



Ministry of National Health
Services Regulations & Coordination
GOVERNMENT OF PAKISTAN



MANAGEMENT OF VECTOR-BORNE DISEASES (VBDs) IN PAKISTAN

Directorate of Malaria, Dengue and other VBDs Control-Pakistan



National Plan of Action 2024-28



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MANAGEMENT OF VECTOR-BORNE DISEASES (VBDs) IN PAKISTAN

MAJOR VECTOR-BORNE DISEASES (VBDs) IN PAKISTAN

DENGUE



MALARIA



CHIKUNGUNYA



LEISHMANIASIS



CCHF



FUTURE THREATS

J. ENCEPHALITIS



FILARIASIS



WEST NILE VIRUS



YELLOW FEVER



ZIKA VIRUS



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ACRONYMS

ACD	Association for Community Development
ACL	Anthroponotic Cutaneous Leishmaniasis
AJK	Azad Jammu and Kashmir
AMP	Alliance for Malaria Prevention
ANC	Antenatal Care
ARI	Acute Respiratory Infection
BCC	Behavior Change Communication
BHU	Basic Health Unit
BI	Breteau Index
BRSP	Balochistan Rural Support Program
BPS	Basic Pay Scale
BSAS	Breeding Site Assessment Survey
B.s	Bacillus Sphaericus
B.t.i	Bacillus Thuringiensis
CBO	Community-Based Organization
CCHF	Crimean Congo Haemorrhagic Fever
CDC	Communicable Disease Control
CI	Container Index
CL	Cutaneous Leishmaniasis
CPEC	China-Pakistan Economic Corridor
CMA	Commodity Management Audit
CMU	Common Management Unit
CS	Capsule Suspension
Cx	Culex
DA	Daily Allowance
DDT	Dichloro diphenyl trichloroethen
DEET	N, N-Diethyl-m-toluamide
DEWS	Disease Early Warning System
DF	Dengue Fever
DHO	District Health Officer
DHF	Dengue Haemorrhagic Fever
DHS	Directorate of Health Services
DIP	District Implementation Plan
DMU	Data Management Unit
DoMC	Directorate of Malaria Control
DSS	Dengue Shock Syndrome
EC	Emulsifiable Concentrate
EP	Epidemic Prevention
EPI	Expanded Program on Immunization
CCTV	Close Circuit Television
CI	Container Index
Cx	Culex
EM	Environmental Management
EOC	Emergency Operation Center
ERP	Emergency Response Plan

FAO	Food and Agriculture Organization
FATA	Federally Administrated Tribal Areas
FBR	Federal Board of Revenue
FGD	Focus Group Discussion
FM	Frequency Modulation
G	Granular
GB	Gilgit Baltistan
GMM	Genetically Modified Mosquito
GoP	Government of Pakistan
GPIRM	Global Plan for Insecticides Resistance Management
GTS	Global Technical Strategy
GVCR	Global Vector Control Response
HH	Household
HR	Human Resource
HSA	Health Services Academy
HQ	Headquarter
ICMRT	International Center for Malaria Research and Training
ICT	Islamabad Capital Territory
IDP	Internally Displaced Population
IGR	Insects Growth Regulators
IHR	International Health Regulations
IHN	Indus Health Network
IFRC	International Federation for Red Cross
IPC	Inter-Personal Communication
IR	Insecticides Resistance
IRM	Insecticides Resistance Management
IVC	Integrated Vector Control
IVM	Integrated Vector Management
IRS	Indoor Residual Spraying
JE	Japanese Encephalitis
LHW	Lady Health Worker
LED	Liquefied Electric Display
LLIN	Long Lasting Insecticidal Treated Net
LSM	Larval Source Management
MCP	Malaria Control Program
M&E	Monitoring and Evaluation
MIS	Malaria Indicator Survey
M/o NHSRC	Ministry of National Health Services, Regulations and Coordination
MNCH	Maternal, Neonatal and Child Health
MPR	Malaria Programmatic Review
MSF	Medecins Sans Frontieres
NGO	Non-Governmental Organization
NHEPRN	National Health Emergency Preparedness and Response Network
NIH	National Institute of Health
NIMRT	National Institute for Malaria Research and Training
NIRMP	National Insecticides Resistance Management Plan

NITM	National Information Technology Board
NRSP	National Rural Support Program
NIMTC	National Malaria Training Center
NSC	National Steering Committee
NSP	National Strategic Plan
MCI	Metropolitan Cooperation of Islamabad
OP	Organophosphate
PC-I	Project Compendium
PHP	Public Health Pesticides
PIAM-Network	Pakistan-Iran-Afghanistan Malaria Network
PLYC	Pakistan Lions Youth Council
PoA	Plan of Action
PoEs	Point of Entrees
POL	Petroleum , Oil and Lubricants
PITB	Punjab Information Technology Board
PPEs	Personal Protection Equipments
PRCS	Pakistan Red Crescent Society
PSDP	Public Sector Developmental Project
QA	Quality Assurance
QC	Quality Control
RBM	Roll Back Malaria
R&D	Research and Development
RDT	Rapid Diagnostic Kit
SC	Suspension Concentrate
SDA	Service Delivery Area
SDGs	Sustainable Development Goals
SWOT	Strength, Weakness, Opportunity and Threat
TA	Travelling Allowance
TB	Tuberculosis
TACOM	Technical Advisory Committee on Malaria
TGF	The Global Fund
TIH	The Indus Hospital
ToT	Training of Trainer
TWG	Technical Working Group
ULV	Ultra Low Volume
USAID	United States Agency for International Development
VBD	Vector Borne Disease
VC	Visceral Leishmaniasis
WHA	World Health Assembly
WHO	World Health Organization
WHOPES	World Health Organization Pesticides Evaluation Scheme
WG	Wettable Granules
WMD	World Malaria Day
WP	Wettable Powder
YF	Yellow Fever
ZCL	Zoonotic Cutaneous Leishmaniasis

FOREWORD



Vector-Borne Diseases (VBDs) are emerging or resurging as a result of speedily and uncontrolled urbanization including demographic and societal changes, environmental and climatic changes, vector species composition and bionomics, development of resistance both in vector and pathogens, disease-specific vector control programs and account for approximately 17% of estimated global burden of infectious disease. During last four decades, many important VBDs had re-emerged or spread to new regions.

quality-qualified diagnostic, curative and preventive services in Pakistan. I strongly believe that, with the help of this Plan of Action (2023-2027), the federation of Pakistan and its provinces will be able to achieve the targets set in National Health Vision 2016 - 2025 and SDGs

Iftikhar Ali Shallwani

Secretary (Health)

Being a subtropical country, Pakistan has a rich fauna of disease vectors that includes mosquitoes, sandflies, ticks, fleas, and bed bugs etc, which account for number of VBDs including arboviruses. Currently the major VBDs are dengue, malaria, chikungunya, leishmaniasis, and Crimean congo H. fever (CCHF). However, Japanese encephalitis, Yellow fever, West Nile fever are the up-coming threats for the country.

Climate Change is a well-established fact and its impacts on Water, Health, Agriculture, sectors are quite visible around the globe, particularly during recent years. Developing countries are suffering more compared to the developed countries. Overall, during 20th century, due to climate change the global temperature has increased by 0.76°C-0.83°C which has increase vulnerabilities for human health, agriculture and water resources. Pakistan contributes less than 1% of global greenhouse gas emissions, but has ranked 10th among the countries of the world that has been severely affected by climate change. These climatic variables, mainly temperature and rainfall significantly influence man-vector interactions, species composition, feeding and resting habits, viruses, human biology, ecology and consequently the intensity and distribution of VBDs particularly dengue, malaria and leishmaniasis.

During 2020 ministry of NHSRC developed the 1st national Plan of Action (2020-2024) through a comprehensive consensus building exercise with all stakeholders. However, the recent outbreaks of malaria and dengue in Pakistan particularly after massive floods highlighted a burning need for revision of this strategic document with more focus on control of VBDs in Pakistan under humanitarian emergencies.

Since health is devolved to the provinces in Pakistan after 18th constitutional amendment, therefore presented proposal for VBDs control is fully aligned with this constitutional amendment i.e. making responsible the provinces for implementation of technically sound cost-effective interventions/ services at all public sector health facilities. Ministry of NHSRC-Pakistan is mainly responsible for uniform policy making, improved surveillance, coordination with international donors and consensus building among all stakeholders and partners. Ministry of NHSRC also encourages the provincial governments to enhance their domestic resources for better sustainability and ownership.

Ministry of NHSRC is fully confident that the updated Plan of Action (2023-2027) will provide clear directions for evidence-based and sustainable control of VBDs through the provision of free of cost

SPECIAL MESSAGE



Currently vector-borne diseases (VBDs: dengue, malaria, chikungunya, zika, CCHF, leishmaniasis and African trypanosomiasis etc) account for approx. 17% of estimated global infectious disease burden. More than 80% of the world's population is at risk of one or more VBDs, claiming more than 700,000 lives each year. Eastern Mediterranean Region (EMR) contributes 2.6% of the global burden of major VBDs. The true burden, however, is most likely under reported due to the limited surveillance and poor reporting system.

In Pakistan currently the major VBDs are dengue, malaria, chikungunya, leishmaniasis, and CCHF. However, zika, yellow fever and Japanese encephalitis which are spread by mosquitoes, also pose emerging threats. Among these VBDs in Pakistan, dengue fever is the fastest emerging arboviral infections since 2005. During 1995-2004 only 699 dengue cases and 6 deaths were reported from 3 districts while these numbers dramatically increased to 289,023 and 1790 respectively affecting 115 out of 154 districts/territories during 2006-2022.

Reduction of VBDs burden in the country is both a national and provincial priority to achieve national targets and international obligations (SDGs) set for VBDs. However, the efficient control of VBDs is not the sole responsibility of health sector but requires viable partnership with different public and private including Community-Based Organizations (CBOs). In the light of lessons learnt from 2019 dengue outbreak in Pakistan we decided to develop a long term national Plan of Action (2020-2024) through consensus building with all stakeholders and partners for sustainable control of VBDs in the country.

Based on our experience of dealing the massive floods in Pakistan in 2022, M/o NHSRC decided to up-date Plan of Action (2020-2024) with more emphasis on climate change and its impacts of VBDs in Pakistan. Climate change is negatively impacting health in a multitude of direct and indirect ways. In particular, climate change is increasing the frequency of extreme weather events, such as heat waves, which can directly cause injury, illness, and death. Climate change also indirectly affects health through alterations to the environment. For example, climate is a significant factor influencing the intensity and distribution of vector-borne diseases (VBDs). The negative health impacts of climate change are particularly acute in Pakistan, which ranks tenth worldwide among countries that have been severely affected by climate change. Climate change-related events, such as rising temperatures and heatwaves, natural disasters, and displacement pose a significant risk to public health.

The development of national PoA (2020-2024) is a momentous achievement of present government which clearly describe our vision and priorities for control of VBDs of public health importance. This plan is fully aligned with WHO Global Technical Strategy (2016-2023) and Global Vector Control Response (2017-2030) which clearly emphasize on integration of all VBDs under one umbrella instead of individual disease specific programs.

Quick and efficient control of dengue epidemic 2019 using local expertise and limited resource and 2022 flood involving all stakeholders and partners brought a huge sense of fulfillment and pride for M/o NHSRC. As a Minister for Health, it is my privilege to launch the updated National Plan of Action (2023-2027) for effective management of not only the existing but upcoming VBDs in Pakistan in the scenario of climate change. I highly appreciate the dedicated efforts of all stakeholders and partners to finalize this strategic document under the leadership of the Secretary and the Director General, Ministry of NHSRC.

All provincial and areas' health departments have been extensively consulted in the development of this PoA and hence it is truly a national document. I would particularly like to appreciate Muhammad Mukhtar, Director for his expertise and leadership who spearheaded this effort. I am pretty much sure that in long term this Plan of Action (2023-2027) will help health planners and policy makers for evidence-based programmatic decision making for sustainable management of VBDs in Pakistan.

Dr. Nadeem Jan
Minister of Health

EXECUTIVE SUMMARY



Rapidly and uncontrolled urbanization and socioeconomic status, increasing global trades, environmental and climatic variations including deforestation, drought, unpredicted rains, vector species composition and bionomics, emerging trends of resistance both in vector (insecticides) and pathogens (drugs), and land-use patterns are extremely likely to influence current VBD epidemiology including the emergence of new diseases and the resurgence of old diseases. The individual disease-specific control programs with limited human and logistic capacities

further compounded the situation. The scale of effects ranges from short-term epidemics to long-term gradual changes in disease(s) trends. Over the last few decades, a number of VBDs have been reported for the first time. Some have become of significant public health concern, such as dengue, malaria and leishmaniasis and others are spreading geographically and their incidence is increasing.

In Pakistan currently the major VBDs are dengue, malaria, chikungunya, leishmaniasis, and Crimean Congo Hemorrhagic Fever (CCHF). However, Japanese Encephalitis (JE), Yellow Fever, West Nile Virus (WNV) and Zika etc which are also spread by mosquitoes also pose an emerging public health threat. Among these VBDs in Pakistan, dengue fever is the most rapidly spreading arboviral infections since 2005. The number of confirmed cases and deaths dramatically increased to 245,000 and 1790 respectively affecting 115 out of 154 districts/ agencies/ territories during 2006-2022, comparing to 699 cases and 6 deaths from 3 districts during 1995-2004. The year 2022 reported the maximum number of dengue cases (76,210) and death 129 in its history, of which 89% cases were reported from five mega cities of the country viz., Lahore, Karachi, Rawalpindi, Islamabad and Peshawar.

Globally the climate change increases the risk of VBD, directly impacting density, abundance, and distribution in a number of ways. For example, climate change affects the geographical distribution of VBDs as warmer temperatures expand the habitats suitable for vectors. Higher temperatures as well as conditions such as wide-ranging stagnant water, lack of sanitation facilities, and proper drainage systems also create more breeding grounds for disease-carrying mosquitoes. Climate change can also alter the behavior of vectors and humans in ways that increase transmission potential. For example, mosquitoes may become more active during warmer weather, increasing their interactions with humans, while people may spend more time outdoors during heatwaves increasing their exposure to vectors.

The impacts of climate change on VBD are evident in the recent heatwaves Pakistan suffered between 2020 and 2022. During the 2022 monsoon season, there was a substantial increase in rainfall in the malaria-endemic provinces of Balochistan and Sindh, with a rise of 370% and 340% respectively. Overall, the country witnessed a 190% increase in rainfall, leading to devastating floods that affected 116 districts (>65% of the country). Resultantly, there has been marked rise in malaria cases from July in 34 districts in Sindh, Balochistan and Khyber Pakhtunkhwa, reaching an emergency situation in August. Health facilities reported a significant surge in malaria cases, from 376,203 cases in 2021 to 1.7 million cases in 2022. This reported figure doesn't include the cases diagnosed and treated by hundreds

of relief organizations during their flood relief operations. The current outbreak in the country has been graded as the heaviest resurgent outbreak during last five decades. In addition to malaria, the World Health Organization (WHO) reported approximately 25,932 dengue cases in the country from 1 June to 27 September 2022, with 75% of these cases occurring in September. These escalating numbers of malaria and dengue cases have placed an increasing burden on healthcare facilities. Other VBDs which includes leishmaniasis, chikungunya, and Congo virus (CCHF) also showing the fluctuated, mostly rising trends in country.

Since vector control under humanitarian emergencies or disaster is not traditional one, therefore it has always been very challenging for program globally. Timely availability, quality of vector control commodities, selection of appropriate and timing of intervention(s) are the key challenges for VBD control under such circumstances particularly during the acute phase of emergency. Availability of required resources both human and logistics further compounded the situation.

Despite number of challenges both in terms of human resources and logistics, Ministry of NHSRC responded the malaria and dengue outbreak in 2022 with an integration approach focusing the developing/strengthening the viable partnership with different public and private organizations and community-based organization (CBOs). This unprecedented outbreak of malaria and dengue also highlighted an urgent need of development of long term planning for sustainable control of VBDs in Pakistan. Parallel to epidemic response, Directorate of Malaria, Dengue and other VBD Control, Ministry of NHSRC develop a national Plan of Action (2023-2027) through a comprehensive consensus building initiative with all stakeholders and partners. This plan focus on Seven Service Delivery areas (SDAs);

- Improved surveillance
- Epidemic preparedness and response
- Institutional strengthening including M&E and viable coordination
- Health education and community awareness and empowerment
- Diagnosis and treatment
- Preventive measures
- Operational research and capacity building.

Current PoA (2024-2028) primarily aims at system strengthening including epidemic preparedness and response, capacity building at all levels, partnership building both public-public and public-private for sustainable management of VBDs of public health importance in Pakistan. Overall, integration is the central theme of this PoA (2023-2027) to achieve the national targets and international obligations set for VBDs control. This PoA (2023-2027) will be mainly funded by Government of Pakistan (GOP) from its domestic resources to ensure the better ownership and sustainability. In long term, Directorate of Malaria, Dengue & other VBDs Control, Ministry of NHSRC is fully convinced that the presented PoA (2023-2027) will help national health planners and policy makers to design more efficient, cost effective, ecologically sound and sustainable interventions using local evidences.

ACKNOWLEDGEMENTS

Pakistan has been ranked as the fifth most climate-vulnerable nation in the world by the Global Climate Risk Index. Interestingly, Pakistan's contribution to the production of CFCs is less than 1%. However, Pakistan is set to encounter rising temperatures, shifting rainfall patterns, and a modest increase in annual precipitation due to future climate change scenarios. These changes will significantly impact the prevalence and distribution of Vector-Borne Diseases (VBDs), particularly malaria and dengue, within Pakistan. Thus, there is an urgent imperative to formulate a comprehensive strategy to mitigate the consequences of climate change on VBD incidence. In this context, Management of Vector-Borne Diseases in Pakistan, National Plan of Action (2024-2028) represents a noteworthy achievement by the Directorate of Malaria, Dengue, and other VBD Control under the Ministry of National Health Services, Regulations, and Coordination.

