
AN ASSESSMENT OF CURRENT STRATEGIES OF THE NATIONAL VECTOR BORNE DISEASE CONTROL PROGRAM (NVBDPC) FOR MALARIA CONTROL IN GOVINDGARH JAIPUR, INDIA

“IDENTIFYING CHALLENGES AND RECOMMENDATIONS FOR IMPROVED MALARIA CONTROL EFFORTS”



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INTRODUCTION

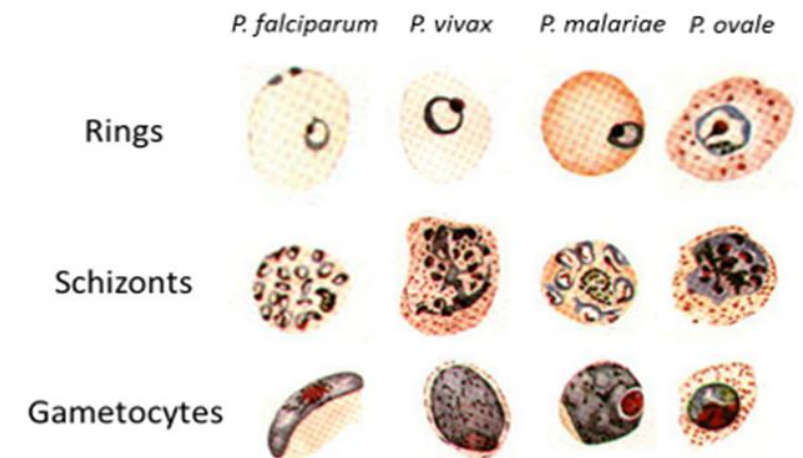
Malaria remains a significant public health challenge in India. The NVBDCP has been implementing various strategies to control and prevent the spread of malaria like (Early case Detection and Prompt Treatment “EDPT”, Vector Control, and Community Participation) However, it is crucial to assess the effectiveness of these strategies to ensure their continued relevance and identify areas for improvement.



WORLD MALARIA DAY

APRIL 25

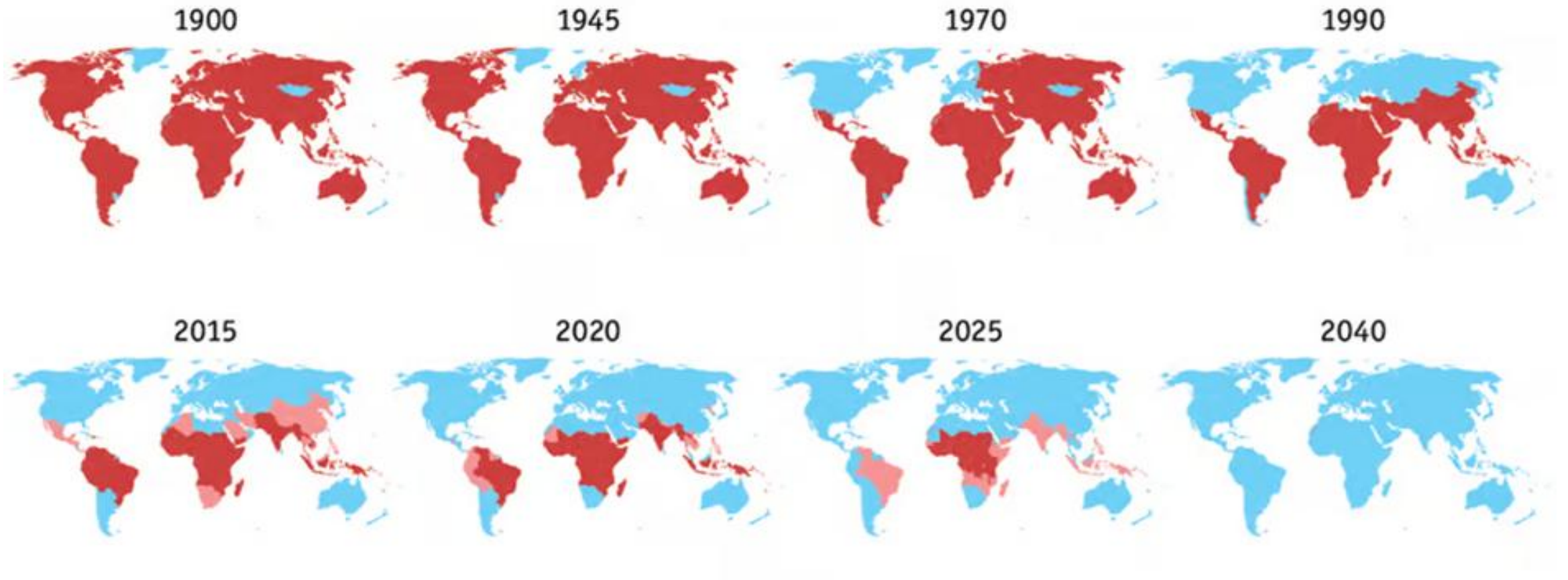
MALARIA SYMPTOMS



MALARIA IN THE GLOBAL CONTEXT

- Malaria is a significant global health issue, primarily affecting tropical and subtropical regions. It is caused by Plasmodium parasites transmitted through the bites of infected female Anopheles mosquitoes. In 2020, an estimated 241 million malaria cases occurred worldwide, with prevalence varying across different countries and regions.
- The incidence of malaria slightly increased in 2021 with 247 million cases reported compared to 241 million in 2020. Malaria-related deaths stood at 619,000 in 2021, a slight decrease from 625,000 in 2020. Malaria can be life-threatening, particularly for young children and pregnant women. However, significant progress has been made in reducing malaria deaths over the years, with the number declining from 897,000 in 2000 to 568,000 in 2019. There was a slight increase in deaths in 2020, attributed in part to the COVID-19 pandemic, but it declined again to 619,000 in 2021.
- Efforts have been made to improve access to diagnostic tools and antimalarial drugs, especially in high-burden countries, through collaborations between the World Health Organization (WHO) and partner organizations. These initiatives aim to increase treatment coverage and reduce the impact of malaria globally.

