2

<sup>11</sup> Annual parasite incidence (API) Plasmodium Falciparum Ratio (PFR) Blood Examination Rate (BER) Slide Positivity Rate (SPR) Passive C ase Detection (PCD)

**Table – 26. Suspected Malaria cases as reported by DHIS**

District	Suspected cases				
	2014	2015	2016	2017	2018
1. Hyderabad	27,268	34,629	50,255	59,595	60,269
2. Tando Allahyar	20,570	18,217	40,342	65,327	48,969
3. Matiari	20,196	19,501	20,388	15,640	18,061
4. T.M.Khan	10,949	14,092	8,528	16,755	55,993
5. Badin	55,855	56,798	79,937	55,956	87,289
6. Khairpur	121,410	137,707	188,369	197,245	194,572
7. Shaheed Benazirabad	70,653	73,562	68,843	69,974	64,666
8. N.Feroze	62,268	52,140	70,739	68,470	123,833
9. Mirpurkhas	50,790	54,480	86,167	97,079	105,081
10. Umerkot	69,832	69,154	69,475	66,130	103,735
11. Tharparkar	51,854	45,842	79,303	88,667	70,419
12. Sanghar	69,269	60,710	66,233	60,174	57,488
13. Sukkur	23,267	28,419	33,844	23,838	44,612
14. Shikarpur	48,552	46,729	47,705	43,662	39,825
15. Ghotki	39,765	33,644	44,445	44,293	43,420
16. Jacobabad	48,776	35,050	64,982	75,999	92,420
17. Kashmore	20,839	25,584	24,687	15,565	17,810
18. Larkana	41,219	84,284	95,602	95,584	92,857
19. Kamber	18,260	20,904	26,152	19,669	45,005
20. Dadu	123,623	91,359	108,122	109,857	94,429
21. Jamshoro	11,960	10,601	12,247	12,611	14,600
22. Thatta	63,861	76,734	72,771	92,325	128,912
23. Sujawal		18,748	40,838	52,029	67,232
24. Karachi (division)	79,965	69,093	87,023	88,154	93,488
<b>Total</b>	1,151,001	1,177,981	1,486,997	1,534,598	1,764,985

**Table – 27. Monitoring Visits conducted by GFATM partners**

District	Partner	2014		2015		2016		2017		2018	
		Planned	conducted	Planned	conducted	Planned	conducted	Planned	conducted	Planned	conducted
Tharparkar	PLYC	0	0	296	296	296	296	804	804	416	416
Mirpurkhas		0	0	296	296	296	296	804	804	416	416
Tando Allah Yar		0	0	296	296	296	296	804	804	416	416
Naushehro Feroze		0	0	0	0	0	0	804	804	416	416
Larkano		0	0	0	0	0	0	804	804	416	416
Qambar /Shahdadkot		0	0	0	0	0	0	804	804	416	416
Khairpure Mirs		0	0	296	296	296	296	804	804	416	416
Sukkur		0	0	0	0	0	0	804	804	416	416
Thatta	NRSP	114	144	77	81	63	51	40	79	8	33
Sujawal		12	12	20	23	42	42	36	42	25	30
Umerkot		0	0	0	0	0	0	24	130	24	183
Badin		0	0	0	0	0	0	32	51	70	73
Tando Mohammad khan		0	0	0	0	0	0	32	52	20	96

Sindh Malaria Program Thematic Review 2019

**Table – 28 a. Staff Position (Provincial)**

	Title of Job	Pay Scale	Provincial			Total		
			S	F	V	S	F	V
1	Director	20	1	1	0	1	1	0
2	Additional Director	19	1	1	0	1	1	0
3	Epidemiologist	18	1	0	1	1	0	1
4	Senior Evaluator	17	1	0	1	1	0	1
5	Entomologist	17	1	0	1	1	0	1
6	Admin Officer	17	1	0	1	1	0	1
7	Senior Malaria Superintendent	17	1	1	0	1	1	0
8	Provincial Health Education Officer	17	1	1	0	1	1	0
9	Office Superintendent	17	1	1	0	1	1	0
10	Transport Officer	16	1	0	1	1	0	1
11	Health Education Officer	16	1	1	0	1	1	0
12	Stenotypist	12	2	0	2	2	0	2
13	Computer Operator	12	2	0	2	2	0	2
14	Senior Auditor	8	1	1	0	1	1	0
15	Auto Electrician	8	1	0	1	1	0	1
16	Droughtman	8	1	1	0	1	1	0
17	ULV Operator	6	13	0	13	13	0	13
18	Cashir	6	1	1	0	1	1	0
19	Junior Auditor	6	1	1	0	1	1	0
20	Entomology Technician	6	1	1	0	1	1	0
21	Junior Mechanic	5	1	1	0	1	1	0
22	Welder	5	1	0	1	1	0	1
23	Tin Smith	5	1	1	0	1	1	0
24	Despatch Rider	5	1	1	0	1	1	0
25	Workshop Boy	1	2	1	1	2	1	1
26	Malhi	1	1	1	0	1	1	0

**Table – 28 b. Staff Position (Provincial and district)**

	Job title	Pay Scale	Province			District			Total		
			S	F	v	S	F	v	S	F	v
26	Malaria Superintendent	16	0	0	0	23	4	19	23	4	19
27	Non Medical Evalator	16	0	0	0	18	1	17	18	1	17
28	Assistant Entomologist	16	0	0	0		3	13	16	3	13
29	Assistant	16	4	2	2	0	0	0	4	2	2
30	Accountant	11	1	0	1	13	5	8	14	5	9
31	Senior Microscopist	8	1	1	0	14	8	6	15	9	6
32	Senior Mechnic	8	1	0	1	13	9	4	14	9	5
33	Assistant Malaria Superintendent	8	1	1	0	78	59	19	79	60	19
34	Storekeeper	11	3	3	0	13	10	3	16	13	3
35	Junior Clerk	6	2	0	2	13	9	4	15	9	6
36	Microscopist	5	56	10	46	96	65	31	152	75	77
37	Insect Collector	5	3	3	0	29	23	6	32	26	6
38	Malaria Supervisor	5	10	1	9	631	542	89	641	543	98
39	Driver	4	9	4	5	41	30	11	50	34	16
40	Laboratory Attendant	2	0	0	0	23	18	5	23	18	5
41	Naib Qasid	1	7	4	3	22	13	9	29	17	12
42	Guard	1	5		5	28	21	7	33	21	12
43	Porter	1	0	0	0	62	43	19	62	43	19
44	Sanitary Worker	1	8	1	7	16	16	0	24	17	7