In this context, we take immense pride in presenting the Management of Vector-Borne Diseases in Pakistan, National Plan of Action (2024-28) as a significant achievement of the Directorate of Malaria, Dengue, and other VBD Control. This plan clearly articulates our vision and priorities for addressing VBDs of public health significance. The development of this document has been guided by the WHO Global Technical Strategy (2016-23) and the Global Vector Control Response (2017-30).

Our heartfelt gratitude extends to Dr. Nadeem Jan, Minister for National Health Services Regulations & Coordination, whose leadership and encouragement were instrumental in guiding the team in creating this national document. We also owe a debt of gratitude to all the Provinces and Muhammad Mukhtar, Director of Malaria, Dengue and other VBD Control, as well as our partners such as TGF, WHO, APMEN, APLMA, MMV, UNICEF, CDC Country Office, HSA, PMAS MU-Rawalpindi, MSE, DESTO, DOPASI, and Reckitt-Pakistan for their invaluable support.

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Lastly, we express our deepest appreciation to Shahid Samad, Dr. Ibrahim, and Dr. Johar Khan of UNICEF Islamabad and GHD (EMPINET) Eastern Mediterranean Public Health Network for their unwavering support, including technical as well as financial backing for the printing of this Plan of Action (2024-28).

In the end, I invite everyone to join hands and work collectively to achieve the targets set in the National Plan of Action (2024-2028) for the sustainable management of VBDs of public health significance in our country. Together, we have the potential to leave a lasting imprint on this endeavor.

Dr. Muhammad Ahmed Qazi

Director General (Health)

VISION, GOAL & OBJECTIVES

VISION STATEMENT

To improve the health of people of Pakistan by providing universal access to affordable, quality, essential diagnosis and treatment and preventive services achieving the targets of National Health Vision 2016-2025, and also fulfilling other global health commitments and obligations (SDGs).



GOAL

To provide a common direction that harmonizes provincial and federal efforts and also other partners to reduce VBDs-induced morbidity and mortality in Pakistan. Integration involving all stakeholders and partners is the central theme of this document.



OBJECTIVE

Provide uniform policy, strategy and operational guiding principles for sustainable management of VBDs ensuring provincial autonomy.



GENERAL OBJECTIVES

- Strengthening of surveillance system (both vector and disease) at all levels through a coordinated approach.
- Detection, preparedness and response to epidemics and outbreak. This also include the control of VBDs under complex operating environment (COE).
- Promotion of system strengthening approach that includes the development of reference laboratory/ insectory networking at both national and provincial levels with all required human and logistic requirements.
- Provision of quality-qualified diagnostic and curative and preventive services.
- Develop a functional mechanism for inter/intra-sector (public-private and public-public partnership).
- Resource mobilization, mainly domestic resources.
- Enhancement of community awareness and empowerment focusing CBOs.
- Promotion of operational research and capacity building.



■ BACKGROUND

The overall situation shows that there is rising trend of VBDs in country. Lack of a designated department, inter-sectoral coordination, timely planning and execution, improved surveillance system, effective M&E mechanism, shrinking domestic resources and trained and motivated human resource are the major identified challenges for efficient and sustainable control of VBDs in Pakistan.

Major VBDs in Pakistan

Currently vector-borne infectious diseases (VBDs: dengue, dengue haemorrhagic fever, chikungunya, malaria, zika, crimean congo haemorrhagic fever (CCHF), leishmaniasis and African trypanosomiasis etc account for approx. 17% of estimated global infectious disease burden. Most of these VBDs are emerging or resurging to new regions as a result of changes in public health policy, insecticide and drug resistance, shift in emphasis from prevention to emergency response, demographic and societal changes and genetic changes in pathogens as well as in vectors. More than 80% of the world's population is at risk of one or more VBDs, claiming more than 700,000 lives each year. Many who survive these diseases are left permanently disabled or disfigured. The World Health Organization's (WHO, 2015) estimates, of the total global burden of major VBDs, 2.6% contributed by the Eastern Mediterranean Region (EMR). The true burden, however, is most likely under reported due to the limited surveillance and poor reporting system in some countries particularly in countries with humanitarian emergencies. Malaria, leishmaniasis and schistosomiasis contribute the highest reported burden of VBDs in the region. In Pakistan, VBDs are also a significant public health problem. Being a subtropical country, Pakistan has a rich fauna of disease vectors that includes mosquitoes, sandflies, ticks, fleas, bed-bugs and biting midges which, account for number of VBDs including arboviruses. Currently major VBDs in country are dengue, malaria, chikungunya, leishmaniasis, and CCHF. However, J. Encephalitis, West Nile Virus yellow fever and zika which is also spread by *Aedes* and *Culex* mosquitoes are also emerging international threat.



Dengue fever (DF) is the fastest emerging arboviral infections since 2005. During 1995-2004 only 699 dengue cases and 6 deaths were reported from 3 districts while these numbers dramatically increased to 145,523 and 731 respectively affecting 115 out of 154 districts/agencies/territories during 2005-2018. During 2019, 56000 dengue cases and 95 deaths have been reported from all over the country, of which 43% cases and

23% deaths were reported from twin cities of Islamabad and Rawalpindi. The disease epidemiology is complex in nature and patterns of disease transmission is influenced by many factors which include weather and environmental changes, human population dynamics, degree of immunity among local population and density, vector species composition, behavior, geographic distribution, and time required for development of virus in vectors. During 2021, a total 48,900 cases (735,200 suspected) and 183 death (case fatality ratio (CFR): 0.4%) reported from Pakistan. Of which the highest number of cases 24,146 and deaths 127 with CFR of 0.5 were reported from Punjab province. This account for 49.4% and 69.4% of all cases and deaths. The reported deaths were mainly reported from Lahore districts. Lack of operational research focusing up-dated knowledge of vector fauna, transmission mechanism, Climatic changes, quality of insecticides, coverage of interventions, over-reliance on traditional methods, lack of innovative technologies and approaches, improved surveillance system, effective M&E mechanism, inter-sectoral coordination, and trained human resource are the major identified challenges for efficient and sustainable control of dengue in Pakistan

DENGUE FEVER

MALARIA



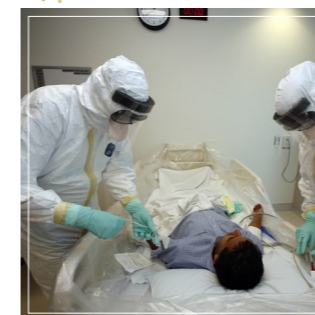
Malaria is 2nd most prevent disease in Pakistan after ARI. Of total 235 M, 29% population lives in high risk transmission areas, mainly in western and southern borders. 70% in low transmission areas, mainly in eastern part of country. Pakistan has been ranked 2nd highest burden for vivax in world after India. According to WHO Pakistan made a remarkable reduction in malaria burden (40% estimated caseload) WHO 2020 as compared to 2015. In 2020 Malaria Elimination roadmap (2021-2035) was developed targeting "Malaria Free Pakistan 2035" during 2021, country also developed Vivax Elimination Roadmap through TA of APMEN.

During the 2022 monsoon season, there was a substantial increase in rainfall in the malaria-endemic provinces of Balochistan and Sindh, with a rise of 370% and 340% respectively. Overall, the country witnessed a 190% increase in rainfall, leading to devastating floods that affected 116 districts (>65% of the country). Resultantly, there has been marked rise in malaria cases from July in 34 districts in Sindh, Balochistan and Khyber Pakhtunkhwa, reaching an emergency situation in August. Health facilities reported a significant surge in malaria cases, from 376,203 cases in 2021 to 3.16 million cases in 2022. The current outbreak in the country has been graded as the heaviest resurgent outbreak during last five decades. National Malaria and WHO expert expected an extended and intense transmission season beyond December 2022 after the recession of flood water. National Malaria Information System (MIS) reported 2.86 million confirm malaria cases till November 2023.


CHIKUNGUNY


Chikungunya, another arboviral disease, transmitted by the bites of infected *Aedes* mosquitoes (*Aedes aegypti* and *Aedes albopictus*). In Pakistan, chikungunya was first documented in 4 rodent and 1 human sample in early 1983. The first recorded human case of chikungunya in Pakistan was reported in Lahore during the 2011 dengue outbreak. The first outbreak reported in November, 2016 when different health-care authorities in Karachi estimate the total number of patients to be more than 30 000. However, National Institutes of Health, Pakistan, and Armed Forces Institute of Pathology, Pakistan, confirmed 4300 cases through qualitative RT-PCR. During 2018, out of a total 1549 samples tested at National Institute of Health (NIH)-Islamabad, 776 (50%) and 109 (7%) patients were found positive with chikungunya and dengue infection respectively. However no patient was found positive for zika virus. However, due to lack of effective implementation of public health measures, there are high chances that Zika virus can travel to Pakistan.

The infection is generally symptomatic, and characterized by an abrupt onset of fever followed by severe polyarthralgia. Other common symptoms include rash, headache, nausea, fatigue, and myalgia. Although the illness is self-limiting, joint pain can persist for months and even several years in some cases. Additionally, many patients develop neurological, cardiovascular, pulmonary, renal, ocular, and cutaneous sequelae following the acute infection. Regrettably, no vaccines or specific antivirals have been approved for chikungunya fever.


CCHF


Crimean congo haemorrhagic fever (CCHF) is a disease caused by a tick-borne virus (Nairovirus) of the Bunyaviridae family, with a case fatality rate is up to 40%. Outbreaks of illness are usually correlated with the distribution of *Hyalomma* tick species (Principal vector). CCHF is endemic in Pakistan since its first case in 1976, with reports of sporadic outbreaks almost from all areas of the country.


LEISHMANIASIS


Leishmaniasis is considered as one of the most neglected diseases in the country. This may be due to illiteracy, low socio-economic status, non-availability of specialized healthcare providers, specific clinical laboratories and relevant drugs. The disease presents in country in both forms of cutaneous leishmaniasis (CL) and visceral leishmaniasis (VL). Cutaneous leishmaniasis (CL), both Zoonotic Cutaneous Leishmaniasis (ZCL) and Anthroponotic Cutaneous

Leishmaniasis (ACL) is endemic in most parts of the country, including Balochistan, Punjab, Sindh, KPK, and AJK. ZCL is endemic in Southwestern Region while ACL is endemic in Central Region. Later is endemic in the Northeastern Region of Azad Jammu and Kashmir (AJK). For Cutaneous L. the causal organism are *L. tropica* (ACL) and *L. major* (ZCL) while the vector species are *Phlebotomus sergenti* (ACL) *P. papatasi* (ZCL) For Visceral Leishmaniasis the causal organism are *L. infantum* and *L. donovani* while the vector species are *Phlebotomus hindustanicus* (AJK) and *P. keshishiani* (suspected) in Northern areas. According to WHO data, 186,703 leishmaniasis cases were reported across Pakistan between 2014 and 2018. Balochistan province, where more than 60,000 cases were reported in that time period, appeared to be the epicentre already at the time. During 2019-2022, another 125,000 cases were reported from country particularly from Balochistan, Khyber Pakhtoonkhwa (KPK) and Sindh province.

■ INTEGRATED APPROACH FOR SUSTAINABLE MANAGEMENT OF VBDs: A GLOBAL APPROACH

Integrated vector/disease management (IVM) is a rational decision-making process for optimal use of available resources for sustainable management of VBDs of public health importance. The primary aim of this coordinated approach is to contribute to achieve the national targets and international commitments set for VBDs control, by making more efficient, cost effective, ecologically sound and sustainable interventions. This approach helps the national health planners and policy makers to find and use more local evidence, to integrate interventions and to collaborate within the health sector and with other sectors, as well as with households and communities. Subsequently, health authorities will be in a better position to meet the growing challenges in the control of VBDs in the face of dwindling public sector human and financial resources.

The integration approach primarily encourages a multi-disease control scheme, integration with other disease control measures through a systematic application of a range of interventions, often evidence-based, integrated, synergistic and participative. Inter-sectoral partnerships and collaboration at both national and local levels will ultimately result in cost savings and benefits to other health services. Other relevant sectors, such as environment, agriculture and livestock, education, defense, communication, port and shipping, local government and municipalities should incorporate this initiative into their Plan of Action (PoA) to prevent vector breeding and disease transmission. However, planning and implementation of integration requires in-depth programmatic and financial needs assessment through a strong and viable coordination and partnership among all stakeholders and partners. Also assessing the epidemiological and entomological situation, analyzing the local determinants of disease, selecting the appropriate control measures, and finally designing the locally appropriate decision-making. Similarly the implementation of integrated strategy for VBD control requires skilled and motivated personal and adequate infra-structure at all levels.



The World Health Organization (WHO) developed IVM strategy in 2004 with key guiding principle of integration i.e. the effective and efficient control of VBDs is not the sole responsibility of health sector but requires viable collaboration and partnership with different public and private organizations and agencies and community-based organization (CBOs).

■ INTEGRATION APPROACH AND CONTROL OF VBDs IN PAKISTAN

In 2011, integrated strategy focusing dengue control was implemented in Pakistan in its true spirit, particularly in Punjab province which resulted in an outstanding success in control of dengue fever and dengue haemorrhagic fever. Same results for dengue control have also been achieved in Khyber Pakhtoonkhwa (KPK) province in 2017/18 through this integration approach. Pakistan is at early stage of implementation of integration approach and country has taken few important steps for its implementation in country viz., Diploma in medical entomology in Health Services Academy (HSA)-Pakistan; programmatic and financial gap/situation analysis; Malaria Programmatic Review (MPR); legislation for dengue control particularly in Punjab, Khyber Pakhtoonkhwa (KPK) and Sindh. However, still there is need to adopt this initiative in its full spirit at all levels through some institutional arrangements primarily focusing system strengthening and capacity building involving all stake holders and partners.

Despite the importance of VBDs, Pakistan has only Malaria Control Programs (MCPs) both national and provincial level having an organized vector control component. However, till 2014 there was no other specific department for the control of dengue, chikungunya, leishmaniasis, and Crimean Congo Hemorrhagic fever (CCHF) in Pakistan which has been one of the reasons for not proper control of VBDs in country. The regular outbreaks of dengue (Rawalpindi, Islamabad-2019; Peshawer-KPK province-2018; Swat-2017; Rawalpindi 2014; Lahore 2011; Karachi 2006-2008 etc), leishmaniasis (2018 and 2019), and CCHF (2016, 2018) requires a systematic efforts to develop well-coordinated mechanism and approach for effective and sustainable control of these VBDs of public health importance in the country. Currently there are threats of some other VBDs which include chikungunya, zika, yellow fever and Japanese encephalitis (JE) which are endemic in China and India: the next door neighbors of Pakistan) which need an advance planning involving all stakeholders and partners. At national level, it has been observed that there is a gap for managing the major VBDs other than malaria. Directorate of Malaria Control (DoMC)-Pakistan receives requests regularly for technical assistance from provinces and other partners for management of all VBDs in the country. Further, the multilateral and bilateral partners also recommend and require to strengthen the Directorate of Malaria Control (DoMC)-Pakistan for managing all the VBD under one umbrella, whereas currently DoMC -Pakistan has no official mandate to deal with other VBDs except malaria.

■ NATIONAL AND PROVINCIAL SET-UPS FOR THE MANAGEMENT OF VBDs

Directorate of Malaria Control (DoMC)-Pakistan

Directorate of Malaria Control (DoMC)-Pakistan has been an attached department of Minister of Health since 1970's with well defined roles and responsibilities. DoMC-Pakistan has been one of the oldest and largest body of Government of Pakistan since eradication era of 1960 and currently having its existence at gross root level i.e. Basic Health Unit (BHU). Currently DoMC-Pakistan has 38 regular government employs in managerial, technical, para-technical and supporting staff categories. In addition to there are also 72 contractual staff supported by The Global Fund (TGF).

In the best interest of public health, DoMC-Pakistan is already playing an active and effective role for the control of VBDs and has developed many strategically important documents which include national policy, strategy, guidelines and surveillance tools. Recently the Competent Authority of Ministry of NHSRC-Islamabad has approved the case for broadening the working scope of this Directorate as "Directorate of Malaria, Dengue & other VBD Control" in May 2019. With this expanded scope, this directorate would encompass dengue, malaria, chikungunya, CCHF, leishmaniasis and other major VBDs. This would also ensure harmonization of coordination, improved surveillance, trainings, logistics, M&E mechanisms etc amongst all stakeholders and partners. Through this integration, a national level database on disease-specific morbidity and mortality would be available to make better-informed programmatic decisions.

Directorate of Health Services, Government of Punjab

Since 2011 Punjab has a separate dengue department fully equipped with logistics and human resource. However, in 2018 it has been merged with Punjab CDC with new name Epidemic Prevention and Communicable Disease (EP&CDC) under the administrative control of Director EC&CDC. Implementation of integrated vector management (IVM) in the Punjab province which resulted in an outstanding success for control of dengue in 2011. Resultantly in 2012 the confirmed cases dropped from 22,000 (2011) to only 325 among 789 suspected cases, and no deaths occurred.

The main features of Punjab CDC include;

- Improved vector surveillance (Indoor and outdoor)
- Larval Source Management (LSM)
- Legislation: Under the West Pakistan Epidemic Disease Act entitled "The Punjab Prevention and Control of Dengue Regulations, 2011" is implemented in Punjab which covers all areas of solid waste management, environmental management, biological control, quality assurance of insecticides, intersectoral coordination, strengthening disease surveillance
- Partnerships building: The province established a very strong partnership with all national and international partners (Sri Lanka, Malaysia, Singapore, etc.) that have extensive experience of dengue control. The experienced scientists from these countries were invited to deal with the situation and build up the capacity of local staff
- Coordination: Strong inter-sectoral coordination mechanisms involving all stakeholders other than health (district governments, municipalities, departments of education, irrigation, livestock, water and sanitation authorities, etc.) was established. Dengue control and prevention has also been included in curriculum of school and collage levels
- Human resource development: Highly qualified technical personnel including entomologists, epidemiologists, environmental inspectors, community mobilizers etc have been recruited for regular disease surveillance throughout the years
- Use of advance technologies: Developed and introduced Punjab Information Technology Board (PITB) for geo-tagging of each case and its response within 24 hrs. Same technology has also been used for vector surveillance
- Capacity building: To build up and strengthen the capacity of newly recruited and existing personnel in 2011, 98 people were sent abroad (Thailand) to be trained as Master Trainers which trickle down its impact at local level
- Establishment of an anti-dengue brigade: To monitor the implementation of guidelines and legislation, an "Anti-Dengue Brigade" was established
- Community motivation and participation: Community-based organizations (CBOs), leaders, volunteers were involved for better ownership and sustainability of all initiatives for dengue control. However for leishmaniasis and CCHF control there is no appropriate and designated department/program in Punjab province.