MAPPING WHERE MALARIA IS ENDEMIC, FROM 1900 TO 2040

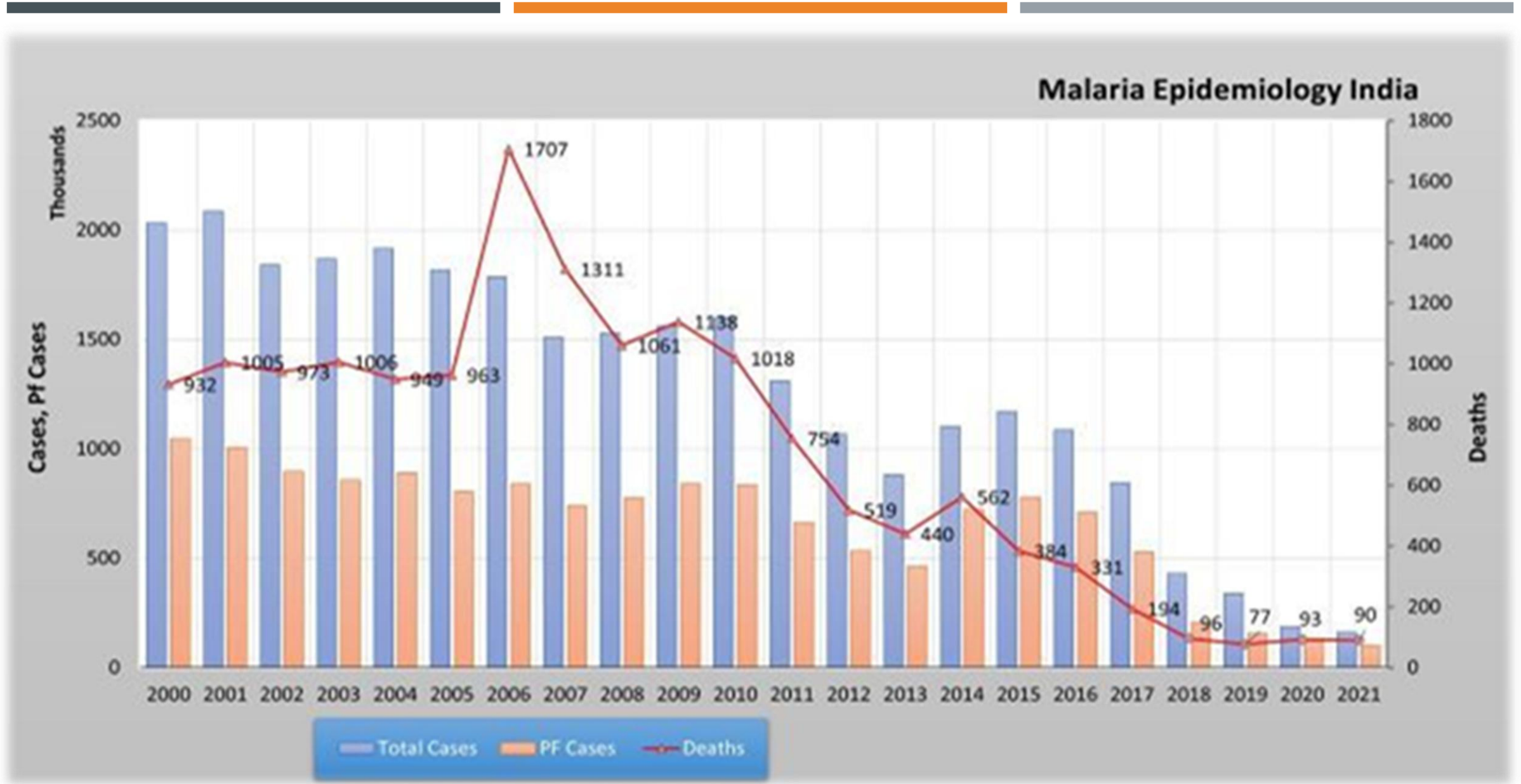


0 1000 2000 4000 km

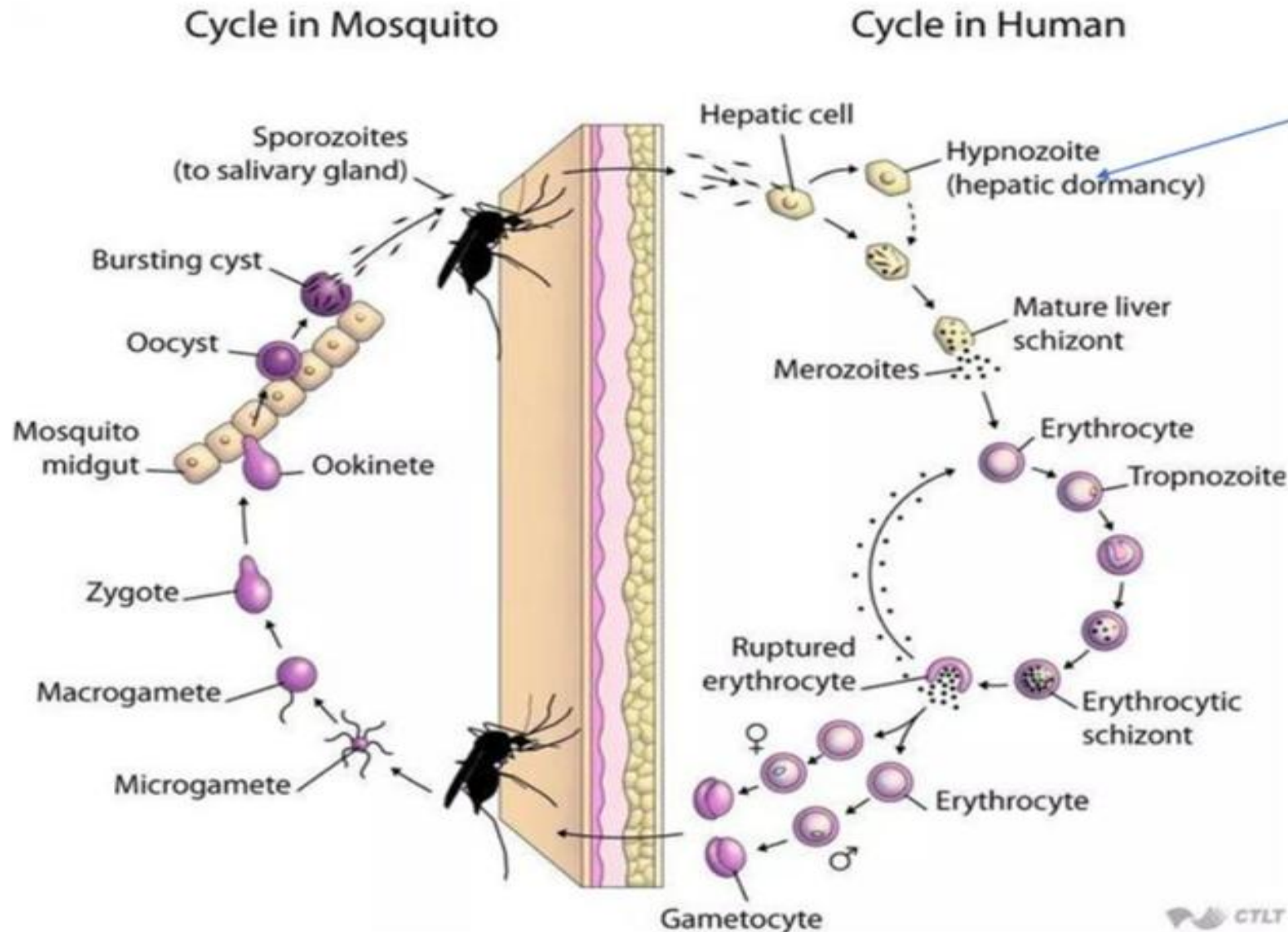
- One or more indigenous cases
- Zero indigenous cases in 2019–2021
- Zero indigenous cases in 2021
- Zero indigenous cases (>3 years) in 2021
- Certified malaria free after 2000
- No malaria
- Not applicable

MALARIA IN THE INDIAN CONTEXT

- India is a country located in the South-East Asia Region, with New Delhi as its capital city. With a population of over 1.2 billion people and an area of 3.3 million square kilometers, the country accounts for a significant burden of malaria cases in the WHO South-East Asia Region, India represents approximately 79% of malaria cases in the region, which itself constitutes about 2% of the global malaria burden. Malaria is endemic in various parts of India, particularly in rural and tribal areas. The prevalence of malaria varies across different states and regions within the country.
- Over the years, India has made progress in malaria control. The annual parasite incidence (API) rate, representing the number of confirmed malaria cases per 1,000 population at risk, has shown a declining trend, with an API rate of 0.72 in 2020. Malaria-related mortality has also decreased, but it remains a concern, especially for vulnerable populations like children and pregnant women. In 2019, India accounted for about 83% of all malaria deaths in the WHO South-East Asia Region
- The National Vector Borne Disease Control Program (NVBDCP) in India, under the Ministry of Health and Family Welfare, is responsible for malaria control efforts. The program focuses on early diagnosis and prompt treatment using artemisinin-based combination therapies (ACTs) as recommended by the WHO. Efforts have been made to improve access to diagnosis and treatment services, particularly in high-burden areas.