Sindh Province: Directorate of Malaria Control (DoMC)

Apart from DoMC Sindh province also has a separate dengue control program. However, the limited resources both in human and logistics are the major challenges for sustainable control of dengue in province. Previously the province has received technical support from Directorate of Malaria Control (DoMC)-Islamabad and WHO. Currently Dengue Cell mainly focuses on thermal fogging/space spraying and larviciding. However the capacity of staff is very low for implementation of interventions. Recently the Government of Sindh has also approved the Vector-Borne Disease (VBD) Control program to deal all VBDs instead of individual programs.

Khyber Pakhtoonkhwa Province: Integrated Vector Control/MCP

In view of rising trend of VBDs in KPK particularly leishmaniasis, provincial Roll Back Malaria (RBM) program in 2014 was converted into Integrated Vector Management Program with some revised roles and responsibilities. Since 2016 there are regular outbreaks of dengue in province particularly in Peshawar and Swat. Currently program mainly focusing the IVM strategy following the Punjab model (Improved vector surveillance; Larval Source Management (LSM); Partnerships building; Inter-sectoral coordination involving Lady Health Workers (LHWs); Capacity building; Community motivation and participation etc). However, the financial and HR constrains are the major challenges in provinces

Balochistan Province: Directorate of Malaria & VBD Control

Like KPK there is always outbreak situation of VBDs particularly leishmaniasis and malaria. The provincial malaria Control Program (MCP) was converted into Integrated Vector Management Program in 2015. Since 2017 there are regular outbreaks of dengue in Gawader and Lesbella. Though the name of program changed to Integrated Vector Management, however there is a still need of significant change in its functions as VBD control program. Unlike Punjab and KPK, program mainly relying on space spraying, IRS and LLINs use. Also have very limited capacity and resources for vector surveillance; Larval Source Management (LSM); Partnerships building; Inter-sectoral coordination etc due very limited financial and HR resources.

National Institute of Malaria Research and Training (NIMRT)

NIMRT was established in May 1985, by taking over International Center for Medical Research and Training (ICMRT) to enhance the technical expertise of the malaria staff and for operation research in the country. For strengthening the training part of the institute National Malaria Training Center (NMTC) was merged in it in 1987. In 1997 Cabinet decided to merge this institute with NIH, Islamabad. On November 01, 2005 NIMRT along with the posts was transferred to Directorate of Malaria Control (DoMC) for strengthening malaria research and training capabilities in the country. However, in 2006 it was again given back to NIH. In March 2007 once again the administrative control of NIMRT was given to DoMC. During 2007 Directorate of Malaria Control (DoMC) took following important steps through Global Fund resources for strengthening of this prestigious institute up to international level;

1. Fabrication of NIMRT building (USD 30, 000)
2. Establishment "Federal Reference Laboratory /Insectory" for QA/QC in diagnosis and treatment and prevention
3. Provision of state-of-art teaching facilities and capacity building programs for doctors, microscopists and entomologists
4. Appointment of two senior staff under GF support.
5. Conduction of resistance monitoring tests in mosquitoes against insecticides.

Despite the importance of VBDs in the country, currently there are no organized program except Directorate of Malaria Control (DoMC)-Pakistan to control other VBDs of public health importance which is one of the major identified challenges for efficient and sustainable control of VBDs in Pakistan. Under this national Plan of Action (PoA 2023-2027) all roles of NIMRT are shifted to Directorate of Malaria, Dengue and other VBDs Control-Pakistan. In long term outcome, National Entomological Reference Laboratory (NERL).

In September 2022, Directorate of Malaria Control (DoMC)-Pakistan and Department of Entomology, Pir Maher Ali Shah Arid Agriculture University (PMAS-AAU)-Rawalpindi established Pakistan's 1st "State-Of-The-Art" National Entomological Reference Laboratory (NERL) through Government --- resources. After the establishment of NERL, Pakistan joined the advance countries for vector surveillance and other operational research activities. Key functions of this facility are;

1. Center of excellent for training and capacity building of young entomologists for VBDs
2. Establishment of "Mosquito and other vector Repository" of Pakistan and other Asian countries
3. Mosquitoes and other vectors identification morphologically and molecular level
4. Monitoring the susceptibility of local vector species of public health importance
5. Monitoring of long lasting efficacy of insecticides and durability of ITNs

These initiatives will enable national health planners and policy makers to take evidence-based decisions to design effective control strategies, including system strengthening for improved vector surveillance, epidemic response, judicious and rational use of insecticides, regular capacity building program. Such changes are now essential to make a significant contribution to ameliorate VBDs in Pakistan and even for advance planning for up-coming threats of other VBDs like Japanese encephalitis, West Nile virus, and yellow fever etc in the country.

Merged Tribal Districts (Ex-FATA)

The Merged Tribal Districts (Ex FATA) program is an Integrated Vector Management (IVM) program, primarily looking into three major vector borne diseases (VBDs) prevalent in the districts. Most prevalent VBDs in tribal districts is malaria followed by leishmaniasis and dengue. Integrated Vector Management-FATA formerly called Malaria Control Program(MCP) is working to control malaria in all the tribal agencies and frontier regions (FRs) under the administrative setup of malaria control in districts through District Health Officer. The Global Fund (TGF) has been the main supporting agency for program to enhance its technical capabilities especially since 2016 for quality assurance and M&E.

At provincial level, IVM program is under the administrative control of Secretary (Health) Government of KPK, through Director-Health Merged Tribal Districts (MTD). Further there is a Program Manager who runs the IVM program. Currently program has very limited staff including technical personal. An entomologist has recently been hired by the program but still the program lacks focal persons for Case Management, Surveillance, M&E, Logistic, Training and BCC and Finance. There is a dire need to fill the gaps of the provincial and district staff keeping in view the changing role of the program from malaria control to VBDs control.

Azad Jammu Kashmir (AJK)

Malaria Control program. More or less similar situation of ICT, MTD, Balochistan.

Islamabad Capital Territory (ICT)

Directorate of Health Services (DHS) under the administrative control of Director General is providing all Primary Health Care Services to general public through its Medical Centers located in different sectors of Islamabad. This Directorate is dealing with all types of epidemics such as dengue and polio epidemics etc.

Malaria component is also supervised by Director General, Director Health Services (DHS) through the entomology team. Currently there are two Insect Collector and 15 spraymen in ICT/MCI team. However, currently no baseline data is available of confirmed case of malaria with bifurcation on type of malaria parasite. Also there is no government infra structure/ lab for malaria diagnosis at ICT/MCI for confirmation of malaria through microscopy. There is a lack of critical staff such as epidemiologist, surveillance officer and M&E officer for the program. As per recommendation of federal Directorate of Malaria Control (currently called Directorate of Malaria, Dengue and other VBDs Control-Pakistan), there should be a designated VBD control program in Islamabad.

Gilgit Baltistan (GB)

There are seven vertical programs in Health Department of Gilgit Baltistan under the administrative control of Secretary (Health). These include; LHW Program, MNCH Program, EPI Program, TB Control Program, Malaria Control Program, HIV / AIDs Control Program, and Hepatitis Control Program.

Of these seven vertical program, Malaria Control Program (MCP)-GB is headed by Program Manager. Like other provincial MCPs, it has wide spectrum of roles and responsibilities for the control of all other major Vector-Borne Disease (VBDs) than malaria. As per recommendation of federal Directorate of Malaria Control (currently called Directorate of Malaria, Dengue and other VBDs Control-Pakistan), Malaria Control Program (MCP)-BG is under the process of re-designation of VBD control program.

POTENTIAL STAKEHOLDERS AND PARTNERS AND THEIR ROLES AND RESPONSIBILITIES

Ministry of NHSRC: National level

- Policy formulation, strategic directions, guidelines development, and standardization to maintain uniformity in VBD control services in country
- Liaison with international donors and partners and other bilateral/multilateral support agencies for exchange of information, experience and resource mobilization and also for inter-regional and cross border collaboration
- Improved surveillance
- To act as primary coordinating body for;
 - ◆ Technical and material support to provinces for successful implementation of disease control strategies
 - ◆ To identify research priorities and their coordination with all stakeholders and partners
 - ◆ Central data base/data management unit (DMU) and sharing data/report with international partners
- To motivate and sensitize the all governmental and non-governmental organizations and partners to adopt the policy decisions in true spirit for sustainable VBD control in country
- To develop and implement a uniform mechanism for supervision and M&E
- Capacity building (Master Trainers)
- Epidemic investigation and analysis.

Ministry of Health: Provincial Governments

- To plan, implement curative and preventive services through coordination approach with national program, provincial level stakeholders and community based organizations (CBOs) align with national VBD control policy, strategies, guidelines and standards
- Timely and sufficiently resource mobilization for;
 - ◆ Procurement of supplies in the light of national standards
 - ◆ Human resources development and logistic arrangements
 - ◆ Supervision and monitoring and evaluation in districts
 - ◆ Conduct BCC/IPC/community awareness campaign preferably in local languages
 - ◆ Capacity building and trainings at district level
- Provide technical guidance and facilitate the districts to prepare District Implementation Plans (DIPs)/annual Plan of Action (PoA)
- Development of provincial level Data Management Units (DMUs) and also to provide feedback to the districts on program performance and guide for the remedial measures (if needed)

- Establishment and management of provincial reference laboratory network and strengthening of district level sentinel sites under different epidemiological and ecological settings
- Conduct entomological and epidemiological surveys/surveillance including Insecticides Resistance Monitoring (IRM) and bio-assay tests
- Implementation/facilitation of operational research.

District Health Authorities

In Pakistan district is the basic management and implementation unit for the control of vector-borne diseases (VBDs) under the administrative control of District Health Officer (DHO) with following roles and responsibilities;

- Develop and implement annual work plan (DIP) for VBD control which includes;
 - ◆ Timely arrangement, distribution and maintenance of supplies including insecticides, LLINs, drugs, equipments, PPEs and health education materials etc
 - ◆ Proper arrangement for storage and transportation of insecticides, LLINs and equipments
 - ◆ Identify the areas for house spraying operation and LLINs distribution
- Coordinate with all district level stakeholders, private sector health service providers, CBOs, NGOs and communities to secure their support for VBDs control-related activities at gross root level
- Establishment of District Data Management Units (DMU) for compilation of district reports
- Monitor the VBDs situation and report immediately to higher levels of any sudden rise of incidence i.e. potential outbreak/epidemic
- Establishment and management of district level sentinel sites
- Regularly conduction of insecticides susceptibility and bio-assay tests as per WHO standards
- Community mobilization and involvement.

Partners

Since malaria eradication era, malaria programs very strong and effective working relationship partners like WHO which has been the major technical partner and supporter of the program. GFATM is currently the major source of additional funding for programs in country. This proposal encompasses all the required initiatives to intensify efforts for partnership with all national and international partners/UN agencies. Other potential partners than WHO will be;

- Asia Pacific Malaria Elimination Network (APMEN)
- Asia Pacific Leaders Malaria Alliance (APLMA)
- Alliance for Malaria Prevention (AMP)
- United Nation International Children Emergency fund (UNICEF)
- International Federation for Red Cross (IFRC)
- Roll Back Malaria (RBM) Partnership to End Malaria

- Medecins Sans Frontieres (MSF)
- United States Agency for International Development (USAID)
- Eastern Mediterranean Public Health Network
- Communicable Diseases Control (CDC)
- Food and Agriculture Organization (FAO)
- Institute for Public Health (IPH)
- Pir Mehr Ali Shah Arid Agriculture University (PMAS-AAUR) Rawalpindi
- Defence Science and Technology Organization (DESTO)-Pakistan
- National Institute of Health (NIH)-Islamabad Pakistan
- Reckitt Pakistan
- Health Services Academy (HSA)
- Indus Health Network (IHN)
- Pakistan Health Research Council (PHRC)
- National Rural Support Programme (NRSP)
- Pakistan Lions Youth Council (PLYC)
- Association for Community Development (ACD)
- Quaid-i-Azam University Islamabad
- Commission on Science and Technology for Sustainable Development in the South (COMSAT)
- All Tertiary Care Hospitals

The Mechanism for Public-Private-Partnership

This Mechanism will include;

- Development of workplan and its implementation for VBDs control in country
- Resource mobilization
- Technical assistance
- Capacity building
- Experience sharing
- Data sharing.

Source of Funding

As mentioned earlier that currently TGF is the only donor for malaria control in Pakistan which fills the gaps identified in national and provincial PC-Is. However, this PoA (2020-2024) with the worth of Rs. 1619.66 millions will be funded by Government of Pakistan (GoP) to ensure the ownership and sustainability. So both TGF and GoP will augment each other through this proposal.

NATIONAL STEERING COMMITTEE AND TECHNICAL ADVISORY COMMITTEE/GROUP

National Steering Committee

Ministry of NHSRC will develop National Steering Committee (NSC) to ensure resource mobilization for better ownership and sustainability implementation of interventions through coordinated approach in country. The NSC will be chaired by Federal Minister of Health and will be comprised of;

- Provincial secretaries (Health)
- Secretary M/o Finance
- Secretary M/o Revenue /FBR
- Secretary M/o Planning Commission
- Secretary, M/o Education
- Secretary M/o Water and Power
- Secretary M/o Port and Shipping
- Secretary M/o Communication
- Secretary M/o National Food Security and Research
- Secretary M/o Defense
- Secretary M/o Railways.

Note: National Steering Committee for Malaria Control Already exist Since 2007

Roles and Responsibilities

The major roles and responsibilities of NSC will be;

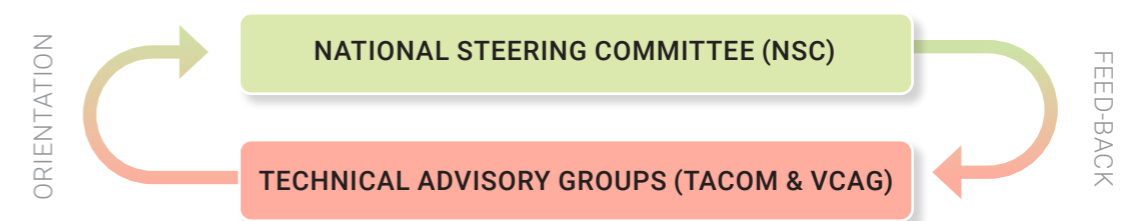
- To review the progress on VBDs control in Pakistan
- To ensure the timely and adequately recourse mobilization
- Identification of issues contribution to low performance and formulate timely remedial actions and recommendations
- Review the policies, strategies and legislations related to VBDs control
- To strengthen the inter-ministry coordination and formulate the mechanism to sustain it
- To review the plan of Action (PoA), their feasibility and soundness for execution
- Ratification/endorsement and implementation, of regional and international commitments
- Endorsement of decisions of TACOM/TWG/VCAG.

Technical Advisory Committees/Group on VBDs

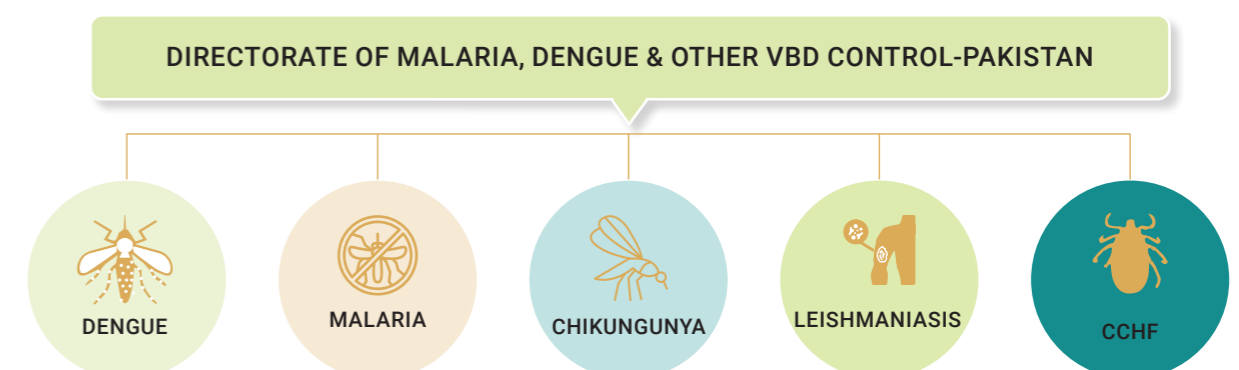
This includes the Technical Advisory Committee on Malaria (TACOM), Vector Control Advisory Group (VCAG), and Technical Working Group (TWG) etc.