LIFE CYCLE OF MALARIA PARASITE



TYPES OF MALARIA PARASITE

Plasmodium vivax (Pv)- may lead to chronicity

Plasmodium falciparum (Pf) – leads to complication death

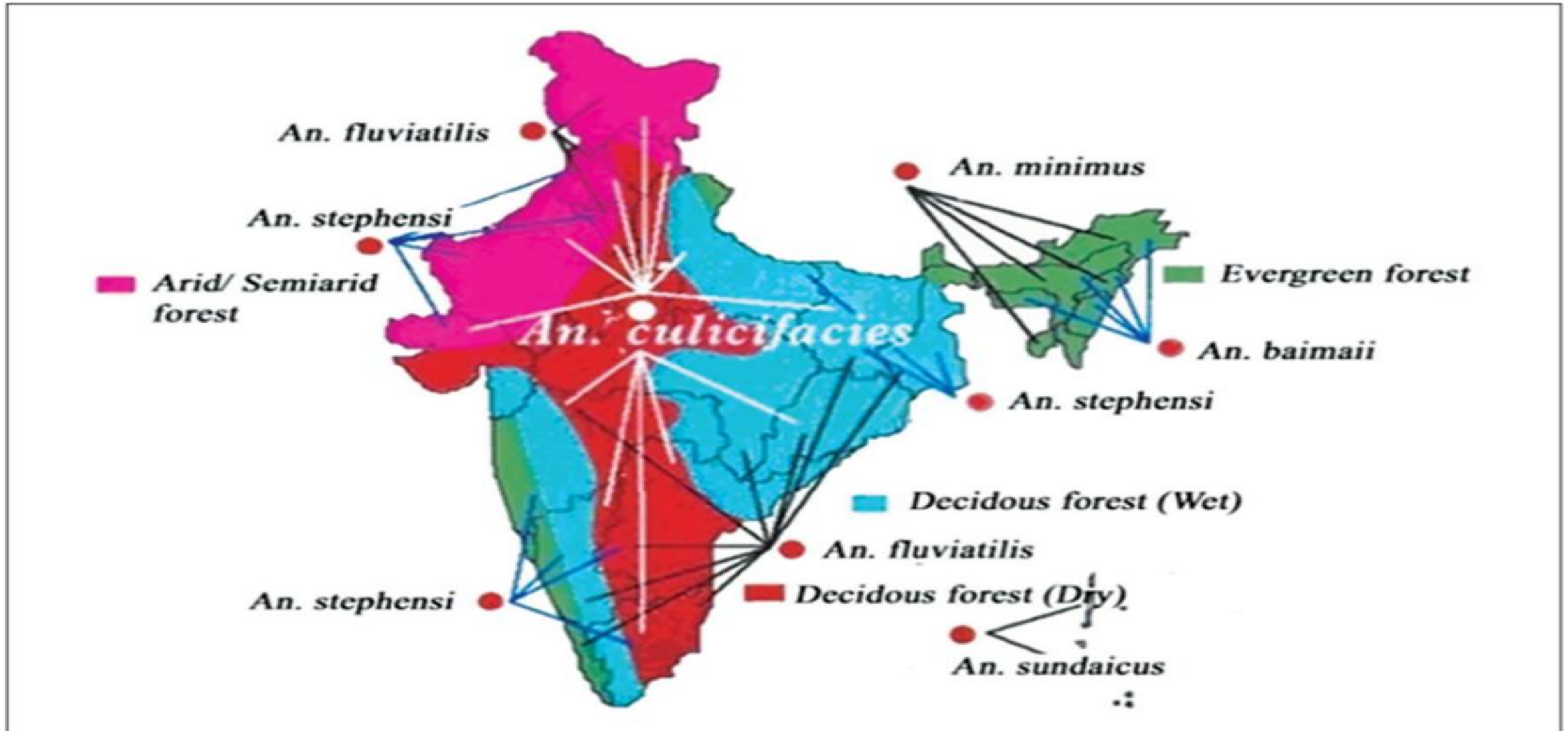
In India, above 2 are common

Others rarely

Plasmodium malariae

Plasmodium ovale

MOSQUITO SPECIES DISTRIBUTION IN INDIA



THE NATIONAL CENTRE FOR VECTOR BORNE DISEASES CONTROL (NCVBDC) OVERVIEW

- The National Centre for Vector Borne Diseases Control (NCVBDC) in India is responsible for coordinating and supporting the prevention and control of vector-borne diseases, with a focus on malaria, lymphatic filariasis, Dengue, Japanese encephalitis, and kala-azar. The program operates under the National Health Mission (NHM), providing technical and financial assistance to states and union territories (UTs) for implementation.
- The strategic framework of the program includes categorizing states/UTs based on the Annual Parasitic Incidence (API) into different phases: prevention of re-establishment, elimination, pre-elimination, and intensified control. Districts serve as the primary unit for planning and implementation, with further subdivision into localized planning units.
- The program prioritizes high transmission areas, primarily in the eastern, central, and northeastern parts of the country, characterized by hilly, tribal, forested, and conflict-affected regions. Special attention is given to the elimination of *Plasmodium vivax*, a major contributor to the global malaria burden.
- Key malaria control strategies include early case detection and prompt treatment, vector control through chemical and biological means, personal prophylactic measures, community participation, environmental management, and source reduction methods. Monitoring and evaluation of the program are conducted through management information systems and field visits.
- The milestones and targets set for the program include reducing the annual parasite incidence API to less than 1 case per 1000 population at risk, achieving zero deaths due to malaria, interrupting transmission, and attaining malaria-free status in all states/UTs by 2024. By 2027 the indigenous transmission of malaria is expected to be interrupted, and by 2030, the re-establishment of local transmission should be prevented nationwide.
- Overall, the NCVBDC's comprehensive approach aims to eliminate malaria and other vector-borne diseases, involving collaboration between the central government, states/UTs, health institutions, research centers, and the community to achieve the desired outcomes

CATEGORISATION OF STATES BASED ON MALARIA BURDEN (API)

Category 1 (15 States)

- State/Districts reporting an API of less than 1 case per 1000 population

- Chandigarh, Daman & Diu, Delhi, Goa, Haryana, Himachal Pradesh, J & K, Kerala, Lakshwadeep, Manipur, Puducherry, Punjab, Rajasthan, Sikkim, Uttarakhand

Category 2 (11 States)

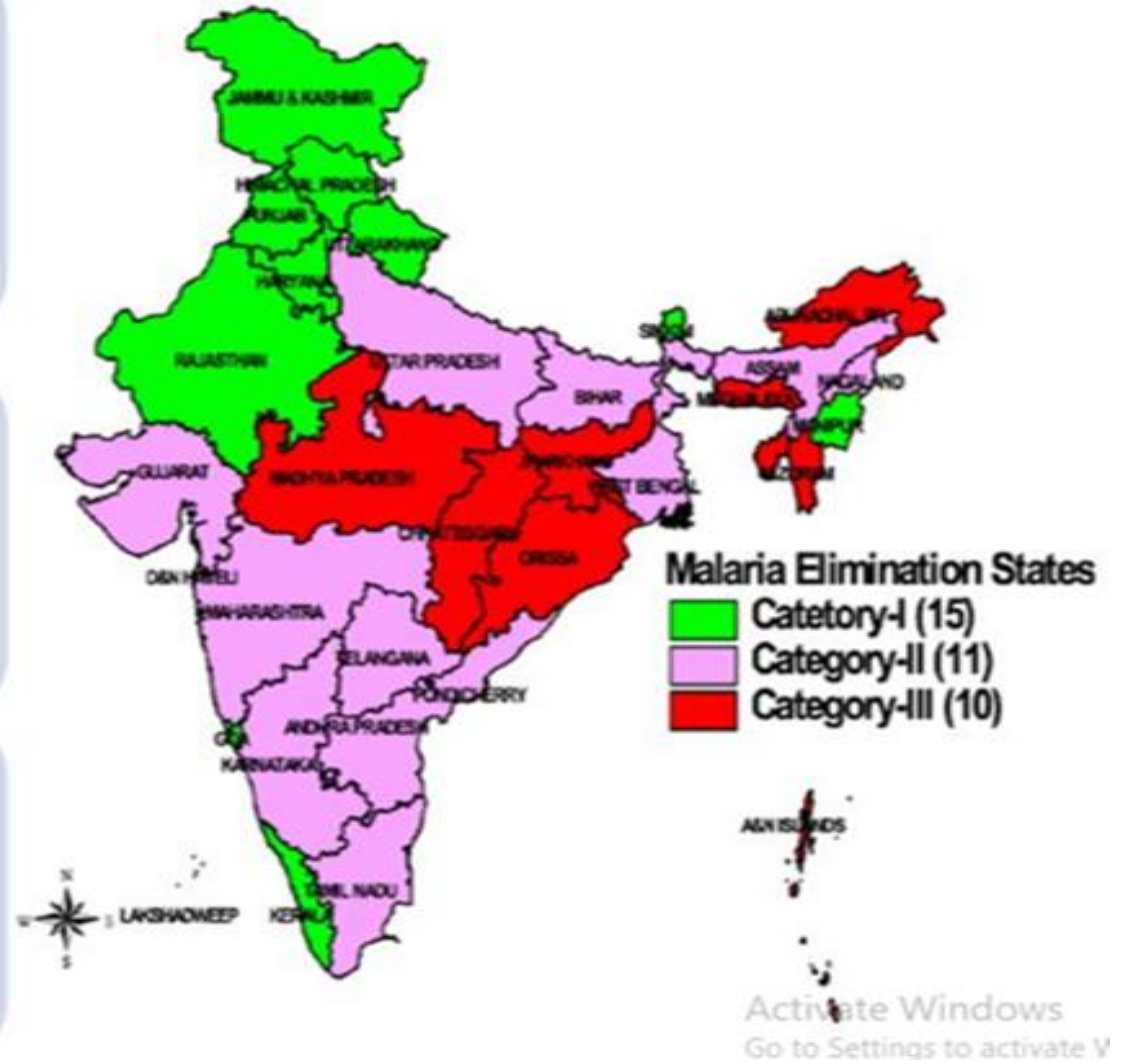
- State < 1 API but some districts report API of 1 case per 1000 population

- Andhra Pradesh, Assam, Bihar, Gujarat, Karnataka, Maharashtra, Nagaland, Tamil Nadu, Telangana, Uttar Pradesh, West Bengal

Category 3 (10)

- States with API of 1 or more per 1000 population

- A & N Islands, Arunachal Pradesh, Chhatisgarh, Dadra & Nagar Haveli, Jharkhand, Madhya Pradesh, Meghalaya, Mizoram, Odisha, Tripura





Indoor Residual Spray



Environmental Management



Chemical Larviciding



Long Lasting Insecticidal Net

**Multiple vector
control interventions**

Multi-disease targeting
Malaria, Kala azar, Dengue,
Chikungunya, Filariasis, JE and
Zika



Outdoor Fogging

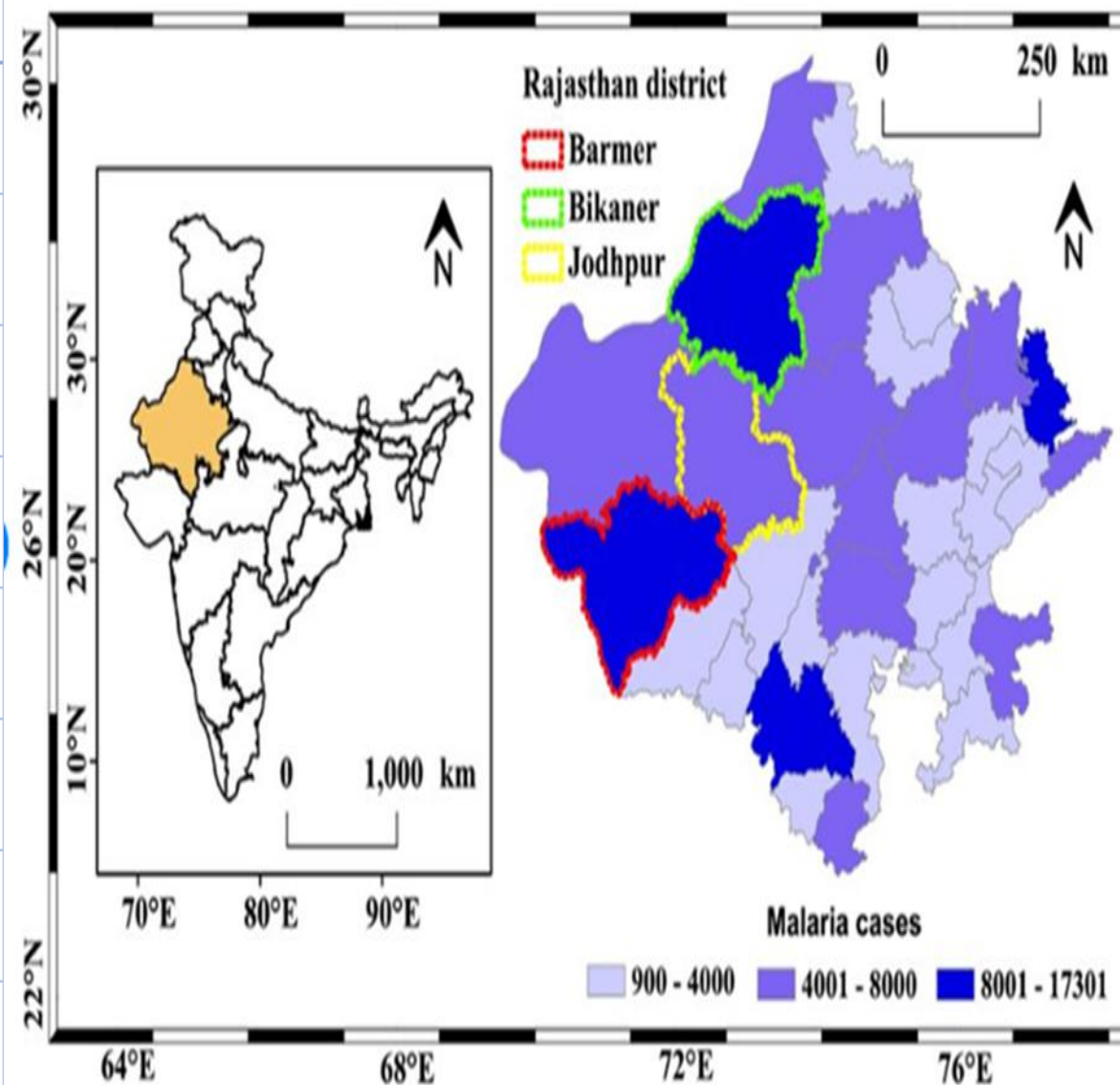


Larvivorous Fish

MALARIA IN RAJASTHAN CONTEXT:

- In the context of malaria in Rajasthan, based on data from 2014, the state falls into Category I, with an annual parasite incidence (API) rate of less than one, indicating a relatively low prevalence of malaria. All districts in Rajasthan have an API rate below one.
- However, there has been a decrease in surveillance at the national level in Rajasthan. When comparing data for January 2023 with the same month of the previous year, several districts in Rajasthan, including Jaipur showed a decrease in national surveillance.
- Some districts in Rajasthan have reported Chloroquine-resistant malaria, while other districts have been identified for the use of ACT (Artemisinin-based Combination Therapy) combination for the treatment of Plasmodium falciparum (P.F.) malaria
- According to the Monthly Malaria Information System (MMIS) for January 2023, there has been a significant increase in the number of blood slides examined (BSE) compared to the last three years' average cumulative, indicating an improvement in diagnostic efforts. However, the number of total positive malaria cases (TPC) has decreased. No positive P.F. malaria cases were recorded during that period
- Overall, there is a fluctuating pattern in malaria cases and P.F. cases in Rajasthan. The number of cases has generally shown a decreasing trend, while the number of deaths due to malaria has remained low in recent years. Continued surveillance, diagnostic efforts, and targeted treatment strategies will be important in maintaining control over malaria in Rajasthan.