To address the challenges of implementation of integrated approach for control of VBDs, Global Plan for Insecticides Resistance Management (GPIRM), and other Research and Development (R&D) needs in field of VBDs, Directorate of Malaria, Dengue & other VBDs Control-Pakistan, Ministry of NHSRC will develop a competent multi-sectoral technical advisory groups having representations from various organizations/ departments with following major TORs;

- To provide technical assistance and guidance to NSC for;
 - ◆ development of strategies, policies and guidelines
 - ◆ programmatic need assessment and gaps identification
- Potential source of assistance to address programmatic gaps
- Research priorities, plans, ethical clearance, execution and dissemination
- Development of liaison with other potential partners including research institutions.
- National Insecticide Decision Making Body
- Technical Advisory Committee on Malaria (TACOM)



Proposed Structure of Directorate of Malaria, Dengue and other VBDs Control-Pakistan and its Components



National Insecticides Resistance Management (IRM) Strategy

Development of resistance against insecticide is the major threat to any vector control program around the globe which relies on use of chemicals. WHO has recently developed a robust Global Plan for Insecticide Resistance Management (GPIRM) in consultation of member States including Pakistan. Overall, GPIRM describes a framework for decision and policy making to handle insecticide resistance, depending on the in-use vector control interventions.

To make this strategy successful, WHO emphasizes that the IRM should be a collective responsibility of all partners and stakeholders at both global & country levels. In this regards, GPIRM explains the roles and responsibilities of each partner and stakeholder and also enlists very essential activities that should be undertaken to implement the strategy.

In 2016, Directorate of Malaria Control (DoMC)-Pakistan revised its national plan for IRM aligned with WHO's GPIRM. Following are the salient features of National Insecticides Resistance Management Strategy/plan (NIRMP);

- This Directorate will act as Central Unit (Focal Point) and develop an appropriate national IRM Decision-Making body. The overall objective of this body will be coordination for all activities to ensure the appropriate prioritization, resource mobilization and utilization and to provide mechanism for evidence-based decision making involving all stakeholders and partners
- Only WHO PQ-Listed insecticides will be used in country
- Development of sentinel sites under different ecological, zones of Pakistan
- Regular conduction of insecticides susceptibility test at sentinel sites of country and also at randomly selected sites/villages.
- All four groups of insecticides will be monitored simultaneously against all major vector
- Specific Terms of Reference of this central IRM decision-making body will be;
 - ◆ Review the data on insecticides used (quantity, classes/groups and strength etc)
 - ◆ Review the current vector control interventions
 - ◆ Review the current status of susceptibility level in local vector species
 - ◆ Provide technical assistance and guidance for; ◆ development of annual workplan for NIRMP plan ◆ development/realignment of strategies, policies and guidelines for vector control ◆ development of sentinel sites in country ◆ development/up gradation of entomological surveillance tools ◆ Development of liaison and linkages with other potential partners including research institutions ◆ Meeting with key decision/ policy makers, health planners, implementers for human and other resource requirements for implementation
 - Facilitate the registration process for insecticides • Frequency of meeting: Committee will meet "Bi-annually". However, meeting can be called upon any time on priority or urgent matters.

National policy for use of insecticides for vector control

As per national vector control policy and strategy only WHO Prequalified/ recommended insecticides of recommended/evaluated manufactures and formulation/strength will be used and promoted in country for vector control operation.

In case of local manufacturing (formulation) of insecticides, the supplier must provide the documentary evidences of "source of active gradient (a.i) or technical material and formulation" The procurement of WHO prequalified ensuring the fairness, competition, transparency, integrity, accountability in whole procurement process will resulted in supply of "Quality-Qualified-Products" for the control of VBDs and help to eliminate the all suppliers or contractor who cannot guarantee the quality and performance of their products. Therefore, unwillingness to guarantee conformity and compliance to required standards (WHO Prequalification) must result in rejection of the supplier.

Vector control interventions and their coverage level

Align with World Health Organization (WHO) policy statement, the Directorate of Malaria Control (DoMC) promotes following two core/primary vector control Interventions;

- Indoor residual spraying (IRS)
- Insecticide-treated nets (ITNs/LLINs)

This Directorate recommends following policy directions for target and population at risk and its coverage through core vector control interventions;

- All population at risk and/or people living in target areas will be considered as target population
- Universal coverage (100%) of target areas/population through core interventions (ITNs and/or IRS) will be the primary objective of national policy for malaria control
- In case of scare recourses, most vulnerable population i.e. pregnant women (PW) and children under five (<5) will be the primary target for coverage and protection
- In case of displaced population (IDPs) 100% population will be protected through ITNs
- Coverage through ITNs or IRS should be completed in shortest possible time as under;
 - ◆ within one week (ITNs)
 - ◆ one month before transmission period (IRS)

Universal coverage (100%) to target population/area will be provided either through any one of these interventions. National and international data reveal that both interventions have the full potential and ability to reduce the malaria incidence significantly, provided these are implemented at right time, and place, give full coverage and with full preparation that includes;

- Adequate logistics and trained human resource
- Having an efficient coordination with all stakeholders
- Well defined supervision and M&E plan

Indoor Residual Spraying (IRS)

Indoor Residual Spraying (IRS) will be refer to the spraying of all stable structures and potential resting place of local vector species inside human occupancy using an insecticide formulation with long-lasting residual efficacy and has been included in WHO-Prequalification list (WHOPES-recommended).

Since malaria vectors have very specific resting places associated with human dwelling/residence places, therefore the proper understanding of resting behavior of local malaria vector(s) is extremely important for successful IRS program in local settings. Due to a pronounced biting (endophagic) and

resting (endophilic) behavior of malaria vectors in Pakistan, Malaria Control Program (MCP) primarily focus on the indoor application of residual insecticides to all identified resting places inside houses. Similarly for effective and sustainable IRS, the Directorate of Malaria Control (DoMC) primarily advocates that Indoor Residual Spraying (IRS) operation must be;

- Total: All human dwellings/structures should be sprayed systematically and thoroughly.
- Complete: All potential resting places including difficult areas/surfaces should be sprayed.
- Uniformity: All treated surfaces must have uniform application of the required dose of insecticide
- Timely: Must start before peak transmission season and also coincide with peak vector population
- Regular: Spraying should be repeated at regular intervals depending upon the length of transmission period to ensure that there is an effective deposit of insecticide in place during the entire transmission season.

Use of long lasting insecticides treated net (ITNs/LLINs)

Current policy decision apply to all brands of LLINs those have been included in WHO - Prequalification list and contain only an insecticide of pyrethroid class i.e. pyrethroid-only LLINs/TNs. This policy decision also equally applies to any LLINs/ITNs brand which contains insecticides from other class than pyrethroid, either singly/alone or in combination with pyrethroid. ITNs will be distributed in target areas through a systematic mass Distribution (MD) campaign to attain a desire level of coverage (100%) in a shortest possible time (5-6 days). MD will be supported by Continuous Distribution (CD) to maintain the desire level of coverage using community-based channels.

B). Supplementary Intervention

In some specific settings, core interventions can be supplemented by larval source management (LSM) which includes habitat modification, habitat manipulation, chemical larviciding, and/or biological control which include the use of Bacillus thuringiensis (Bti), Spinocids and other insect Growth Regulators (IGRs), Wolbachia etc

Larval Source Management (LSM): Best method to control vector mosquito densities and disease transmission is to find and eliminate or alter their breeding places and this intervention should be the backbone of any good vector control program. However, the mosquito breeding sites that are undesirable or impossible to alter or eliminate should be treated with an appropriate larvicide. Generally the larvicides should be applied after careful assessment of water bodies. The use of chemical (larvicides) in flood water should discouraged due to;

- Domestic use of flood water including for livestock
- Flowing nature of water
- Presence of natural enemies (predators) for mosquito larvae.
- Large size of water bodies

Larvicide should only be used in small, close to human settlements etc. Bio-larvicides (Bti) should be preferred under such circumstances.

Selection of intervention(s) and their cycles

The Directorate of Malaria Control (DoMC)-Pakistan in collaboration and consultation with provinces and other partners will Introduce and/or scale up coverage of selected vector control interventions (IRS or LLINs) in areas where available epidemiological and entomological data indicates that it can be cost-effective and efficient towards achieving national targets for malaria control and elimination. This Directorate suggests following criteria for selection of vector control intervention(s) in country;

- Epidemiological characteristics
 - ◆ Transmission pattern: Indoor or outdoor transmission which determines the type of intervention
 - ◆ Peak transmission which determines the time for implementation of intervention. Ideally for IRS and ITNs, the intervention must be implemented at least one month before peak transmission season
 - ◆ Transmission period: length of transmission season i.e. seasonal or yearly. This determines the number of applications particularly for IRS. In case of seasonal transmission for 3-4 months 1 round of IRS is sufficient. In case of around the year transmission two cycle of IRS are required to cover entire transmission season. However in case of use of 2nd or 3rd generation insecticides which have efficacy period of 8-9 month one cycle of application is enough.
- Entomological characteristics
 - ◆ Behavior of local vector species: endophilic or exophilic; endophagic or exophagic
 - ◆ Susceptibility level of local vector species
- Demographic characteristics
 - ◆ Population characteristics: settled or nomadic
 - ◆ Internally Displaced Population (IDP)
 - ◆ Access to target areas
- Community acceptance and response
- Experts' opinions

Use of New Generation Insecticides and ITNs/LLINs

As a part of NIRM Strategy, country will promote the use of New Generation insecticides and/or ITNs having dual active ingredients (a.i). However, WHO Prequalification for these products are compulsory. Main intention is to be used against vector resistant to pyrethroids

Combination of Interventions (IRS with ITNs)

The Directorate of Malaria Control (DoMC)-Pakistan does not recommends deployment of both IRS and LLIN simultaneously in same area(s), provided a pyrethroids origin insecticide has been used on nets and insecticides of other class (OP, Carbamates, HC etc) has been used in IRS campaign (and vice versa) as an Insecticides Resistance Management (IRM) tool.

This Directorate in consultation with provinces and other partners should develop a robust M&E

system and also through operational research to determine the appropriate level of combination of both interventions in local context that is cost-effective and sustainable

Note: Directorate of Malaria Control (DoMC) urges the “cost-effectiveness” to supplement with LLINs or IRS before the application/ deployment of LSM in local settings

Implementation mechanism for vector control Interventions

National program in collaboration and consultation with provinces and other partners will develop and introduce all necessary Standard Operating Procedures (SOPs) / policy and strategic directions to ensure the cost-effectiveness, sustainability of selected vector control interventions. These SOPs will primarily focus on;

- Selection of appropriate intervention (IRS or LLINs) in areas where available epidemiological and entomological data indicates that it can be efficient towards achieving malaria targets
- Preventing the use of unauthorized or un-recommended insecticides, LLINs, equipments and PPEs. Note: Only WHO Prequalified listed brands will be used and promoted in country
- Appropriate selection insecticides (formulation and strength) in view of susceptibility level of local vector species and also with appropriate application techniques
- Appropriate selection of timing for IRS application time or LLINs distribution
- With full preparation i.e. ensuring timely and sufficiently availability of all required logistics and human resources
- Strengthen the managerial capacity of MCPs through improve human, technical and financial resources with adequate M&E system.
- Partnership building for sustainability (Public-Public-Partnership and Public-Private-Partnership)
- Strengthening the community involvement and empowerment giving special emphasis on community-based social mobilization and behaviour Change Communication (BCC) in vulnerable population. For this Community-Based Organizations (CBOs) will be encouraged to participate

Scale-Back of vector control intervention(s)

Sustainability of vector control is always a big challenge for any program particularly when there are scarce resources. Directorate of Malaria Control (DoMC)-Pakistan does not recommend the scale-back (discontinuation) of vector control intervention(s), particularly in areas with on-going local/indigenous transmission. However, the full coverage of target population should be continued to maintain the desired level of coverage.

Scale-back of vector control intervention can only be recommended for areas with no local case consecutively for at least three (03) years. However in areas where local transmission has been interrupted, decision on discontinuation of vector control intervention should be made on the basis of;

- Detailed epidemiological and entomological analysis of area
- Vulnerability and susceptibility
- Disease surveillance
- Coverage level of intervention(s) and impact assessment

- Capacity of local staff for case management and vector control response
- Data validation

These information will be collected through special surveys, expert opinion, community feedback etc preferably through external evaluation/3rd party validation

Quality Assurance (QA) mechanism of insecticides

Quality Control (QC) of insecticides for vector control is extremely essential to minimize the risks associated with their use, handling and also to ensure their effectiveness and stability during storage and transportation under local climatic condition. Poor quality insecticides always results in enhance risk for human (spray operators, handlers etc) and environment and finally lead to ineffective control of vectors and possible development of resistance.

Registration

All insecticides intended to use for vector control in country must be registered with relevant authority (Drug Regulatory Authority-Pakistan (DRAP) after filling all codal formalities.

Since DRAP currently does not have separate sections for registration of public health pesticides (PHP), therefore it is recommended that a “Technical Wing for PHPs” in DRAP should be established having representation from DRAP, DoMC-Pakistan, WHO, FAO, PARC

Pre and post market survey

This also includes the collection of Certificate of Analysis (CoA) along with “Prototype sample” This will be provided by supplier/manufacturer either from its own lab/facility at the time of /along with bulk supply or shipment. However, buyer should also demand “3rd Party Evaluation Report” mainly from any certified or accredited Labs (WHO-Prequalified or ISO 17025).

To insure the quality of supply, Buyer/Program should collect randomly selected samples of an appropriate size after 6-8 months from (at least three in number) different storage facilities and should send to above mentioned facilities i.e. WHO-Prequalified and/or ISO 17025. **Note: It will be prime responsibility of Program to establish and maintain appropriate storage facilities as mentioned in “Quality Assurance Protocol and Tools for Storage of PHPs”**

In case of any difference in results from those at time of supply, the supplier will be immediately called and intimated. The rest supply will be collected and returned at the cost of supplier. Note: In case of different results from different facilities, the program should immediately review the storage conditions and also collect another three samples. If results are same and storage conditions are satisfactory, the supply will be returned and supplier will be notified.

To guarantee or maintain the transparency and confidentiality, selected laboratories and sampling agent must be independent of manufacturer, supplier and procuring agency. Selected laboratories must be equipped with;

- Sufficient and highly qualified human resource to perform all physico-chemical analysis of samples
- A sophisticated system for quality assurance,

Vector Surveillance

Vector surveillance involves the regular and systematic collection, analysis and interpretation of entomological data for health risk assessment, and for planning, implementing, monitoring, and evaluating vector control. Monitoring and surveillance of vector control interventions are required in order to ensure that intervention programs are on track and to provide information for future policies/strategies and to plan future resource requirements. It can also provide early warning information that an outbreak of a VBD may be likely, and can thereby trigger a pre-emptive response, such as the launch of a special vector control campaign.

A). Establishment of entomological reference laboratory net work

Currently this Directorate has established a National Entomological Reference Laboratory (NERL) at Pir Mehar Ali Shah Arid University (PMAS-AAU)-Rawalpindi with prime objective to meet the country needs for vector surveillance and operational research. Also to design and disseminate the Quality Assurance (QA) mechanism in vector surveillance. All provincial malaria/VBD control programs are also encouraged to develop/strengthen their Provincial Entomological Reference Laboratories at provincial headquarters with main objectives of implementation QA mechanism for vector surveillance. The Directorate of Malaria, Dengue and other VBD Control-Pakistan" also encourages to establish district level entomological laboratories and insectories in country with objectives;

- Collection of local vector species and their susceptibility level
- Capacity building at local level
- Facilitation of operational research at local level

B). Re-activation of National Institute of Malaria Research and Training (NIMRT)

There is also a national entomological reference lab reference laboratory in National Institute of Malaria Research and Training (NIMRT)-Lahore to meet the need of research and capacity building for vector control in country. Directorate of Malaria Control-Pakistan also encourages the provinces to establish their entomological reference laboratories to act as "Centre of excellence for provision of technical assistance and guidance for quality assurance in vector control interventions in the country through research and development, intersector coordination and capacity building"

C). Establishment of sentinel sites

This Directorate suggests and recommends that there should be a network of sentinel sites representing different epidemiological and ecological strata of the country. The criteria for selection of sentinel sites should be based on;

- High and stable malaria case load or disease risks
- High vector densities
- Available infrastructure and inputs required
- Availability of trained and motivated staff
- Record of previous and currently use of insecticides in health and agriculture sectors
- Expert opinion.

B). Vector fauna

Being a subtropical country, Pakistan has a rich fauna of vectors of public health importance which includes; mosquitoes, sand/f, ticks, fleas, bed bugs, house/f, mites, c/roaches etc which, account for number of VBDs including arboviruses. One of the key functions of national, provincial and district level entomological laboratories and insectories to maintain the record of fauna and their geographical and ecological distribution in country.

C). Monitoring of susceptibility and bio-assay

This Directorate will take essential measures and encourages all provincial MCP to conduct susceptibility test to all insecticides annually at designated sentinel site under different ecological and epidemiological settings using standard WHO or CDC protocols to determine the susceptibility level of local vector species. When resistance against in-use insecticides will be reported, an insecticide (group/formulation) with different mode of action / group will be selected. This should be the primary strategic decision to select an insecticides for IRS/LLINs operation and larviciding. However, all operational, strategic, and financial aspects before selection of new insecticide must be considered. This Directorate also encourages the all provincial programs and partners (using insecticides) to conduct wall bioassay tests after IRS operation (preferably monthly basis) at selected sites to determine the level and length residual efficacy of applied insecticides under field conditions.

As a part of national IRM strategy this Directorate will developed/strengthen the multi-sectoral national Insecticide Decision Making body (under chairship of secretary/Director General) with primary mandate to review the vector susceptibility data and decide the new group of insecticides. This body will also review the cases of registration of PHPs and make recommendations before submission to DRAP.

Public health pesticides (PHPs) management

This Directorate in consultation of provincial malaria/VBD control programs and partners will develop strategic and operational directions for acceptable safety standards and practices for handling of PHPs in Pakistan. These safety standards will be fully align with guiding principles developed by World Health Organization (WHO), Food and Agriculture Organization (FAO) to ensure the safe and secure handling of PHPs avoiding any adverse impacts on human health or environmental contamination.

To ensure the quality, reliability and accuracy all PHPs and related products intended for the control of malaria and other VBDs will be registered in country before marketing. National program in collaboration with national regulatory authorities will facilitate the registration PHPs and other products (LLINs etc) in country. This Directorate will also develop a multi-sectoral central board for management of PHPs focusing registration, disposal of wastes and establishment of designated storage and disposal facilities.