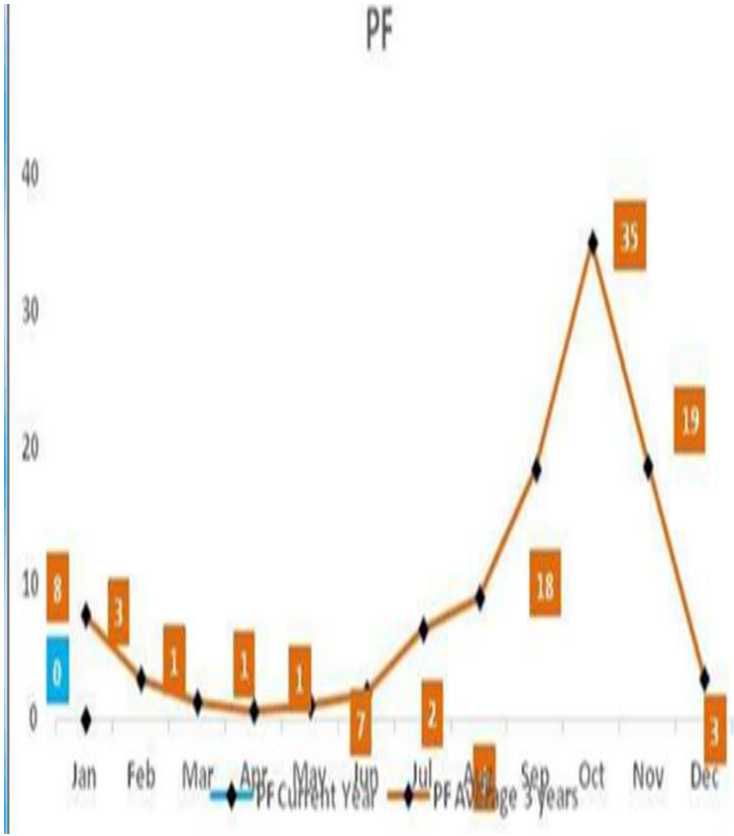
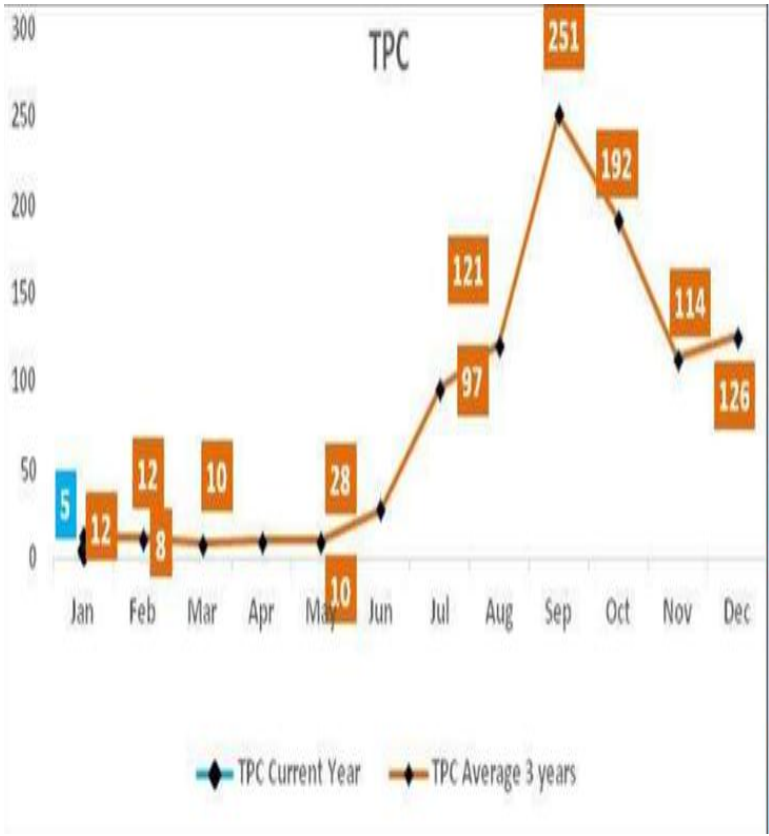
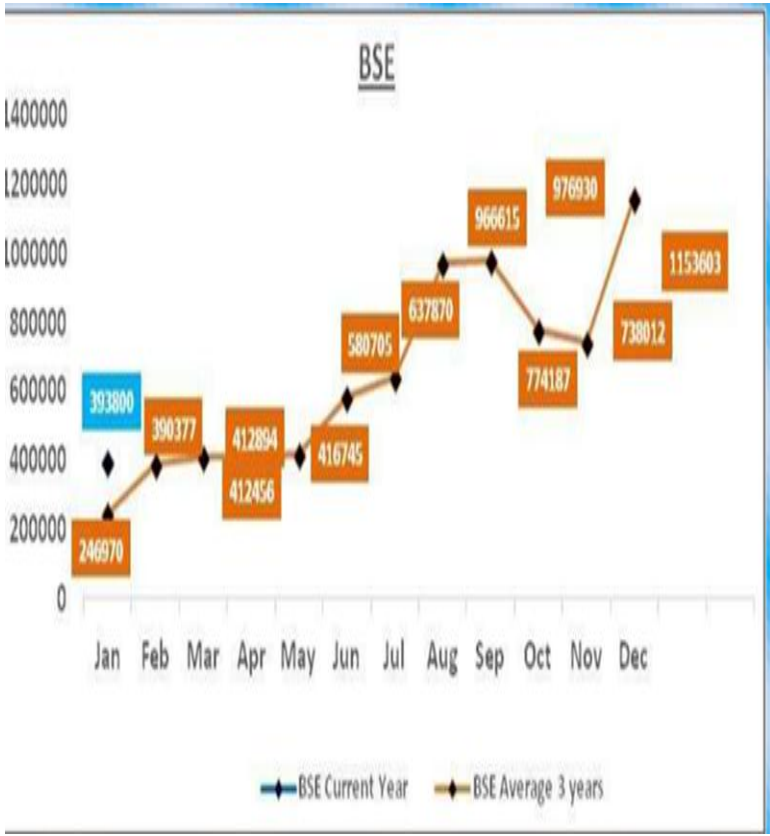
year	Blood Slide Examination	Malaria cases	P.F cases	Deaths
2000	/	35 973	3 425	10
2013	/	33 139	1086	15
2014	/	15 118	603	4
2019	8460010	3421	420	1
2020	6068951	1276	119	0
2021	6632314	925	119	0
2022	10250383	1026	104	0
2023	1827030	17	1	0



There is an increase of No. of blood slides examined (BSE) by 59.45% up to January 2023 as well as during January 2023 as compared to the last three years' average cumulative

There is a decrease of No of total positive malaria cases(TPC) by 59.46% up to January 2023 as well as during January 2023 as compared to the last three Years' average cumulative.

Nil No. of Plasmodium Falciparum malaria cases(P.F) has been reported up to January 23.



LITERATURE REVIEW ON MALARIA CONTROL STRATEGIES

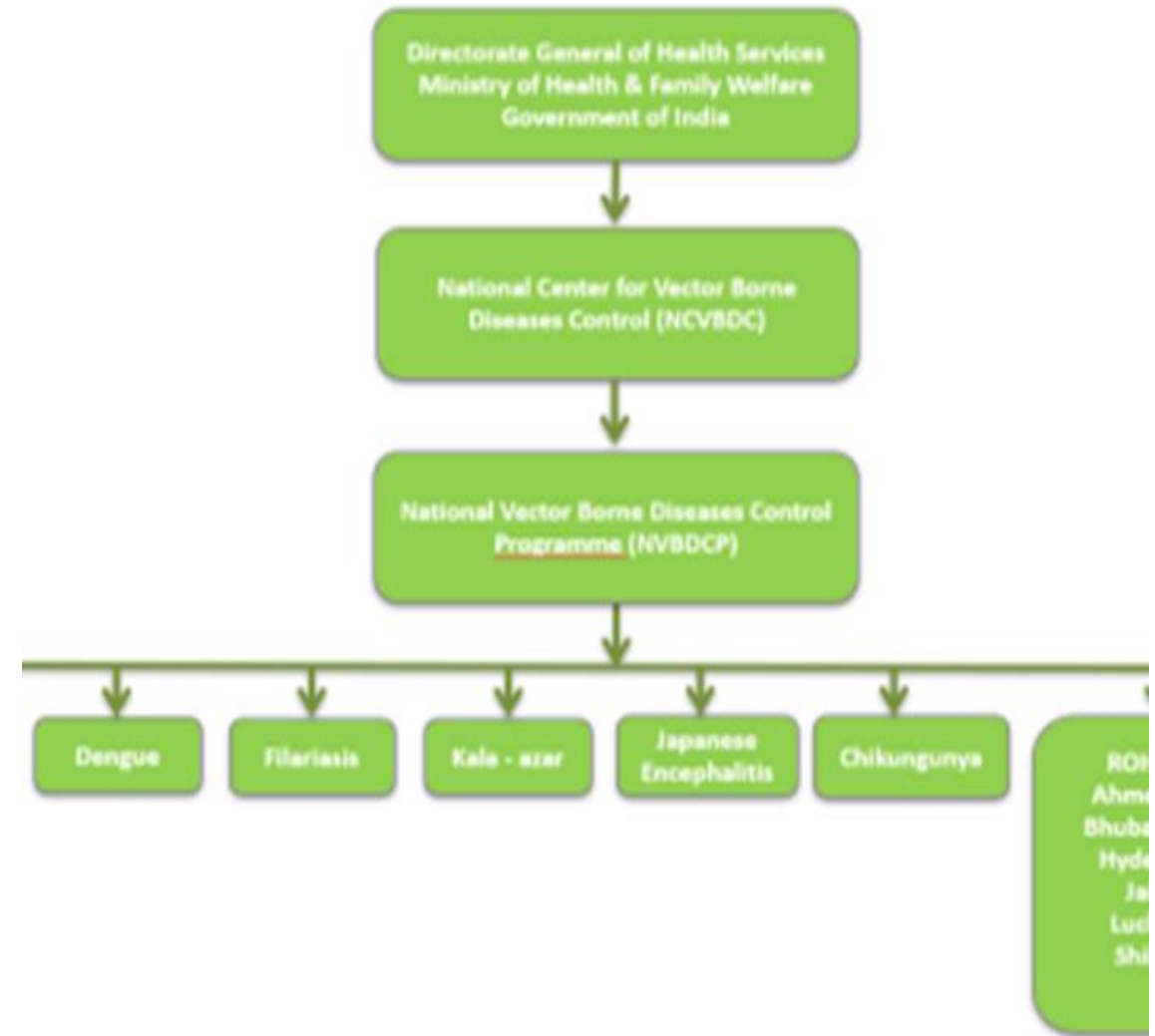
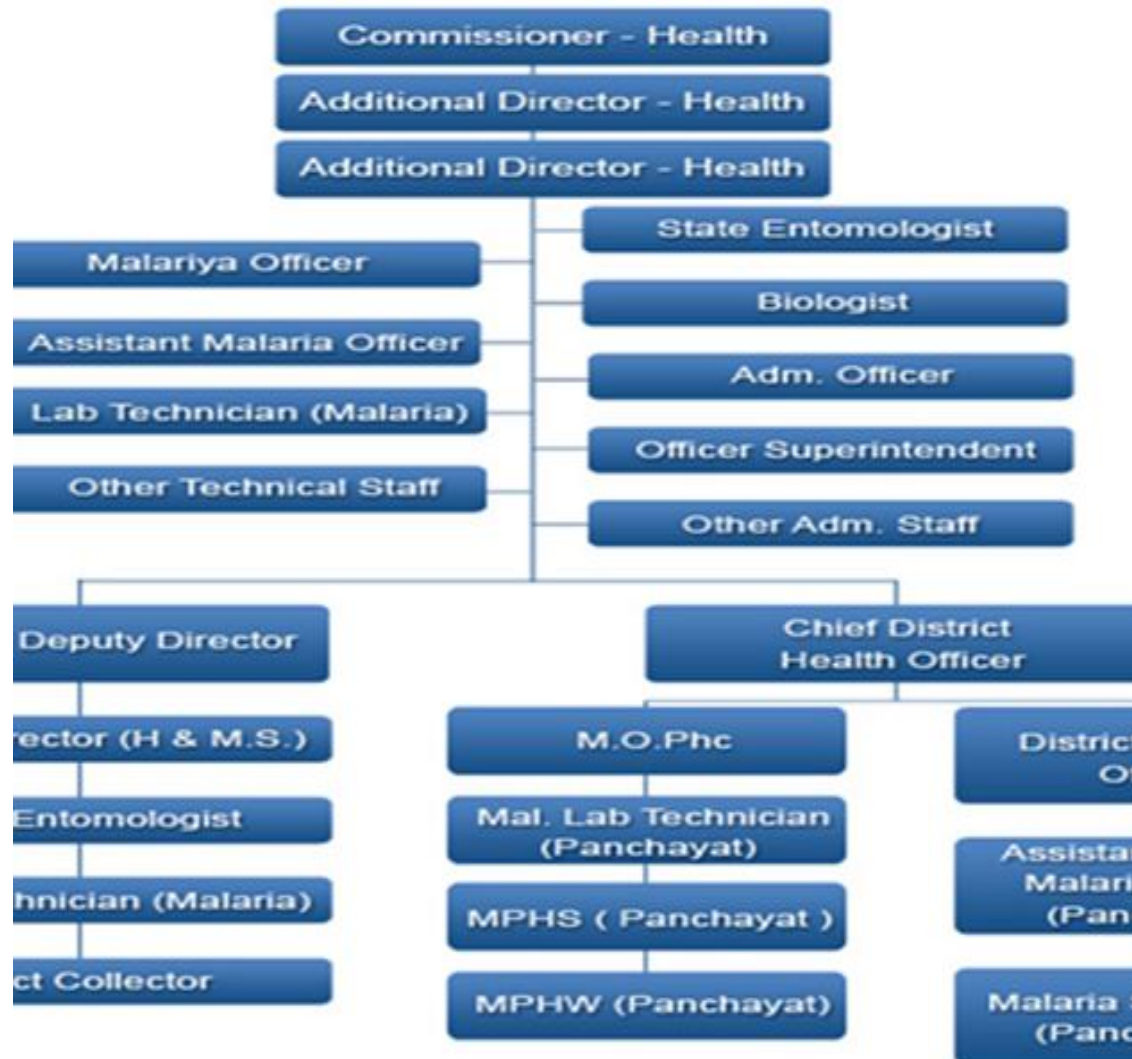
- This literature review focuses on malaria control strategies in the context of Rajasthan, India. Several studies conducted in different parts of Rajasthan highlight the challenges and opportunities for malaria control and elimination. The findings from these studies contribute to a comprehensive understanding of the malaria situation in the region and provide valuable insights for targeted interventions.
- (Rathor*, 2021) (Lal, Rajvanshi, Himanshu, Aparup, & Praveen, 2019) The studies emphasize the need for strengthening the current approach to malaria control and elimination. Factors such as social, economic, political, cultural, and environmental linkages are crucial to understanding the public health approach to malaria. It is suggested that additional modifications and resources should be directed towards forested areas, where forest malaria poses a significant obstacle to control efforts.
- (Raju & Sharma, 2021) (Subbarao, Nanda, Rahi, & Raghavendra, 2019) (Jelia, Meena, & Meena, 2016) The studies find the ability of Plasmodium parasites to develop resistance to antimalarial drugs is identified as a major challenge for malaria elimination. Therefore, awareness of critical prevention practices and combating drug resistance is crucial in Rajasthan. Behavioral interventions, including public awareness programs, rallies, and educational camps, have been found effective in decreasing malaria incidence.