All these strategic pillars are aligned with The Global Vector Control Response (GVCR: 2017–2030 (GVCR) which provides clear strategic directions globally for the strengthen vector control initiatives through capacity building, improved surveillance, better coordination and integration action across sectors and diseases.

■ Climate Change and vector-borne diseases (VBDs)

Climate change is negatively impacting health in a multitude of direct and indirect ways. In particular, climate change is increasing the frequency of extreme weather events, such as heat waves, which can directly cause injury, illness, and death. Climate change also indirectly affects health through alterations to the environment. For example, climate is a significant factor influencing the intensity and distribution of vector-borne diseases (VBDs), including malaria, dengue, and Leishmaniasis. The negative health impacts of climate change are particularly acute in Pakistan, which ranks tenth worldwide among countries that have been severely affected by climate change. Climate change-related events, such as rising temperatures and heatwaves, natural disasters, and displacement pose a significant risk to public health.

Pakistan experiences a number of natural and man-made humanitarian emergencies. For example, heatwaves have become more frequent and intense, leading to increased incidents of heat exhaustion, heatstroke, and other heat-related illnesses. Such emergencies result in mass population displacement and forced migration. Locally affected populations are often compelled to relocate into formal and informal temporary camps, where living conditions are extremely poor. The indirect impacts of such emergencies



are persistent and wide-ranging. The World Bank Pakistan Country Climate and Development Report notes “indirect long-term threats such as outbreaks of malaria, dengue, and severe gastroenteritis have been observed in Pakistan in the aftermath of a heatwave”. Increased temperatures and changes in rainfall patterns can exacerbate vulnerabilities for human health, agriculture, infrastructure, and water resources upon which a large part of the economy and livelihoods are dependent. Climate change-induced humanitarian emergencies lead to infrastructure damage resulting in the destruction of essential services, food insecurity, malnutrition, limited/diminished governance, and severe health system disruption that complicate disease prevention, diagnosis, and treatment efforts.

Importantly, climate change increases the risk of VBD, directly impacting density, abundance, and distribution in a number of ways. For example, climate change affects the geographical distribution of VBDs as warmer temperatures expand the habitats suitable for vectors. Higher temperatures as well as conditions such as wide-ranging stagnant water, lack of sanitation facilities, and proper drainage systems also create more breeding grounds for disease-carrying mosquitoes. Climate change can also alter the behavior of vectors and humans in ways that increase transmission potential. For example, mosquitoes may become more active during warmer weather, increasing their interactions with humans, while people may spend more time outdoors during heatwaves increasing their exposure to vectors. The impacts of climate change on VBD are evident in the recent heatwaves Pakistan suffered between 2020 and 2022.

The impacts of climate change on VBD are evident in the recent heatwaves Pakistan suffered between 2020 and 2022. During the 2022 monsoon season, there was a substantial increase in rainfall in the malaria-endemic provinces of Balochistan and Sindh, with a rise of 370% and 340% respectively. Overall, the country witnessed a 190% increase in rainfall, leading to devastating floods that affected over 33 million people in 116 districts. Furthermore, health facilities reported a significant surge in malaria cases, from 376,203 cases in 2021 to 1.7 million cases in 2022. In addition to malaria, the World Health Organization (WHO) reported approximately 25,932 dengue cases in the country from 1 June to 27 September 2022, with 75% of these cases occurring in September. These escalating numbers of malaria and dengue cases have placed an increasing burden on healthcare facilities.

Pakistan is considered a moderate malaria endemic country, with the highest endemic areas located on the western borders with Afghanistan and Iran. In recent years, the country has made remarkable progress towards malaria elimination. Overall, malaria transmission is typically unstable with the major transmission period occurring post-monsoon, i.e., from August to November. *Plasmodium vivax* (78.1%) and *P. falciparum* (19%) are the prevalent species of parasites in the country driven by established and emerging mosquito species, such as *Anopheles pulcherrimus*. During 2022 floods, there has been marked rise in malaria cases from July in Sindh, Balochistan and KP provinces, reaching a malaria emergency in August 2022. WHO expert mission estimated 3 million cases would occur in 2022 with an extended and intense transmission season beyond December 2022 in Sindh and Balochistan. The current outbreak in the country has been classified as the heaviest resurgence in the last five decades.

¹Maryam Salma Babar et al., “Impact of climate change on health in Karachi, Pakistan,” *The Journal of Climate Change and Health* 2 (May 2021):100013, doi: <https://doi.org/10.1016/j.jocl.2021.100013>.

²<https://www.gavi.org/vaccineswork/human-toll-rising-dengue-cases-pakistan>

■ Climate change and its Impacts on vector densities and survival

There is concrete evidence that climatic variables such as temperature, rainfall and humidity have a direct impact on densities of vectors of public health importance like mosquitoes and consequently increase the incidence of VBDs by:

1. **TEMPERATURE:**

- On vector metabolic rate
- Population size
- Blood Feeding rate
- Distribution & Survival rate.

2). **HUMIDITY:**

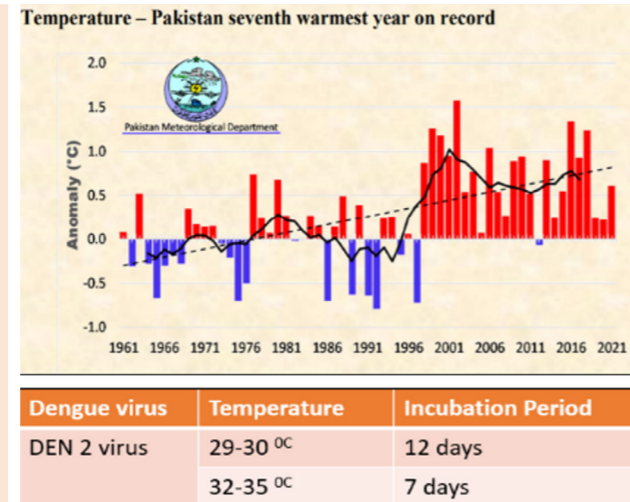
- On Blood Digestion
- Dehydration
- Survival Rate

3). **PRECEPITATION:**

- On Presence/Absence of breeding site
- Size and duration of breeding sites

4). **WIND:**

- Dispersal & Distribution



- Increase in vector population growth rate and decrease in developmental period
- Increase in number of generation per year
- Increase in vector metabolic rate
- Increase blood feeding rate and frequency
- Increased size and duration of breeding sites
- Introduction of new vector species and/or bio-types
- Dispersal and distribution

In response to some environmental changes, such as deforestation, a zoophilic species may become anthropophilic and thus targeting humans.

China-Pakistan Economic Corridor (CPEC) and VBDs



China-Pakistan Economic Corridor (CPEC) is a framework of regional connectivity and has become a real back-bone in economy of Pakistan. This regional connectivity will not only be in the benefit of Pakistan and China, but also have significantly positive impact on economy of Afghanistan, Iran and Central Asian Republics etc.

The CPEC entirely based on transportation of goods through improved road, railways and air networking etc. having frequent people to people contact for higher volume of flow of trade and businesses, enhancing understanding through academic, cultural and regional knowledge by win-win model. No doubt CPEC is a journey towards economic regionalization in the globalized scenario, but there are also some potential health-related threats particularly the spread/re-emerge of some VBDs to other regions. After inception of CPEC most of trade is being done by the use of containers which are transported through roads and sea routes. It is believed that transmission of dengue globally happened through containers and other goods like used tyres. According to the route map of CPEC (Figure) many Point of Entrees (PoEs) and also loading and unloading points (Dry ports as well as sea port) are locating in dengue endemic zones/districts. An eye-opening example is regular outbreaks of dengue in Gawadar and its surrounding areas.

As already mentioned that Japanese encephalitis is endemic in China and India which are next door neighbors of Pakistan. Traditionally *Cx. tritaeniorhynchus* and *Cx. pseudovishnui* are vectors of JE in Asia and also vectors of West Nile virus in the Indo-Pakistan subcontinent. Both vector species have huge population in Pakistan, particularly in Punjab, Sindh and KPK. Pakistan particularly eastern route/zone

also have huge population of pigs (the amplifier host of virus). If there is any introduction of infected bird with virus through trade, the vector population is already well established there then there is big threat of JE in these areas along-with CPEC routes. The transportation of infected vector mosquitoes from endemic countries is the key factor behind this threat. WHO (1995-2010) has already warned that the location of Pakistan next to endemic areas for West Nile virus in China and India increases the risk of outbreaks. There is also regular arrival of some migratory birds (Krans) that may act as zoonotic hosts and may have to be considered while evaluating the risk of Arbovirus transmission in the area.

In view of rising trend of VBDs and potential threats of new VBDs via CPEC, there is burning need to develop a comprehensive plan for disinfection of containers and ships at all PoEs and all dry ports and sea ports within the country involving all relevant stakeholders.

CPEC and International Health Regulations (IHR)

As mentioned above, there is a rapidly growing regional and global trading through development of connectivity framework across the globe. Such connectivity networking playing a significantly role in the strengthening of economy of a country linked with. In view of health-related threats of VBDs as mentioned earlier through these international and regional connectivity, the presented proposal also contains a comprehensive plan of action (PoA) for disinfection of containers and ships at all entry points (dry ports and sea ports) involving all relevant stakeholders. Screening of all suspected cases of malaria at entry and exit points, vaccination for yellow fever are the key interventions proposed in this proposal.

Cross Border Collaboration

Currently about 80% malaria caseload of Pakistan is being reported from bordering areas with Afghanistan and Iran. Same situation is in Afghanistan having most of the malaria cases with East border of Pakistan. Currently Iran is qualifying for malaria elimination. However, currently 100% malaria cases have been reported as "imported cases" from Pakistan which has been a major concern by Government of Islamic Republic of Iran. Iran also reporting the rising trends of *Aedes aegypti* and *Ae. albopictus* (the vectors of dengue), but yet not the cases of dengue. Pakistan and Afghanistan has the rising trend of dengue, which is again the major threat for Iran. Similarly Leishmaniasis is another major health concerned issue in three countries.

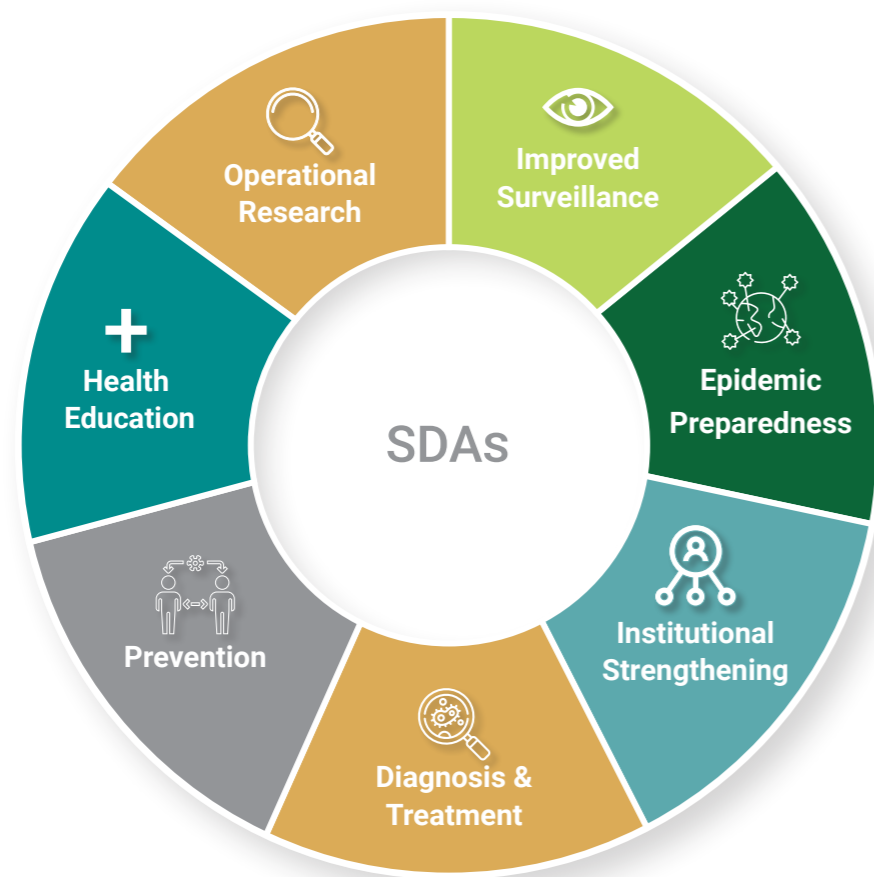
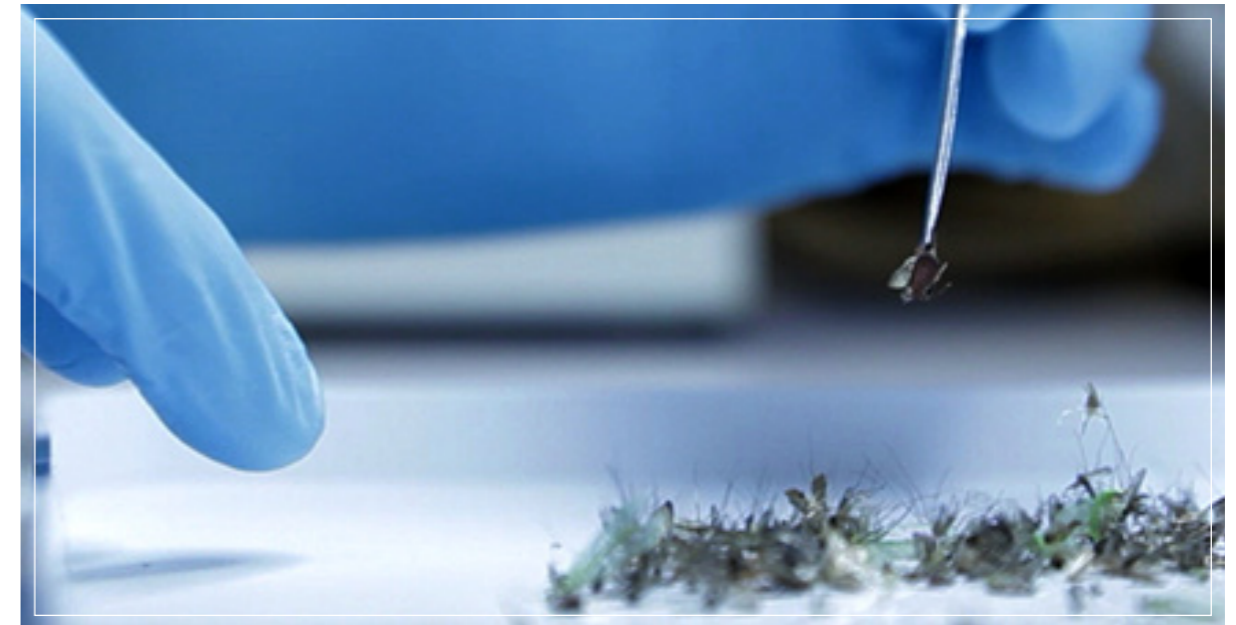
Currently these three countries have "Pakistan-Iran-Afghanistan Malaria Network" (PIAM-Network) for exchange of information, experience for the control of malaria in their bordering areas. This proposal also highlight the need of strengthening of this networking for other VBDs than malaria. The current proposal also highlighted the need of a "Joint Regional Proposal" for The Global Fund (TGF) for the control of malaria in their bordering districts, having a strong commitment and contribution of domestic resources from three countries.

■ SERVICE DELIVERY AREAS (SDAs)

■ IMPLEMENTATION

The proposed national Plan of Action (PoA 2023-2027) for sustainable control of VBD will be implemented through following Service Delivery Areas (SDAs);

1. Improved surveillance
2. Epidemic preparedness and response
3. Institutional strengthening including M&E and viable coordination
4. Diagnosis and treatment
5. Preventive measures
6. Health education and community awareness and empowerment
7. Operational research and capacity building.



At national level, it has been observed that there is a gap for management VBDs other than malaria. Directorate of Malaria Control (DoMC)-Pakistan receive requests regularly on technical assistance from provinces and partners for management of all VBDs in the country. Further, the multilateral and bilateral partners also recommend and require to strengthen the DoMC-Pakistan for managing all the VBD under one umbrella, whereas currently DoMC-Pakistan has no official mandate to deal with other VBDs except malaria. Though DoMC has been providing technical assistance to provinces and partner and collecting data on some of the VBDs, but this lacks official mandate. In this situation, now there is a strong realization that an entity may be officially mandated by Ministry of NHSRC to fill this gap.

Since most of the preventive measures for the control of VBDs are cross-cutting, therefore in consultation of provinces and other partners, DoMC developed proposal to be declared as Directorate of Malaria, Dengue & other VBD Control" in October 2015 which has been approved by competent authority in May 2019. With this the scope of DoMC would encompass dengue, malaria, chikungunya, CCHF, leishmaniasis and other major VBDs. DoMC had already started the interacting with provinces, national and internal partners in order to design national strategies, policies / plans and interventions for sustainable control of VBDs in the country. This would ensure harmonization of coordination, improved surveillance, trainings, logistics, M&E mechanisms etc amongst all stakeholders and partners. Through this integration a national level data set on disease morbidity and mortality would be available to make better-informed decisions.

Key Contribution of DoMC for Control of VBDs in Pakistan

In the best interest of public health, DoMC is already playing an active and effective role for the control of VBDs and has already developed following strategically important documents and other initiatives;

- Vector Control Under Complex Operating Environment Overview (COE/Humanitarian Emergencies 2023)
- National Entomological Reference Laboratory (NERL), 2022
- Yibx Malaria Elimination Road map (2021)
- National Strategy Plan for Malaria Control and Elimination (2021-2035)
- National Insecticides Resistance Management (IRM) Plan (Final version May. 2021)
- National Policy for VBDs Management in Pakistan (January 2021)
- National Plan for Insecticides Resistance Management (IRM) 2014. (Updated version will be in March 2021)
- Quality Assurance Protocol and Tools for Indoor Residual Spraying (IRS) (Final version Feb. 2021)
- National guidelines for the control of vector of public health importance 2011. This also include mosquitoes, sandflies, ticks, fleas, cockroaches, houseflies etc. (Updated version Sep 2020)
- Plan of Action (2020) for dengue control in Islamabad Capital Territory (ICT). Rs. 82.9 Millions
- National guidelines for control of dengue vectors in Pakistan 2013 (Updated version July 2020)
- Quality Assurance Protocol and Tools for Public Health Pesticides (PHPs) Management (Final version October 2020)
- National Plan of Action (2018) for Leishmaniasis control in Pakistan. Note: Ministry has already declared DoMC as “Focal Point” for the control of leishmaniasis in Pakistan
- Development of 5-Year National Plan of Action (2018-2022) for the control of VBDs in Pakistan
- Short-Term Plan of Action (2018-2019) for Dengue Control in Khyber Pakhtoonkhwa (KPK)
- Emergency Response Plan (Aug-Dec, 2017 & 2018) for dengue control in Islamabad
- National guidelines for the prevention and control of CCHF 2017
- Programmatic and financial gap analysis in 2013/14 up to district level with Planning Commission of Pakistan for dengue control.
- National guidelines for the control of malaria vector 2012 & 2014
- Development of surveillance tools (case reporting and vector surveillance) for all major VBDs

The contributions made by DoMC-Pakistan support it as a central point for management of VBDs in Pakistan. Since health is decentralized and devolved to provinces in Pakistan after 18th constitutional amendment since 2011, therefore the presented proposal for VBDs control is fully align with this constitutional amendments, making responsible the provinces for implementation of technically sound cost-effective services at all public sector health facilities. However, Ministry of NHSRC-Pakistan is mainly responsible for policy making, coordination, improved surveillance and consensus building among all stakeholders and partners. Also to provide technical support and to meet the services gaps identified in provincial PC-Is and to fulfill the commitments with international partners/donors.

■ WAY FORWARD



Reduction of VBDs burden in the country is both a national and provincial priority. Federal and provincial governments are strongly committed to combat VBDs and achieve national targets of Global Roll Back Malaria (RBM) initiative and SDGs as an essential component of health program/agenda of the country. National Health Vision 2016-2025 of the Government of Pakistan provides a long term vision and strategy for national health policy development as priority area including health sector. Government has accorded a high priority for control of malaria along-with other 6 communicable diseases as embodied in its National Health Policy of 2001. During last few years the rising trend of VBDs i.e. dengue, leishmaniasis and CCHF has also become priority agenda of all provincial and federal governments including AJK, MTDs, ICT and GB.

The present proposal has been developed mainly in light of WHO's Global Technical Strategy (2016-2030) and Global Vector Control Response (GVCR 2017-2030) which clearly emphasis on integration of all VBDs (dengue, malaria, zika, leishmaniasis, CCHF, yellow fever, japanese encephalitis etc) under one umbrella instead of individual programs. Overall, GVCR (2017-2030) provides strategic guidance to countries and development partners for urgent strengthening of vector control as a fundamental approach for preventing VBDs and responding to outbreaks through capacity building for effective, locally-adaptive and sustainable vector control interventions for VBD control. Also emphasizes on response to outbreaks, epidemics and humanitarian crises, with the aim to reduce the burden and threat of such diseases. It is also pertinent to note that GVCR (2017-230) has been approved by 70th World Health Assembly ([Resolution A70/26 http://apps.who.int/gb/ebwha/pdf_files/WHA70/A70_26Rev1Add1](http://apps.who.int/gb/ebwha/pdf_files/WHA70/A70_26Rev1Add1)). Government of Pakistan also signatory of the resolution ensuring the integration of all vector-borne diseases (VBDs).

■ EXPECTED OUTCOME(S)



In long term this proposal developed by Directorate of Malaria, Dengue & other VBD Control, Ministry of National Health Services, Regulations and Coordination (NHSRC), through consultation and consensus building with all provincial counter-partners and other stakeholders will have following major outcomes;

1. A clear roadmap for evidence-based and sustainable control of VBDs (dengue, malaria, chikungunya, leishmaniasis, CCHF etc) through the provision of free of cost quality-qualified diagnostic and curative and preventive services in Pakistan
2. Provide technical assistance to provincial VBD Control Programs to develop their provincial Plan of Actions (PoAs) aligned with Present National PoA 2023-2027.
3. Establishment of "National Steering Committee" (NSC) to over sight the implementation of integrated strategy in Pakistan with prime objective of sustainable control of VBDs through coordination approach. Note: This initiative will help to improve the domestic resources and also identify the issues contribution to low performance and timely remedial actions
4. Revival and Broadening the scope of Malaria Control Programs (MCPs) to Vector-Borne Disease (VBD) Control Programs. Competent Authority of Ministry of NHSRC has already declared the Directorate of Malaria Control (DoMC) as Directorate of Malaria, and other Vector-Borne Diseases Control" in May 2019. However, in light of one of the recommendations form Ministry of NHSRC, the name has been further modified as "Directorate of Malaria, Dengue and other Vector-Borne Diseases Control" Note: Province Balochistan, Khyber Pakhtoonkhwa (KPK), MTD (Ex-FATA). Punjab has already converted their malaria programs to VBD control programs in the light of the recommendations of this Directorate. While Sindh and AJK are in process. Consequently this initiative will institutionalize their efforts for the control of major VBDs (dengue, chikungunya, zika, leishmaniasis, CCHF etc) other than malaria. This paradigm shift was occurred on the basis of federal guidelines and directions.

5. Rehabilitation of National Institute of Malaria Research and Training (NIMRT). Note: Presently National Institute of Malaria Research and Training (NIMRT) is only designated institute to enhance the technical expertise of the malaria staff and for operation research in the country. This institute was established in May 1985, by taking over International Center for Medical Research and Training (ICMRT) as a broad based malaria research and training institute with the goal to meet the needs of research and training of malaria control programs in Pakistan. For strengthening the training part of the institute National Malaria Training Center (NMTC) was merged in it in 1987.
6. Development/ up gradation of;
 - Long-term (5-Years) and short-term (2 years) costed national Plan of Action (PoA) with well defined roles and responsibilities for the control of VBDs in Pakistan
 - Emergency Response Plan (ERP)
 - National policy and strategy for control of VBDs (1st draft available in July 2020)
 - National policy and strategy for public health pesticides (PHPs) management (Final draft July 2020)
 - National Insecticides Resistance Management Plan (NIRMP)
 - National reference Entomological laboratory / insectory and sentinel site networking
7. Timely outbreak detection and response
8. Merger of ICT and MCI under the administrative control of Ministry of NHSRC. Note: This integration approach will facilitate the program to use the available human and other logistic resources more optimally
9. Recruitment of another 200 Lady Health Workers (LHWs) to facilitate the surveillance activities in Islamabad
10. Programmatic and financial need assessment of country for management of VBDs
11. Better domestic resource mobilization (Co-financing) for proper planning, execution and M&E for sustainable control of VBDs
12. Conduction of national Vector Control Need Assessment (VCNA) and development of costed National Strategic Plan (NSP 2021-2035)
13. Strong and functional inter-sectoral coordination at all levels (Public-Public-Partnership and Public-Private partnership) and fixing of responsibilities among ministries, departments, and institutes in Pakistan
14. Regularization/ registration of junk yards in mega cities (Karachi, Lahore, Rawalpindi, Islamabad, Peshawar and Faisalabad etc). Note: The recent outbreak in Islamabad and Rawalpindi is mainly caused by un-regulated junk yards which need to be addressed on priority basis
15. Development of quality assurance protocols and tools for public health pesticides (PHPs) management focusing regularization of PHPs business in Pakistan. Note: This initiative will also promote the local industry for manufacturing PHPs in Pakistan as per WHO standards
16. Development of quality assurance (QA) protocol and tools for core vector control intervention (IRS and LLINs)
17. Desired impact of CPEC on economy of Pakistan through implementation of International Health Regulations (IHR)
18. Better Cross Border Collaboration between Pakistan, Iran and Afghanistan (Strengthening of

Pakistan-Afghanistan and Iran Malaria (PIAM)-Network). Note: This also includes the "Regional Proposal" for control of malaria and other VBDs in these three countries

19. Development/ establishment of "Dis-infection" points at main dry and sea ports through fumigation of containers and other imported goods particularly from endemic countries
20. Strengthening of surveillance system and M&E mechanism for;
 - Monitoring the trend of VBDs. Note this initiative will also help national health planners and policy makers to address timely and advance the up-coming threats of yellow fever, japanese encephalitis etc
 - Monitoring insecticide resistance and timely response as a part of National Insecticide Resistance Management Plan (NIRMP)
 - Monitoring of vector population dynamics including changes in densities, species successions, and behavior of vectors of public health importance
 - Impact analysis of interventions (IRS, LLINs, LSM etc)
 - Regular capacity building of programs at all levels.

Statements of Intent

1. Since health is decentralized and devolved to the provinces in Pakistan after 18th constitutional amendment since 2011, therefore presented proposal for VBDs control is fully aligned with this constitutional amendments i.e. making responsible the provinces for implementation of technically sound cost-effective interventions/ services at all public sector health facilities. However, Ministry of NHSRC-Pakistan is mainly responsible for uniform policy making, improved surveillance, coordination with international donors and partners consensus building among all stakeholders and partners. Also to provide technical support and to meet the services gaps identified in provincial PC-Is and commitments with international partners/ donors.
2. Currently The Global Fund (TGF) is the only donor for malaria control program in Pakistan. However, TGF only fills the gaps identified in national and provincial PC-Is. This PoA (2023-2027) with the worth of Rs. 1619.66 millions will be mainly funded by Government of Pakistan (GoP) from its domestic resources. This will also fulfill the commitment of Govt. of Pakistan with TGF to enhance the domestic resources for better ownership and sustainability.

List of Activities (PoA 2023-2027)

A comprehensive list of activities (main activities, sub-activities and sub-sub activities/ gross root level) under each Service Delivery Areas (SDAs) has also been attached with this national Plan of Action (2020-2024).

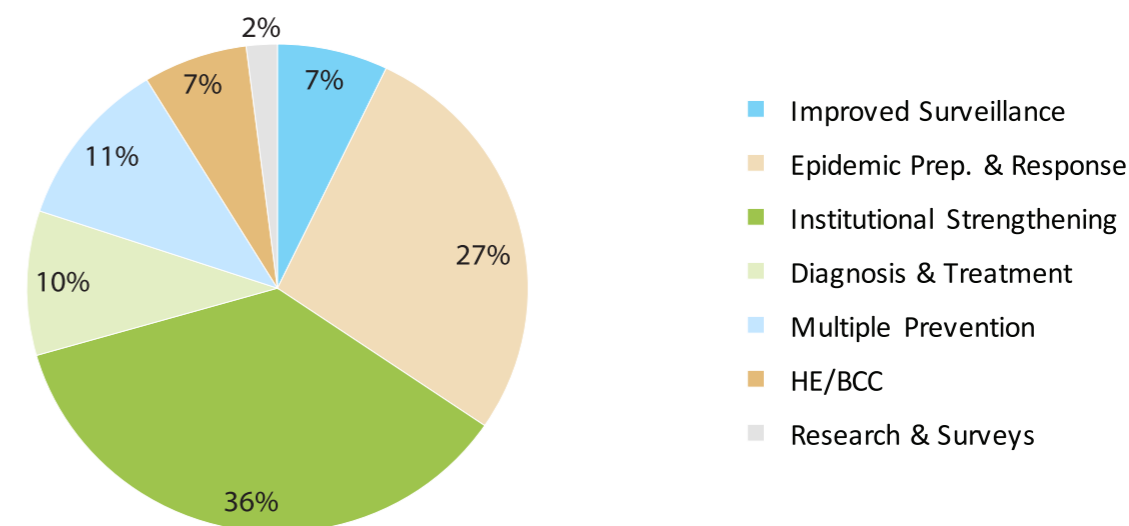
Next Steps

- Launching of Updated PoA (2023-2027) at national level
- Replication of PoA at provincial level from their resources
- Costing of activities and preparation of PC-I (2023-2027). Note: A rough estimates of the activities mentioned in table of this PoA Rs. 1619.66 millions which is 7-10% of total need of the country.

PROPOSED CAPITAL COST (YEAR-WISE AND SDA-WISE) FOR POA 2023-2027 (RS.MILLIONS)

SDA s	Year-1	Year-II	Year-III	Year-IV	Year-V	Totals	%age
Improved Surveillance	35.704	17.5	18.7	21.2	22.6	115.70	7.14
Epidemic Prep. & Response	144.5	82.3	66.4	80	70.1	443.30	27.37
Institutional Strengthening	128.2	97.1	104.22	115.95	138.35	583.82	36.05
Diagnosis & Treatment	43.9	43.6	12.4	28.6	26.4	154.90	9.56
Multiple Prevention	47.9	48.4	29.7	21.6	33	180.60	11.15
HE/BCC	26	23.1	16.6	21.4	21.93	109.03	6.73
Research & Surveys	5.2	6.2	6.2	7.3	7.4	32.30	1.99
Totals	431.404	318.2	254.22	296.05	319.78	1619.65	

Percentage of capital cost (SDA-wise) for POA 2023-2027



SERVICE DELIVERY AREA I (SAD-I): IMPROVED SURVEILLANCE

S #	Main Activity	Sub-Activity	Sub-Sub-Activity
1	DEVELOPMENT/ STRENGTHENING OF SURVEILLANCE SYSTEM (VECTOR + DISEASE).	A). VECTOR SURVEILLANCE: Establishment of sentinel sites under different geo-graphical and epidemiological areas. <i>Note: Based of need, some sentinel sites will also be developed at some randomly selected field sites. This also includes the sentinel sites at major entry points (PoE) of the country.</i>	Stratification of country i.e. High, moderate and low burden sharing areas for all VBDs diseases (dengue, malaria, chikungunya, leishmaniasis, CCHF etc) based on at least 2-3 previous years data.
			Selection of sites under different epidemiological scenario (High, moderate and low burden sharing areas. Note: 100 sentinel sites (both hospital-based and field based) will be established across the country addressing all VBDs. <i>Note: Some site will be purely disease-specific in view of the distribution of VBDs in country.</i>
			Provision of equipments for surveillance and field investigation.
		Up gradation of disease-specific vector surveillance tools	Up-gradation/ development of vector surveillance tools. Note: Country have no up-dated recording and reporting tools for tick, sandfly, fleas, <i>Culex</i> mosquitoes etc. This proposal will address this issue on priority basis.
			Up-gradation/ development of the reporting tools for intervention (IRS, LLINs, Fogging, Fumigation, LSM and Repellents etc). <i>Note: Country has no recording and reporting tools for fogging, fumigation particularly. This proposal will address this issue on priority basis.</i>
			Up-gradation/ development of disease- specific tools for dengue, malaria, leishmaniasis, CCHF etc. <i>Note: Country has no proper recording and reporting tools for other VBDs than malaria. This proposal will address this on priority basis.</i>
			Field testing of tools.

S #	Main Activity	Sub-Activity	Sub-Sub-Activity
			Final endorsement and implementation through consensus building among all provincial stakeholders and other partners. <i>Note: TGF providing surveillance tools in all GF supported districts. However, for non-GF supported districts, surveillance tools will be provided through this proposal.</i>
		Baseline survey (Both adults and young ones during Feb-March). <i>Note: This baseline survey will be mainly used for dengue vector mosquito to prevent any outbreak during main breeding as well as transmission period.</i> For malaria DoMC- Pakistan has developed vector surveillance tools which are already in-use of provinces. For other VBDs, same approach with slight variation (disease to disease) will also be adopted.	Pakistan (National) Information Technology Board. <i>Note: This will be aligned and coordinated with Punjab Information Technology Board (PITB)</i>
	Breeding sites assessment surveys (BSAS).		
	Enlisting of potential breeding sites (both Indoor & Outdoors).		
	Review of last last year (2019) data entomological data. <i>Note: Ideally it should be 2-3 years for more precise disease trends determination.</i>		
	Risk Mapping to identify the "Hot-Spot" for all VBDs.		
	Finalization of collection site/sectors etc. <i>Note: For more precise and accurate estimation of dengue, all positive and at least 25% negative HH will be surveyed based on previous year data.</i>		
	Tagging of positive HHs. <i>Note: Aligned with Punjab Information Technology Board (PITB), National Information Technology Board (NITB) will also be established for mapping of houses and breeding sites through this proposal.</i>		
	Calculations for indexes (CI, HI, BI, adult densities/ +ve HH/ room etc) for dengue vectors. Other VBD-specific thresholds will be calculated according to WHO guidelines.		
	Viral load detection/ calculation (adults).		
	Establishment of possible prediction model/ dengue disease trends.		
	Routine surveillance (Around the year).	Marking "fixed" and temporary sampling sites. <i>Note: This approach will primarily focus sampling at sentinel sites.</i>	

■ SERVICE DELIVERY AREA-II (SDA-II): EPIDEMIC PREPAREDNESS AND RESPONSE

S #	Main Activity	Sub-Activity	Sub-Sub-Activity
			Enlisting of potential breeding sites (both Indoor & Outdoors).
			Monthly/Bi-weekly collection of sample (Larval + Adults). Note: <i>Depending upon disease, sampling frequency will be monthly or bi-weekly.</i>
			Calculations for CI, HI, BI, adult densities/ +ve HH/room etc on monthly basis.
		Establishment of national and Provincial insectories.	Establishment national insectory. Note: <i>Already available insectory in NIH/ HSA/ can be strengthened for this vital activity. This will help to implement biological control methods of mosquitoes (E.g Walachia, GMM etc). The role of National Institute of Malaria Research and Training (NIMRT) will be very crucial and through this proposal this institute will be rehabilitated. (Details are in SDA 3 i.e. Institutional Strengthening.</i>
		Monitoring of Insecticides Resistance (IR)/ Susceptibility level of local vectors.	Monthly collection of mosquitoes and other vector (adults + larvae) from sentinel sites to estimate the thresh-holds. Conduction of susceptibility test in local vector species mainly in mosquitoes (dengue, malaria, yellow fever, chikungunya etc) , and sandflies (Leishmaniasis). The test will be conducted during March-April & Aug-Nov. depending upon disease transmission pattern and vector densities. Data analysis and interpretation for Insecticides Resistance Management (IRM). Mapping of country for Insecticides Resistance (IR).
		Reference collection of vectors.	Establishment of "Bank" of reference collection of vector fauna in National Reference Lab/Insectory. Replication in provincial Ref. Lab/Insectories. Maintenance of "Resistant" and Susceptible colonies/strains of mosquitoes in National Ref/Insectory.