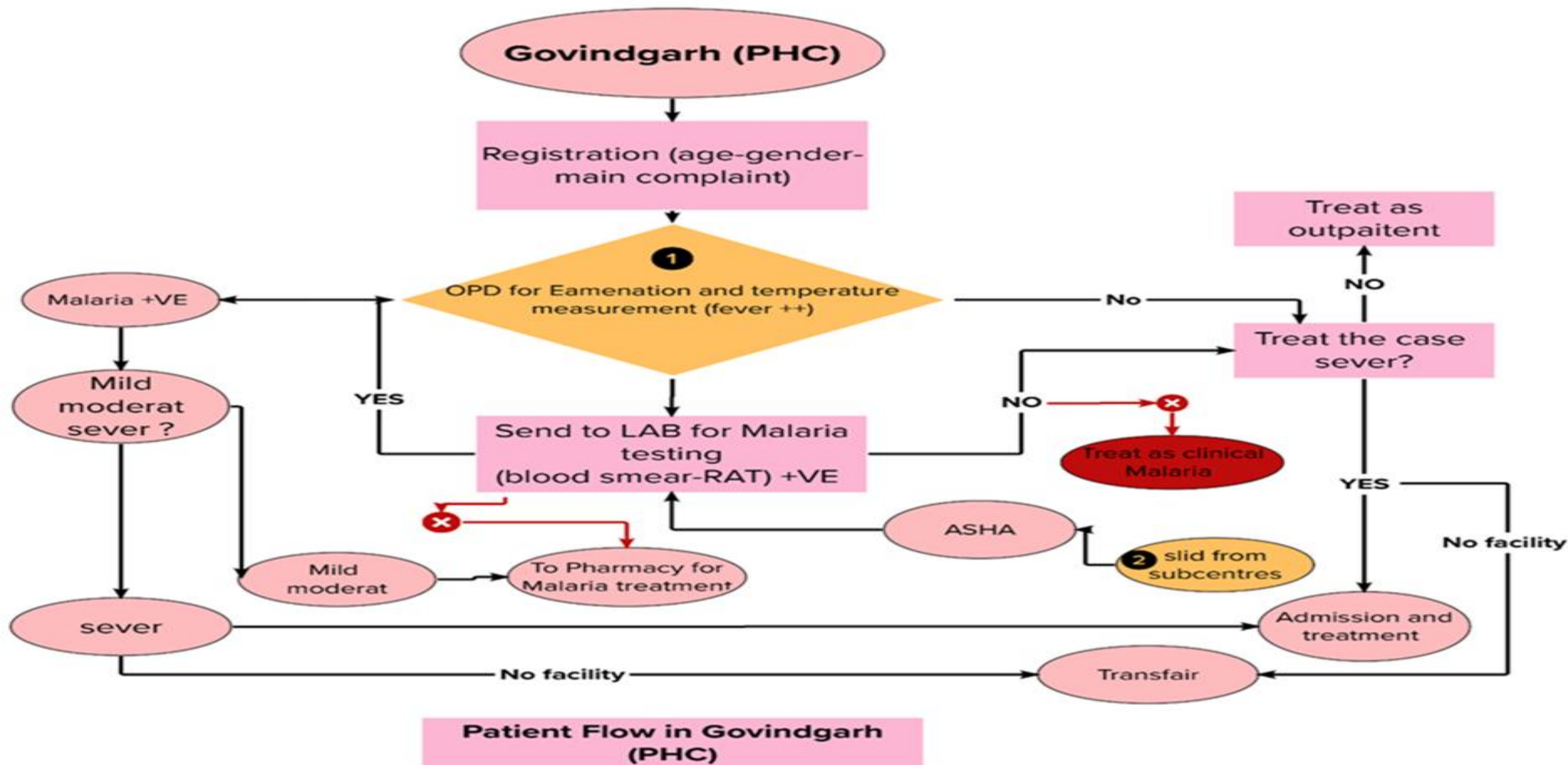
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- (Lakshmi, Kapoor, & Garg, 2020) (Verma, Sharma, & Sharma, 2019) (Yadav, 2015)The key factors contributing to the complexity of malaria in India include the presence of multiple parasite and vector species, asymptomatic cases, drug, and insecticide resistance, and social, demographic, cultural, and behavioral factors that make the country still have high malaria burdens. Sustainable vector control and case management interventions are identified as pivotal in malaria control leading to elimination. However, the persistent use of insecticides has led to widespread resistance in vectors and changes in their behavior, necessitating further research and strategies.
 - (Dhamnetiya & Sahu, 2015) (Haanshuus,,Vivek, Xena, & Chandy, 2015)The clinical profile and complications of malaria vary in different regions of Rajasthan, emphasizing the need for continued surveillance and targeted interventions. Improving knowledge and understanding of malaria prevention and control measures through literacy and education initiatives can significantly contribute to effective control.The national strategy for malaria control in India has undergone a paradigm shift with the introduction of new interventions for case management and vector control

SCHEMATIC ILLUSTRATION DEPICTING PROGRAM DESIGN AND SERVICE DELIVERY

- The Vector-Borne Disease Control Program in India aims to control and prevent the spread of vector-borne diseases through various strategies. These include disease surveillance, vector control, health promotion and awareness, diagnosis and treatment, capacity building, research and innovation, and collaboration among government agencies. The program emphasizes surveillance and monitoring to track disease trends and evaluate interventions. Vector control interventions focus on reducing disease-transmitting vectors, while health promotion and awareness activities empower communities. Diagnosis and treatment services ensure timely detection and effective care, while capacity building enhances healthcare workers' skills. Research and innovation contribute to the development of new tools and interventions and monitoring and evaluation drive continuous improvement. Collaboration among government agencies and stakeholders is crucial for achieving the program's objectives and minimizing the impact of vector-borne diseases in India.