S #	Main Activity	Sub-Activity	Sub-Sub-Activity
1	PREDICTION AND FORECASTING: ALERT GENERATION.	Development of Disease Early Warning System (DEWS).	Establishment of Disease Early warning System (DEWS) at Central Level (n=1). Note: <i>NIH-Islamabad has established "State-Of-The-Art" Emergency Operation Center (EOC). This will be central point for this activity.</i> Establishment of Disease Early Warning System (DEWS) at provincial headquarter (n=5). Establishment of Disease Early Warning System (DEWS) at selected (High burden sharing) districts (n=60). Strengthening and collaboration with Pakistan Mosquito Alert, initiated by NIH.
2	CAPACITY BUILDING	Developing a team of competent Master Trainer (ToTs) to deal emergencies/ outbreaks. Training on interventions (IRS, LLINs, LSM etc) have been elaborated in SDA-V (Prevention).	Number of Master Training Sessions (ToT) and Refresher for Disease Early Warning System (DEWS). Note: <i>10-15 Master Trainers from each province after every alternate year. The priority will be given non-TGF funded districts.</i> Number of Master Training Sessions (ToT) for vector control under emergencies/ outbreak response. Note: <i>5 Master Trainers from each province each year.</i> Number of Master Training Sessions (ToT) for Complicated Case Management (CCM) during emergencies/ outbreak response. Note: <i>5 Master Trainers from each province each year.</i> Number of Master Training Sessions (ToT) for Management of Sentinel site (both hospital-based and field level) during emergencies/ outbreak response. Note: <i>A total 10 Master Trainers from each province. The priority will be given non-TGF funded districts.</i>

SEVICE DELIVERY AREA III (SDA-III): INSTITUTIONAL STRENGTHENING INCLUDING M&E AND VIABLE COORDINATION

S #	Main Activity	Sub-Activity	Sub-Sub-Activity
3	EMERGENCY PREPAREDNESS AND RESPONSE.	Establishment of "Emergency Response Squads" for case response. <i>NOTE: There will be 5 Emergency Response Squads at central level to deal any outbreak situation in the country. Each squad will comprised of 1 vehicle mounted fog machine, 5 hand-carrying foggers, 10 spray pumps, 3 machines for dis-infections, and insecticides for IRS, space spraying, Larviciding etc. For HR there will 30 personal with multi-purpose functions will be trained from existing HR in different public health sectors.</i>	Identification of HR in existing health system capable for case response.
			5-day training of selected HR for case response.
			Purchase of 5 Heavy Duty Fog Machines.
			Purchase of 30 hand-carrying fog machines.
			Purchase of 15 hand-carrying fumigation machines.
			Purchase of 60 Spray Pumps.
			Purchase of Personal Protecting Equipments (PPEs) for field teams particularly for spraymen (n=200).
			Purchase of insecticides for IRS operation. <i>NOTE: These insecticides, LLINs, spray pumps, foggers and PPEs etc will be kept as "Contingency Plan" to deal any out-break in any part of the country. Routine procurements for these commodities will be done by provincial programs through their PC-Is and also through donor support (GFATM, WHO etc).</i>
			Purchase of chemicals for fumigation for dis-infection of containers, carriages etc at ports, railway stations, hospital wards etc.
			Purchase of insecticides for space spraying/ fogging.
			Purchase of insecticides for larviciding.
			Purchase of LLINs only for patients in health system.
			Purchase of repellents for patients and their attendees in health facilities.
			4
Data analysis and Reporting	Secondary and primary data analysis and interpretation Reporting and dissemination.		

S #	Main Activity	Sub-Activity	Sub-Sub-Activity
1	ORGANIZATIONAL STRUCTURE.	Organogram.	Identification of various positions.
			Development of roles and responsibilities.
			Development of organogram of program.
2	NATIONAL STEERING COMMITTEE (NSC).	Composition.	Meeting and coordination with all relevant stakeholders and partners at top-level for nomination of members. <i>Note: DoMC-Pakistan has NSC on RBM since 2009 having representation from various ministries (Secretaries) chaired by Federal Minister for health. However, after 18th constitutional amendment no meeting could be convened.</i>
			Revision of ToRs.
		Frequency of meeting.	Bi-annually.
3	VECTOR CONTROL NEED ASSESSMENT (VCNA) .	Through review of program for SWOT analysis. This VCNA basically review the policy and institutional arrangements within sectors/ ministries and/ or among the ministries/ institutes.	Detailed activities have been elaborated in SDA-V (Multiple Prevention).
4	REHABILITATION AND STRENGTHENING OF NIMRT (National Institute for Malaria Research & Training). This will also act/serve as National Reference Lab/Insectory for Quality Assurance for VBDs.	In-Service trainings, Refresh courses/ Short course and other Research & Development work on VBDs.	Revision of all training modules, course curriculum and other related material. <i>Note: The currently available materials were developed during mid 1990's which needs to be reviewed and up-dated aligned with advance technologies for the control of VBDs in Pakistan.</i>
			Malaria/ VBDs short courses (on-service).
			Short courses on vector biology and control.
			Short course (s) for QA of interventions (IRS, LLINs, LSM etc).

S #	Main Activity	Sub-Activity	Sub-Sub-Activity
			Short course(s) on Public Health Pesticides (PHPs) Management.
			Short course(s) on "Dis-infection" principles.
			Short course(s) on drugs efficacy.
			Short course(s) on microscopy.
			Short course(s) on insecticides resistance management (IRM).
			Short course(s) on case management of VBDs.
			Serve as National Reference Insectory for Vector Surveillance and capacity building. Note: <i>This national insectory will also serve as "rearing site" for genetically modified mosquitoes (GMM) and use of walbachia for biological control of vector mosquitoes.</i>
			Preservation of reference collection of vector and disease slides.
			Maintenance of both "susceptible" and "Resistant" colonies of vectors.
			Conduction of operational Research.
			Testing of sample of insecticides and LLINs for manufacturers.
			Employ-related expenditures, POL, Stationary, Utility bills, TA &DA, M&E visits etc.
		Non-Operational Cost.	Equipments and their maintenance.
5	STAKEHOLDERS INVOLVEMENT AND COORDINATION.	Partnership building.	Identification of potential partners. Defining the roles and responsibilities of all stakeholders. Quarterly meeting to review the progress. Annual review meetings.
6	HUMAN RESOURCE (HR) DEVELOPMENT AND MANAGEMENT	Recruitment. However the possibilities should be explore to use existing HR through a well defined policy mechanism and service protection.	Recruitment of five (05) Scientific/ Research Officer/ Medical Ento (BPS-17). Disease-specific HR. Recruitment of one (01) Bio-statician/ Statistical Officer (BPS-17). Recruitment of five (05) Fog Machine Operators (BPS-4). Recruitment of ten (10) Spray Operators (BPS-4).

S #	Main Activity	Sub-Activity	Sub-Sub-Activity
			Recruitment of five (05) Lab/ Insectory Technicians (BPS-14). Recruitment of five (05) Insects Collector (BPS-4). Recruitment of 03 Data Entry Operator for Central Data Management Unit (CDMU) (BPS-14). Recruitment of 05 Community Mobilizers (BPS-04).
7	ESTABLISHMENT/ STRENGTHENING OF MONITORING AND EVALUATION (M&E) SYSTEM.	Establishment of M&E logical frame work. Development of supervisory checklists.	Establishment of disease-specific logical frame work/ M&E frame work. Finalization of M&E indicators and their levels (1st level indicators: Inputs and process; 2 nd level indicators output; 3 rd level indicators (Coverage and impact). Finalization of Tools for Impact assessment. Establishment of checklist for M&E of various activities. Field testing and finalization.
		Review and impact assessment of the program.	Routine field visits for surveillance, supervision and Monitoring and Evaluation (M&E) etc. Advisory Committee (TACOM) meetings for review and impact assessment of the program (Quarterly). Compilation and preparation of report for National Steering Committee (NSC).
8	COORDINATION.	National and Provincial stakeholders. International partners. This also includes a close coordination with the key hospitals of the country for data sharing and patient management.	Inter-Provincial Coordination Committee (IPCC) meetings (Quarterly). Central Board for Management of PHPs meetings (Bi-annually). Meeting of National IRM Decision Making Body meetings (Quarterly). Meetings with all international partners (Quarterly). Note: <i>Beside TGF and WHO, DoMC-Pakistan has developed recently strong collaboration with other international partners for technical and material support for the control of malaria, dengue, leishmaniasis, and CCHF etc. This include MSF, UNICEF, IFRC, USAID etc.</i> Meetings with Common Management Unit (CMU) for TGF activities (Monthly).

S #	Main Activity	Sub-Activity	Sub-Sub-Activity
9	COMMODITY MANAGEMENT AUDIT (CMA) SUPPLY CHAIN MANAGEMENT.	Systematic accountability of commodities.	Introduction of a systematic mechanism of accountability for commodities (insecticides, LLINs, equipments etc) as per international standards. <i>Note: DoMC-Pakistan has conducted same exercise for accountability of LLINs through TGF support. Same will be introduced in non-GF funded districts for better accountability.</i>
			Reporting and dissemination.
10	INTEGRATED SERVICE DELIVERY.	Integrated Service Delivery.	Malaria (ANC, Child Health services).
11	MATERIAL DEVELOPMENT.	Development of training materials, guidelines, surveillance tools etc.	Printing of strategic/policy documents, guidelines, training materials, BCC/IPC materials etc.
			Printing of FM tools for Non-TGF supported districts. DoMC-Pakistan through support of TGF has introduced disease surveillance and M&E tools which will also be printed for Non-TGF Supported districts through this proposal.
12	RESEARCH/SURVEYS AND IMPACT ASSESSMENT OF PROGRAM.	Surveys and Impact assessment of program.	Research and survey. <i>Note: This activity will promote problem solving operational research (Priority list attached in this proposal at SDA-VII) for evidence-based decision making.</i>
			Review and impact assessment of the program.
			Programmatic Review (e. g: MPR).
			Malaria Indicator Survey (MIS).
		Establishment of Reference Laboratory / Insectory Network.	Development of National Reference Lab / Insectory (See NIMRT section).
			Development /Strengthening of Provincial Reference Lab / Insectory. Strengthening of district level insectories (N=50).

S #	Main Activity	Sub-Activity	Sub-Sub-Activity
13	QUALITY ASSURANCE (QA) IN DATA MANAGEMENT AND INTERPRETATION.	Data Management Units (DMUs).	Strengthening / Establishment and strengthening of Data Management Units (DMUs) for all VBDs in TGF supported and non-supported districts.
			Development of surveillance tools (both vector and disease) for all VBDs.
14	IMPLEMENTATION OF INTERNATIONAL HEALTH REGULATION (IHR).	Cross Border Collaboration.	Strengthening of Pakistan-Afghanistan-Iran Malaria (PIAM)-Network.
			Development of concept note for a "Joint Proposal" for TGF between these countries. <i>Note: As per national data, >80% malaria caseload of Pakistan is with western border with Afghanistan and Iran. Same Afghan case load is with eastern border with Pakistan. Similarly Iran has 100% caseload with Pakistan border particularly close to Ketch and Gawader. This shows that all three countries have major problem in bordering areas. This proposal will explore the possibilities of a joint proposal for TGF in future.</i>
			Meetings of PIAM-Network (annually).
		China-Pakistan Economic Corridor (CPEC).	Establishment of sentinel sites at all entry point (Khujrab) and other major sea and dry ports for monitoring VBDs. Same sites will also be established at all other PoEs of country.
			Establishment of joint working group of experts of Pakistan and China for management VBDs. Meetings of Pakistan and Chinese experts of VBDs (Annually).
		Treatment and disinfection of containers/ goods at all Point of Entries (PoEs) of the country.	Establishment /strengthening of treatment and dis-infection at all Point of Entries (PoEs) of the country.
Diagnosis and treatment facilities for VBDs.			
Establishment /Strengthening treatment and diagnosis facilities for malaria at all Point of Entries (PoEs) for Punjab, AJK (Regions / province qualifying for malaria elimination in country).			
	Indoor residual spraying (IRS), space spraying, fumigation etc of major godowns.		

■ SERVICE DELIVERY AREA-IV (SDA-IV): DIAGNOSIS AND TREATMENT

S #	Main Activity	Sub-Activity	Sub-Sub-Activity
		Implementation of Quarantine Laws.	Sampling of import and export goods, particularly tires and other used goods.
			Joint committee of Ministry of NHSRC and Ministry of National Food Security and Research for implementation of quarantine laws for VBDs. Note: <i>National Steering Committee (NSC) will serve the same purpose having representation of Ministry of National Food Security and Research (Secretary).</i>
		Health Certificate Declaration.	Strengthening the health certificate declaration at airports.
			Strengthening the health certificate declaration at International PoEs (Wahga, Chaman, Pishin etc).
			Establishment/strengthening vaccination centers (yellow fever) at all PoEs.

S #	Main Activity	Sub-Activity	Sub-Sub-Activity
1	STRENGTHENING/ DEVELOPMENT OF QUALITY ASSURANCE (QA) SYSTEM NOTE: All national (NIMRT+IPH), provincial and District level insectories/Sentinel sites will be inter-lined through a coordinated mechanism.	Estab./strengthening of Reference Laboratory Network.	Establishment of National Reference Laboratory for QA in diagnosis and treatment. Note: <i>QA in vector control interventions/research/National Insectory will also be part of this National Reference Lab/Insectory.</i>
			Strengthening of Provincial Reference Labs for QA (n=5). DoMC-Pakistan has established/strengthened Ref. Labs at provincial HQs through TGF support (mainly) and public sector funding (PSDP). These Ref. Labs will be further strengthened and expanded to all VBDs.
		QA for sample handling and analysis	Development of QA guidelines and training modules for microscopy.
			Development of QA guidelines for use of Rapid Diagnostic Kits (RDTs). Development of QA guidelines for sample handling and sample analysis. Note: This has been elaborated in previous SDA-I (Improved surveillance - Laboratory Methods).
2	DEVELOPMENT OF NATIONAL POLICY, STRATEGY AND GUIDELINES FOR CASE MANAGEMENT OF VBDs.	Consensus building.	Consensus building workshop for development of national policy and guidelines for case management of VBDs (dengue, malaria, chikungunya, leishmaniasis, CCHF etc).
			Consensus building workshop for developing reporting and recording tools for VBDs (Case reporting).
			Consensus building workshop for development and up-gradation of disease surveillance tools.
			Field testing and endorsement from all stakeholders

S #	Main Activity	Sub-Activity	Sub-Sub-Activity
3	CAPACITY BUILDING FOR DIAGNOSIS AND TREATMENT.	Developing a team of competent Master Trainer (ToTs) for case management of VBDs.	Number of Master Training Sessions (ToT) and Refresher for DENGUE/DHF/DSS case management at provincial level. Note: 10-12 Master Trainers every year from each province.
			Number of Master Training Sessions (ToT) and Refresher for MALARIA case management at provincial level. Note A: 10-12 Master Trainers every year from each province. Note B: DoMC-Pakistan has already trained many ToTs for case management of malaria in TGF supported districts. For rest of the country ToTs will be produced through this proposal.
			Number of Master Training Sessions (ToT) and Refresher for CHICKENGYUA case management at provincial level. Note: 10-12 Master Trainers from each province.
			Number of Master Training Sessions (ToT) and Refresher for LEISMANIASIS case management at provincial level. Note A: 10-12 Master Trainers every year from each province.
			Number of Master Training Sessions (ToT) and Refresher for CCHF case management at provincial level. Note: 10-12 Master Trainers from each province.
			Number of Master Training Sessions (ToT) and Refresher for "Improved Disease surveillance (Data Collection and Management). 5-7 Master Trainers from each province will be trained every year.

S #	Main Activity	Sub-Activity	Sub-Sub-Activity
			Number of Master Training Sessions (ToT) and Refresher for "Complicated Case Management" of dengue, malaria, leishmaniasis, CCHF etc .
4	PATIENT MANAGEMENT AT HOSPITALS.	Establishment of Isolation and special treatment wards and desks at OPDs.	Dengue, malaria, chikungunya, leishmaniasis, CCHF etc.
5	PROCUREMENT OF COMMODITIES.	Rapid diagnostic Kits (RDTs).	DoMC-Pakistan providing RDTs particularly in TGF supported districts. To meet any emergency / outbreak in country, RDTs will also be provided through this proposal.
		Artemisinin-Based Combination Therapy (ACT).	For malaria patients. DoMC-Pakistan providing mainly ACT through TGF support in selected districts. However, to meet any emergency / outbreak in country, ACT will also be provided through this proposal.
		Primaquine.	Provincial governments are encouraged to procure this drug from their resources mainly. Note: DoMC-Pakistan through the support of TGF providing this AMD to selected districts of the country. To meet any emergency, this drug will also be provided through this proposal.
		NS1 Kits.	For dengue diagnosis.
		Glucantime injection.	Provincial governments are encouraged to procure this injection from their resources mainly. Note: DoMC-Pakistan through WHO support is providing this drug to provinces since 2015. However, to meet any emergency/outbreak in country, this injection will also be provided through this proposal.
		Sodium STIBOGLUCONATE.	Same as above.
		Other equipments.	Thermotherapy Machines (ThermoMed 1.8).
			Microscopes.
			Teaching microscopes for Reference Lab and insectories.