ORGANOGRAM & ORGANIC STRUCTURE OF NCVBDCP





THE OBJECTIVES OF THE CAPSTONE PROJECT

The capstone work area for the project focused on assessing the effectiveness and assessing strengths, weaknesses, and challenges within the NVBDGP's malaria control strategies in Govindgarh, Jaipur. The objectives of the capstone were:

- •To assess the current strategies employed by the NVBDGP for malaria control in Govindgarh, Jaipur.
- •To Assess the strengths, weaknesses, opportunities, and challenges faced by the NVBDGP in implementing malaria control measures.
- •To Provide recommendations to enhance the effectiveness of malaria control efforts in the region.

METHODOLOGY

- primary data collection methods were visualized. Secondary data was collected in the form of NCVBDC project documents, NCVBDC annual reports, WHO reports, health facility records, and published studies. Primary data was collected using interviewing method.
- Data Collection Methods
- Qualitative: informant interviews with healthcare providers (General Physicians, Technicians, Medical Officers) and beneficiaries, to gather insights into the program's implementation, challenges, and facilitators.
- Interviews of health service providers and community members:
- I interviewed key informants with physicians and paramedical staff (lab technician, pharmacist, and staff nurse, ASHA) trained in the diagnosis and treatment of malaria cases (including management of post-confirmation complications, and follow-up requirements). I conducted one interview for each of them (2 doctors, 2 laboratory technicians, 2 pharmacies, 1 ASHA, the director of the center, and 3 community members), and areas of inquiry included: availability of infrastructure, trained human resources (MD Medicine / MBBS, practice, staff, Communicable disease specialist “Malaria”), basic medical equipment, medicines for malaria, and the ability to perform a malaria test (rapid test, blood smear) at the health facility.

FIELD VISIT DOCUMENTATION (ACTIVITY DESCRIPTION)

- Location: Govindgarh Center, Jaipur
- Activities Conducted: I follow the specific interview guideline and I use a specific Observation and assessment checklist

Interviewee	Purpose	Observations	ASHA member	Assess the ASHA role in NCVBDCP	Door-to-door survey No training in combating malaria. Lack of experience in sample preparation. Follow-up of mistaken dengue case Follow-up rate of 20 cases per worker
Health Director	work done with NVBDCP	Malaria cases not recorded for 5 years Shortage of operational materials and doctors. Lack of special training in combating malaria. No guidelines for the program. Electricity supply shortage. Old and bad quality fogging machine Resistance from some communities	Pharmacy staff	Drug Availability	Shortage of malaria drugs and intravenous treatment. Monthly withdrawal of malaria drugs despite no recorded cases
OPDs Doctors Two doctors (GP, Pediatrician)	OPD and Service Provision Area	Lack of appropriate training in the malaria eradication program. The high workload in OPDs. Suspected cases not sent for investigation. Treatment without looking at investigation results. No specific CD Clinic	Community Interview three community members (2 adults, 1 child)	Assess the knowledge about malaria	Language issues No meetings with malaria patients Lack of knowledge about malaria symptoms, prevention, and causes. Absence of bed nets and limited use of spraying. Long waiting times, medication shortages, and inadequate examinations
Laboratory Technician stuff	Blood Test for Malaria	Samples referred from clinics and subcentres Shortage of RDT kits. Old and poor-quality microscope. Lack of special training since 2019. No guidelines are available. Limited records for suspected cases			

FINDINGS AND RECOMMENDATIONS

- Based on the information provided, it appears that the National Vector Borne Disease Control Program (NVBDCP) in Govindgarh, Jaipur, India has not recorded any cases of malaria in the past five years. However, several challenges and areas for improvement have been identified through interviews and observations

Objectives	Indicators	Result
Objective 1	Number of malaria cases reported in Govindgarh, Jaipur	Nil
	Percentage of the population in Govindgarh, Jaipur covered by malaria control interventions.	100%
	Availability and utilization rate of diagnostic tools	RDT no available
	Availability and utilization rate treatments for malaria.	Injected treatment is not available
	Compliance with national and international guidelines for malaria control.	No guidelines used
Objective 2	Existence and functionality of surveillance systems for malaria in Govindgarh.	Not available
	Availability of financial resources allocated for malaria control activities.	Available
	Capacity and training of healthcare personnel involved in malaria control activities.	Need training
	Accessibility and availability of insecticide-treated bed nets	Not applicable
	Coordination and collaboration among various stakeholders involved in malaria control efforts.	MoH&FW , NCVBDC, stale level, district level, healthcare provider
	Community awareness and engagement in malaria prevention and control.	Need more effort
Objective 3	Monitoring and evaluation mechanisms	Need support
	Insecticide Resistance	No Resistance
	Vector Density	No data
	Bed Net Ownership and Usage	30%
	Research and Development	Inadequate
	Drug Resistance	No Resistance
	Percentage of indoor residual spraying coverage in high-risk areas	No data

- Slide collection was recorded during a field visit to a Community Health Center (CHC): the left table shows monthly data for the year 2022, and The right table provides data for the year 2023 regarding slide collection for malaria cases. It provides information on the number of active collections by ASHA, passive collections by OPDs doctors, total suspected cases, and the absence of positive or negative cases
- Comparing the two tables, we can see that the number of active slide collections in the CHC for January, February, March, and April of 2023 is lower than the corresponding months in 2022. This suggests a decrease in the number of active slide collections through ASHA.
- The number of passive slides collected in the CHC for January, February, March, and April of 2023 is higher than the corresponding months in 2022. This indicates an increase in the number of passive slide collections by OPDs

Months	Active	Passive	Total	Positive	Negative
Jan	130	218	359	0	359
Feb	164	192	356	0	356
Mar	152	229	381	0	381
Apr	109	206	315	0	315
Total	555	845	1411	0	1411

Months	Active	Passive	Total	Positive	Negative
Jan	98	151	199	0	199
Feb	86	215	301	0	301
Mar	114	210	324	0	324
Apr	105	171	276	0	276
Total	403	747	1100	0	1100

CHALLENGES

- Availability and utilization rate of diagnostic tools: RDT (Rapid Diagnostic Test) not available.
- Availability and utilization rate of treatments for malaria: Injected treatment is not available.
- Compliance with national and international guidelines for malaria control: No guidelines used.
- Existence and functionality of surveillance systems for malaria in Govindgarh center: Not available.
- Capacity and training of healthcare providers involved in malaria control activities: Need training.
- Community awareness and engagement in malaria prevention and control: Need more effort.
- Monitoring and evaluation mechanisms: Need support.
- Research and Development: Inadequate.
- Weak Laboratory Infrastructure: Challenges in resources, infrastructure, and training impacting the accuracy and timeliness of malaria diagnosis.

FIVE MOST IMPORTANT CHALLENGES & SUGGESTIVE ACTIONS

Problems	Suggestive Actions	Feasibility	Priority
Availability and utilization rate of diagnostic tools	Procure and distribute RDT kits for malaria diagnosis.	Challenging	High
Weak Laboratory Infrastructure	Upgrade laboratory equipment and resources Provide specialized training to laboratory workers	Challenging	High
Capacity and training of healthcare personnel	Conduct regular training programs on malaria control and management for healthcare personnel.	Swift	High
Lack of guidelines and protocols at the center	Guidelines are available at NCVBDC, WHO, CDC.	Challenging	Medium
Community awareness and engagement	Launch community awareness campaigns on malaria prevention and control. Engage local community leaders and organizations to promote participation	Swift	Medium

SUPPORTING ACTIONS REQUIRED FOR SUSTAINABILITY

Best Practices	Supporting actions required to sustain the best practices
Strengthened diagnostic and treatment infrastructure	Regular maintenance and upgrade of laboratory equipment and resources.
	Continuous supply of diagnostic tools and treatments.
	Training and capacity building for laboratory staff and healthcare professionals.
Comprehensive Guidelines and protocols for malaria control	Disseminate guidelines to healthcare providers.
	Conduct regular training on guideline implementation.
	Monitor and evaluate adherence to guidelines.
Robust surveillance systems	Establish a centralized surveillance system for monitoring malaria cases.
	Train healthcare providers on accurate reporting and data collection
	Regular analysis and reporting of surveillance data
Community engagement and awareness	Conduct community awareness campaigns on malaria prevention.
	Engage local community leaders and organizations
	Provide educational materials and resources to the community.
Continuous monitoring and evaluation	Establish mechanisms for ongoing monitoring and evaluation of malaria control efforts
	Regularly review and assess the effectiveness of interventions.
	Use data-driven decision-making for program improvements.

LIMITATIONS OF THE STUDY

- The lack of necessary data due to the lack of cases recorded for about 5 years
- Because most of the population spoke Hindi, and I was not proficient in it, I was not able to conduct many interviews with community members.
- The study will focus only on Govindgarh Jaipur, India, so it will not be generalizable to other settings, as malaria epidemiology and local context may differ.
- The study relied on self-reported data from participants, which may be subject to bias and retrieval errors.
- The sample size was limited by resource and time constraints, and the sample selection method was not fully representative of the population.
- The study faced challenges in accessing accurate and up-to-date information on the burden of malaria and implementing malaria control strategies in the region. There was no cooperation from the data officer at the center.
- The study was unable to assess all aspects of the malaria control program, such as financing mechanisms or policy frameworks, due to the focus on targeted interventions.
- The study was conducted over a limited period, in a very short time, and I was unable to capture the long-term effect of the targeted interventions.

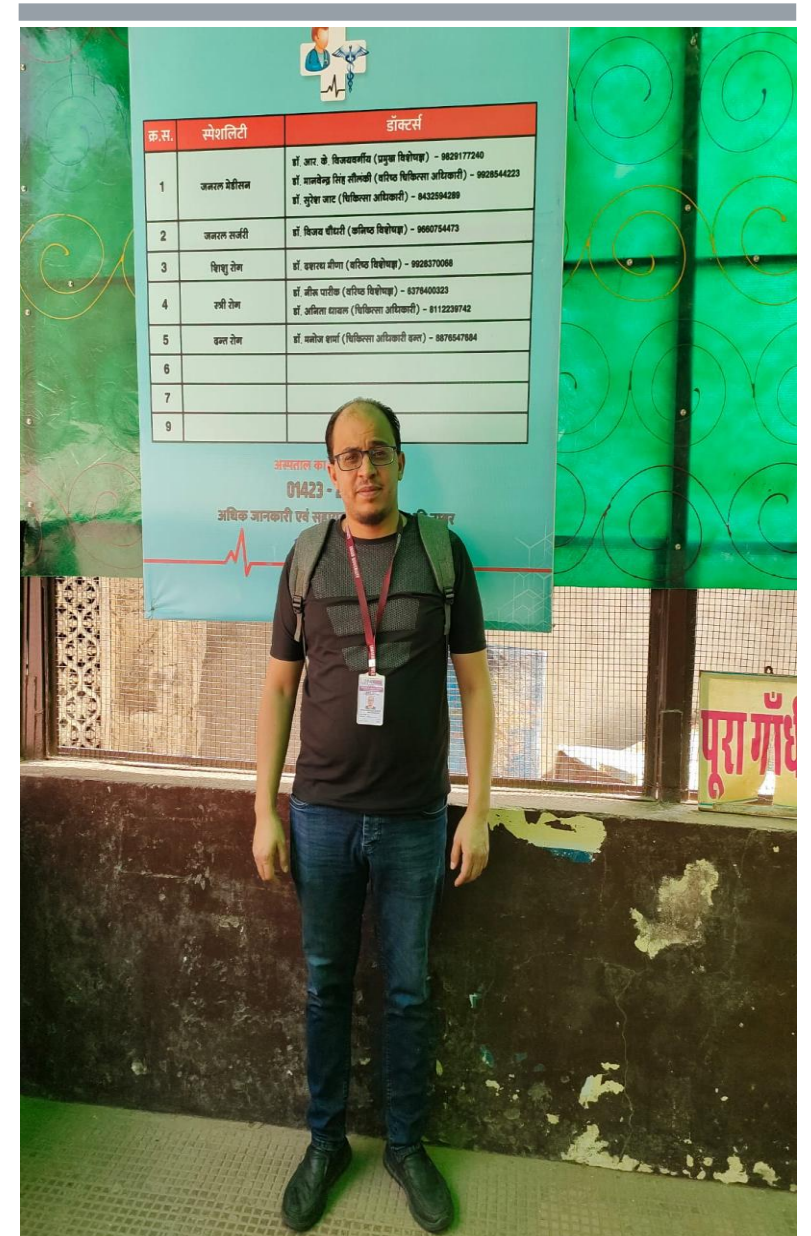
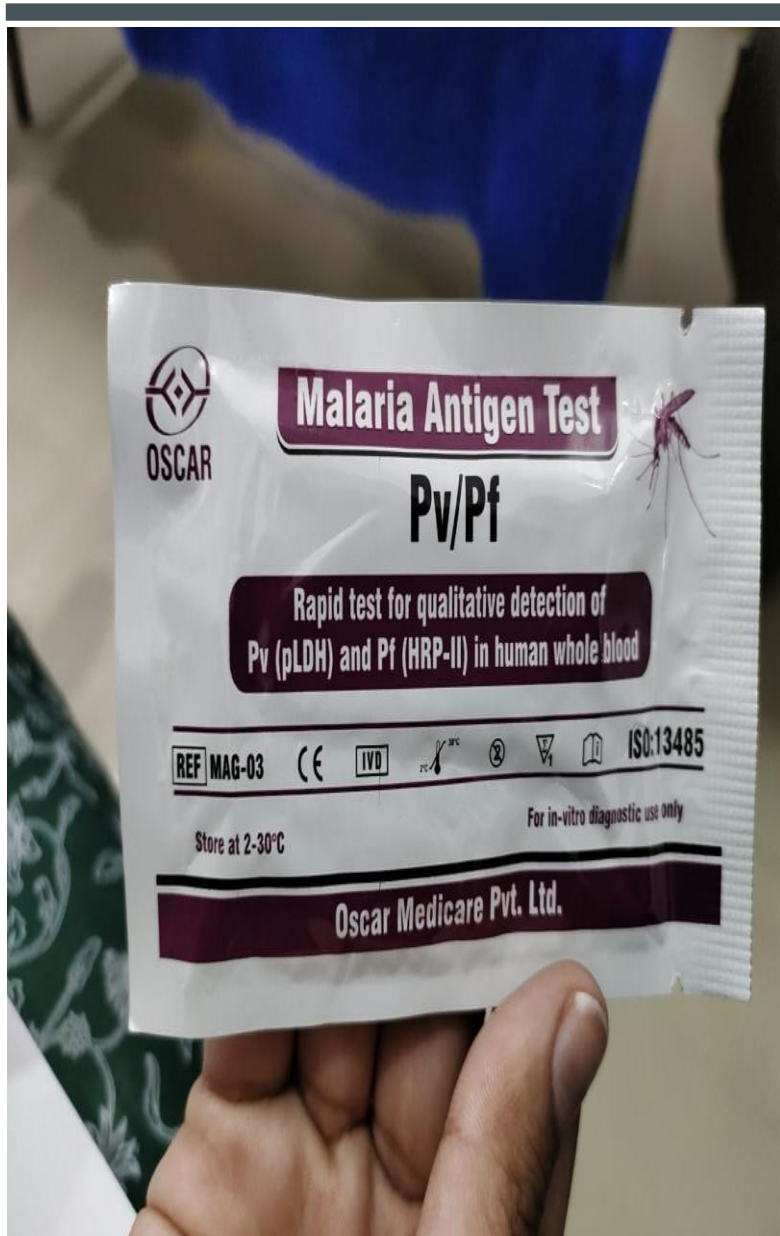
ETHICS

- Informed consent was collected from all participants,

CONCLUSION

- In conclusion, by implementing the recommendations provided, the NVBDCP can address the identified weaknesses and challenges and enhance the effectiveness of malaria control efforts in Govindgarh, Jaipur. These efforts will contribute to the reduction of the malaria burden in the region and the achievement of the NVBDCP's goals





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THANK YOU

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