■ SERVICE DELIVERY AREA-V (SDA-V): MULTIPLE PREVENTION

S #	Main Activity	Sub-Activity	Sub-Sub-Activity
1	NATIONAL VECTOR CONTROL NEED ASSESSMENT (VCNA).	SWOT analysis. Note: <i>This strategically important activity is pending for a long time in country. WHO encourages DoMC to conduct on priority basis. During 2020 this vital activity has also been planned and approved through TGF resources.</i>	Analysis of national strategy, policy and guidelines for the control of vectors of public health importance.
			Current Core and Supplementary vector control interventions and their coverage level.
			Infra-structure for vector surveillance at all levels.
			Quality Assurance (QA) and QC for vector control interventions.
			Inter and intra-sectoral collaboration (Public-Private-Partnership & Public-Public-Partnership) vector control.
			Public Health Pesticides (PHPs) Management system. Note: <i>This will include the availability of SOPs for procurement of PHPs; storage, transportation, disposal, emergency response etc.</i>
			Central Board for Public Health Pesticides (PHPs) management including registration.
			Registration mechanism for Public Health Pesticides (PHPs) in country.
			National Steering Committee and its functionality.
			HR for vector control operations and their capacities.
			Sentinel sites.
			National/provincial reference insectories.
			National Insecticides Resistance Management Plan/Strategy (IRM). Operational Research.

S #	Main Activity	Sub-Activity	Sub-Sub-Activity
2	SYSTEMATIC REVIEW OF VECTOR CONTROL INTERVENTIONS.	Interventions (Core and Supplementary) and their coverage level.	<p>Core Intervention 1: Indoor residual spraying (IRS). It is a key intervention for HIGHEST MALARIA BURDEN SHARING AREAS of country i.e. > 5 API. However IRS needs a very strong programmatic and financial preparation having all necessary logistic arrangements, financial resources, fully trained and motivated human resources. Until program has full preparation, and also to sustain the gain of previous LLINs distribution in country, LLINs will be continued as core intervention in all high burden sharing areas of the country.</p> <p>Note: <i>In view if potential threats of insecticides resistance against pyrethroids, 3rd Generation insecticides will be promoted in country.</i></p> <p>Core Intervention 2: Use of Long lasting insecticidal nets (LLINs). Note: <i>In view if potential threats of insecticides resistance against pyrethroids, New Generation Nets (NGN) will be promoted in country.</i></p> <p>Space spraying. (Fogging) As per national policy, strategy and guidelines for vector control, this intervention is not recommended as routine intervention, rather an epidemic response or as contingency plan. Keeping in view the behavior of local vectors (end/exophilic and end/exophagic) outdoor and or indoor space spraying will be selected. Similarly, the time of peck activity of local vector species will also determine the timing of application.</p>

S #	Main Activity	Sub-Activity	Sub-Sub-Activity
			<p>Larval Source Management (LSM). As supplementary intervention, for malaria control will be integral part of vector control operation. However, for dengue and leishmaniasis will be main intervention in country. It includes;</p> <ul style="list-style-type: none"> • Environmental Management (EM) • Environmental Manipulation • Use of chemicals (larvicides), • Insect growth regulators (IGRs) • Use of mosquito fish. <p><i>Note: It is important to note that use of mosquito-fish is only limited to small and confined water bodies.</i></p>
			<p>Use/Promotion of Repellants. The use of repellants has never been in main stream of malaria program. However, this will be in future integral part of vector control operation, particularly for dengue, CCHF and leishmaniasis.</p>
			<p>Cloth treatment with insecticides (Pyrethroids).</p> <p><i>Note: This intervention is particularly recommended for armed forces (and for farmers) when they are deployed in forests.</i></p>
			<p>A systematic review of vector control services which includes the target population, most vulnerable population, IDPs, nomads etc coverage level of these population, challenges and mitigations etc.</p>
			<p>Percentage (%age) of case response against dengue, CCHF and leishmaniasis of previous year(s).</p>

S #	Main Activity	Sub-Activity	Sub-Sub-Activity
3	DEVELOPMENT OF NATIONAL POLICY, STRATEGY FOR VECTOR CONTROL (VC) INTERVENTIONS.	Consensus building workshop.	<p>Consensus building workshop for development of national policy, strategy and guidelines for the control of vectors of public health importance (mosquitoes, sandfly, ticks, fleas, bugs etc 2020).</p> <p>Consensus building workshop for up-gradation national guidelines for IRS, LLINs, LSM, etc (2023).</p> <p>Consensus building workshop for development and up-gradation of reporting and recording tools for vector surveillance (2020).</p> <p>Consultative workshop for national Monitoring & Evaluation (M&E) framework and Impact assessment of vector control interventions (2021).</p> <p>Consultative workshop for Public Health Pesticides (PHP) management including registration mechanism (2020).</p> <p>Consultative workshop for insecticides Resistance Management Plan/Strategy (IRM), (2023).</p>
4	CAPACITY BUILDING FOR VECTOR CONTROL INTERVENTIONS (IRS, LLINs, LSM,IGRs, REPELLENTS etc).	Developing a team of competent Master Trainer (ToTs) for Vector Control interventions. This includes Indoor Residual Spraying (IRS); Use of LLINs, Larval Source Management (LSM), use of repellants, IGRs, etc.	<p>Number of Master Training Sessions (ToT) and Refresher for vector control interventions for mosquito control (Dengue/DHF/DSS. Chikungunya etc).</p> <p><i>Note: 10 Master Trainers from each province on alternate years.</i></p> <p>Number of Master Training Sessions (ToT) and Refresher for vector control interventions for mosquito control (Malaria).</p> <p><i>Note: 10 Master Trainers from each province every year. Also to note these ToTs will be selected from non-TGF supported districts.</i></p> <p>Number of Master Training Sessions (ToT) and Refresher for vector control interventions for Sandfly control (Leishmaniasis and CCHF).</p> <p><i>Note: 10 Master Trainers from each province on alternate year.</i></p>

S #	Main Activity	Sub-Activity	Sub-Sub-Activity
			Number of Master Training Sessions (ToT) and Refresher for vector control interventions (Ticks, Bedbugs, Cockroaches, houseflies etc). Note: 10 Master Trainers from each province during 2021 and 2023.
			Number of Master Training Sessions (ToT) and Refresher for Vector Surveillance (Data Collection and Management). Note: 5-7 Master Trainers from each province every year.
			5-Days training on innovative techniques of Indoor Residual Sparing (IRS). Note: 5 Master Trainers from each provinces during first three (03) years. (N=15)
			3-Days training on LLINs. Note: 5 Master Trainers from each provinces during first three (03) years. (N=15). Nominees will be from non-TGF supported districts.
			3-Days training on Larval Source Management (LSM). Note: 5 Master Trainers from each provinces during first three (03) years. (N=15).
			3-Days training on Space Spraying and Fumigation. Note: 5 Master Trainers from each province (N=25) on alternate years.
			Establishment of insecticides storage facilities at selected areas (n=3).
5	PUBLIC HEALTH PESTICIDES MANAGEMENT (PHPs).	Development of facilities for storage, transportation and disposal etc of PHPs.	Establishment of independent fleet of vehicles for transportation of spray teams, insecticides, equipments which also include spray pumps, foggers etc. Note: At central level there will be three (02) designated vehicles to deal any emergency whereas at provincial headquarter three (03) vehicles will be designated.
			Establishment of insecticides disposal facilities at district level (n=10). Pilot project.

S #	Main Activity	Sub-Activity	Sub-Sub-Activity
6	DEVELOPMENT OF QUALITY ASSURANCE SYSTEM FOR VECTOR CONTROL.	Development of Quality Assurance (QA) protocol and tools. Note: All strategic documents will be developed by using its own technical expertise. However, partners will also be invited as additional assistance.	Development of Quality Assurance mechanism for vector control intervention and its implementation.
			Development of QA protocol and tools for selection of "Quality-Qualified-Products" which include selection of Vector control products (insecticides, larvicides, LLINs, repellents, spraying equipments, PPEs etc).
			Development of QA protocol and tools for IRS. Note: As mentioned above, this intervention will be for HIGHEST malaria burden sharing areas of country i.e. > 5 API ensuring all preparation. This also include the QA protocol and tools for selection of target appropriate insecticides, areas, appropriate timing, quantification, etc.
			Development of QA protocol and tools for Public Health Pesticides (PHPs) management. This includes the procurement, storage, transportation, disposal (both solid and liquid wastes), handling of emergency, stock management etc.
			Development of QA protocol and tools for use of LLINs.
			Development of QA protocol and tools for Dis-infection points (containers at dry ports, airports, railways carriages etc. This also include the dis-infection of wards in case of CCHF.
			Development of QA protocol and tools for Space Spraying / Fogging, Fumigation etc.
			Development of QA protocol and tools for use of Larval Source Management (LSM) and repellents.
			Development of QA protocol and tools for Discarded containers including tyre at dumping points or at business places of garbage collection.

S #	Main Activity	Sub-Activity	Sub-Sub-Activity
			Development of Standards Operating Procedures (SOPs) for management of Junk Yards (houses, shops etc).
			Development of QA protocol and tools for use of mosquito-fish.
			Development of Standards Operating Procedures (SOPs) for swimming pools, service stations, tire puncturing shops, ceramic points etc.
			Development of QA protocol and tools for vector surveillance/ Recording and reporting for vector control interventions.
7	<p>PROCUREMENT OF COMMODITIES.</p> <p>Note: As per 18th constitutional amendment provinces are fully responsible for implementation of technically sound cost-effective interventions/ services. However, Ministry of NHSRC, Pakistan is mainly responsible for uniform policy making, improved surveillance including epidemic response, coordination with international donors and partners, etc. As contingency plan DoMC since 1976 only procure 5-10% of total need of the country as contingency plan. This proposal fully aligned with this principle of devolution to provide technical support and to meet the services gaps identified in provincial PC-Is</p>	<p>Standards.</p> <p>Insecticides.</p> <p>LLINs.</p> <p>PPEs.</p> <p>Spraying equipment.</p>	<p>Only WHO PQ-Listed products of recommended manufacturers at recommended strength (%) and formulation (EC, SC, CS, WG, WP etc).</p> <p>Note: As per national vector control guidelines only WHO Prequalified (PQ-Listed) PHPs/insecticides of recommended/ evaluated manufactures and formulation/ strength will be used and promoted in country for vector control operation. In case of local formulation of PHPs/insecticides, the supplier must provide the documentary evidences of "source of active gradient (a.i) or technical material and formulation" Conforming to WHO specifications and standards will ensure the supply of high quality PHPs/insecticides in the country and also help to eliminate the all suppliers or contractor who cannot guarantee the quality and performance of their products.</p> <p>This includes the insecticides for IRS, space spraying, fumigation, larvicides, cloth treatment, dis-infection etc .</p> <p>For non TGF target districts.</p> <p>For all personal involve in vector control operation.</p> <p>Selection of only WHO recommended brand. This includes space spraying (Thermal and cold fog machines), spraying pumps etc.</p>
			Development of Standards Operating Procedures (SOPs) for management of Junk Yards (houses, shops etc).

S #	Main Activity	Sub-Activity	Sub-Sub-Activity
8	IMPLEMENTATION OF VECTOR CONTROL INTERVENTIONS.	General strategy.	See in SDA Epidemic Response and Preparedness. Note: As per defined roles and responsibilities provincial malaria/VBD programs will be implementing units where as this Directorate will be responsible for policy formulation, coordination, epidemic response etc.
		Indoor Residual Spraying (IRS).	As per national guidelines and strategy (New version 2020).
		Long lasting insecticides treated nets (LLINs).	As per national guidelines and strategy (New version 2020).
		Larval Source Management (LSM).	As per national guidelines and strategy (New version 2020).
		Use of repellents including IGRs.	As per national guidelines and strategy (New version 2020).
9	ESTABLISHMENT OF DIS-INFECTION POINTS AT POINT OF ENTRIES (PoEs).	Disinfection of imported containers and good at main PoEs, that includes sea and dry ports, airports, railway stations etc.	<p>Primary dis-infection of containers and other goods at all Point of Entries (PoEs) at international border i.e. Khujrab, Sost, Chaman, Pishin (Mond-Ketch), etc.</p> <p>Dis-infection of containers and other goods at Sea Ports i.e. Bin Qasim, Gawader. It also includes the disinfection of ships staying at port for more than 7 days.</p> <p>Dis-infection of containers and other good at main airports of country. Karachi, Lahore, Islamabad, Peshawer, Faisalabad, Quetta, Rahim Yar Khan etc.</p> <p>Dis-infection of containers and carriages at main railway stations of country. Karachi, Lahore, Peshawer, Faisalabad, Khanewal, Hyderabad, Quetta, Chaman etc.</p>

■ SERVICE DELIVERY AREA-VI (SDA-VI): HEALTH EDUCATION AND COMMUNITY AWARENESS AND EMPOWERMENT

S #	Main Activity	Sub-Activity	Sub-Sub-Activity
1	WORKSHOPS/ ADVOCACY AND SEMINARS.	Seminars.	Seminar for Policy and decision makers at national and provincial level. It also includes the briefings for National Steering Committee (NSC). Sensitization sessions with all stakeholders, community representatives and clerics faith group, provincial and district governments and health care providers as a part of IPC/BCC campaign.
		Ground events.	Celebration of ground events like World Malaria Day (WMD: April 25), World Health Day (WHD: April 07), National Dengue Day, walks, sponsorship for sports events, celebrations with celebrities etc.
2	ELECTRONIC MEDIA.	TV channels and CCTV.	Programs and campaign (5-10 min) on national TV network highlighting the importance and management of for VBDs.
			Telecasting of TV commercials of 30-45 seconds duration, preferably on local TV channels at prime time location.
			Display of messages through Close Circuit TV (CCTV) network at prime public places which includes railway stations, airports, bus stands/stops, shopping malls, and roads etc.
		Radio and Mobile SMS/ Alerts.	Production of radio programs (25-50 min). Broadcasting of radio commercials of 30-45 seconds duration on various local radio channels including FM radio and networks at prime time locations, talk shows and talks with celebrities etc. Alter messages through leading mobile networks.

S #	Main Activity	Sub-Activity	Sub-Sub-Activity
3	PRINT MEDIA AND MATERIALS.	Printing of IEC materials and hoardings.	Printing of various advocacy and BCC materials (colored/BW) such as advocacy kits, posters, brochures, booklets, stickers etc.
			Design and art work for advocacy and BCC print materials.
			Billboard production and installation on prime locations in high risk districts.
			Advertisements in leading newspapers in national and regional dailies and magazines.
4	PUBLIC ANNOUNCEMENTS.	Announcement about interventions	Announcement through mosques, mega phone, leading electronic (TV and radio) print media (newspaper, pamphlets etc) before the special interventions like space spray and fumigation and also about the distribution of LLINs.
5	COMMUNITY INVOLVEMENT AND EMPOWERMENT.	Community-led intervention	Focused Group Discussions (FGD) with community leaders/ representatives, and volunteers.
			Selection of Community-Based Organizations (CBOs), representatives, volunteers Demonstrations on Larval source management (LSM), IRS, LLINs use and maintenance etc
6	AUDIO-VISUALS.	Materials/ commodities for promotion of local events.	Procurement of LEC TV 50" (n=3), multi-media (n=3), Digital Camera (n=2)
7	COMMUNITY BASED MONITORING AND EVALUATION (M&E).	Survey and FGD.	Selection of model households/ communities based on their practices for management of VBDs
			Selection of model households/ communities based on their practices for management of VBDs
			KAP surveys.
			FGD for impact analysis of community-based intervention.

■ SERVICE DELIVERY AREA VII (SDA-VII): OPERATIONAL RESEARCH AND CAPACITY BUILDING

S #	Main Activity	Sub-Activity	Sub-Sub-Activity
1	IDENTIFICATION OF RESEARCH PRIORITIES.	Identification of Research priorities.	List of priority operational research has been attached
2	APPROVAL AND ENDORSEMENT.	Approval from appropriate forum (NSC, TACOM, TWG).	Approval from appropriate forum (NSC, TACOM, TWG).
3	IMPLEMENTATION OF DISSEMINATION	Execution	Execution and dissemination

1. Epidemiological Surveys

- Distribution of VBDs by geographical areas
- Identification of risk factors for VBDs
- Planning strategies for control/interventions
- Equitable distribution of limited resources
- Disease-specific Indicator Surveys
- Monitoring disease trends over time.

2. Entomological Studies

- Situation analysis of VBDs, capabilities and practices, both in public and private sector and potentials for future public-private partnership
- VBDs incidence in high risk groups
- Risk mapping of VBDs in Pakistan (Entomological Indicators)
- VBDs incidence with respect to age and sex
- Impact of agricultural spraying and irrigation on VBDs particularly in cotton and rice growing areas
- Studies on vector bionomics and population dynamics in selected high-risk areas
- Evaluation studies/KAP studies regarding community perception about insecticide treated nets (LLINs), Indoor residual spraying (IRS) and Larval Source Management (LSM) and their promotion and implementation
- To investigate barriers for scale up of Insecticide Treated Nets (LLINs)
- Insecticides resistance in malaria/dengue and leishmaniasis local vectors.

3. Specialized Studies

- Develop methods that permit quantification of parasite density and selective use of rapid diagnostic tests (RDTs) where appropriate
- Quantitative estimate of parasite density be a feasible approach
- Pilot study on intermittent malaria treatment in pregnant women in high risk areas
- Identify potential markers that predict the development of complications, treatment outcomes and/or drug resistance
- Application of environmental management and chemical larval control in selected areas
- Use of GIS and remote sensing for VBDs incidence
- Cost effectiveness of VC interventions
- Cost analysis for combination of LLINs and IRS
- Cost analysis of use of 3rd Generation insecticides for IRS
- Cost comparison of New Generation Nets (NGNs) and standards net (LLINs).

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