

# **An Assessment of Current Strategies of the National Vector Borne Disease Control Program (NVBDCP) for Malaria Control in Govindgarh Jaipur, India**

**Subtitle: Identifying Challenges and Recommendations for Improved Malaria Control Efforts**

**A Capstone project submitted to  
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in partial fulfillment of the requirements for  
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Master of Public Health (Implementation Science)**

**by**

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## Table of Contents

|                                                                                      |    |
|--------------------------------------------------------------------------------------|----|
| <b>Introduction</b> .....                                                            | 4  |
| <b>Malaria in the global context</b> .....                                           | 4  |
| <b>Malaria in the Indian Context</b> .....                                           | 5  |
| <b>The National Centre for Vector Borne Diseases Control (NCVBDC) overview</b> ..... | 6  |
| <b>Malaria in Rajasthan context:</b> .....                                           | 8  |
| <b>literature review on malaria control strategies</b> .....                         | 10 |
| <b>Schematic Illustration depicting Program design and service delivery</b> .....    | 11 |
| <b>The Objectives of the Capstone Project</b> .....                                  | 13 |
| <b>Methodology</b> .....                                                             | 14 |
| <b>Field visit documentation (Activity description)</b> .....                        | 14 |
| <b>Expected Outcomes</b> .....                                                       | 15 |
| <b>Findings and Recommendations</b> .....                                            | 16 |
| <b>Limitations of Study</b> .....                                                    | 22 |
| <b>Ethics</b> .....                                                                  | 23 |
| <b>Conclusion</b> .....                                                              | 23 |
| <b>References</b> .....                                                              | 23 |

|                                                                    |    |
|--------------------------------------------------------------------|----|
| Table 1 Malaria Situation In Rajasthan.....                        | 8  |
| Table 2 Tubular Interview Format Source Filed Visit.....           | 15 |
| Table 3 Objectives Measurement .....                               | 16 |
| Table 4 Observation & assessment checklist Source Filed Visit..... | 17 |
| Table 5 Malaria Slide Recorded in CHC 2022 .....                   | 19 |
| Table 6 Malaria Slide Recorded In CHC 2023 .....                   | 19 |
| Table 7 The Finding Challenges & Enablers.....                     | 20 |
| Table 8 Main five challenges .....                                 | 20 |
| Table 9 Main Five Enablers.....                                    | 21 |
| Table 10 The recommendations.....                                  | 21 |

|                                                                                      |    |
|--------------------------------------------------------------------------------------|----|
| Figure 1 Global Malaria Endemic Resigns .....                                        | 4  |
| Figure 2 Malaria Trend In India .....                                                | 6  |
| Figure 3 Categorisation Of States Based On Malaria Burden (API) Source NCVBDCP ..... | 7  |
| Figure 4 Rajasthan Mapping for Malaria Distribution Source NCVBDC .....              | 9  |
| Figure 5 NCVBDC organogram Source NCVBDCP.....                                       | 12 |
| Figure 6 Patient flow Source Filed visit observation .....                           | 13 |

## 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.

## Malaria in the global context

Malaria is a significant global health issue, primarily affecting tropical and subtropical regions ([WHO, 2021](#)) 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. See the Figure below for Global Malaria Endemic Resigns.

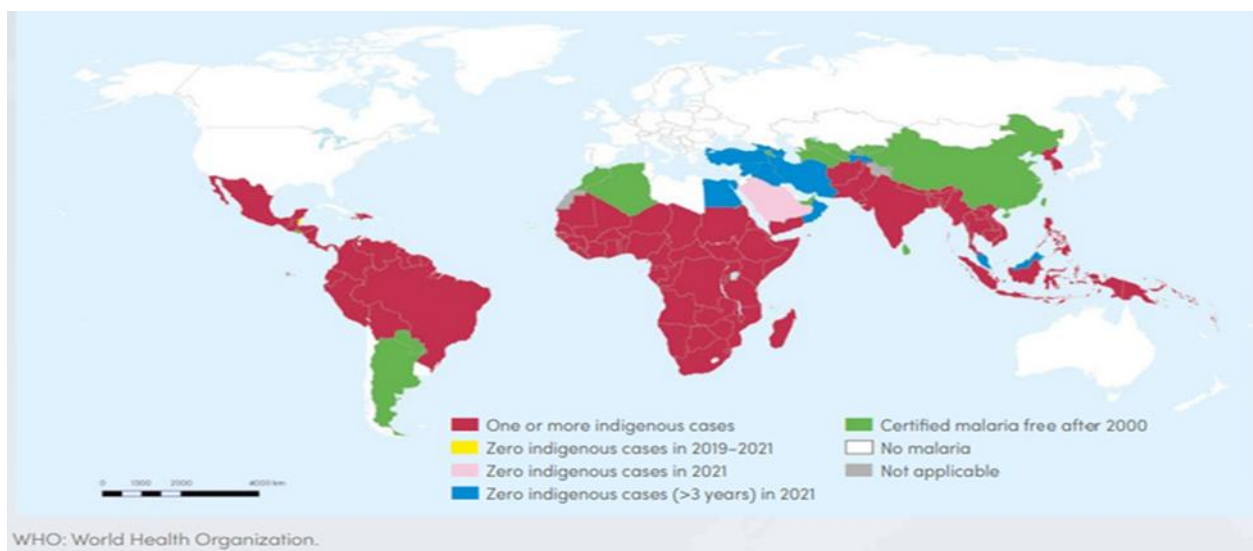


Figure 1 Global Malaria Endemic Resigns

The incidence of malaria slightly increased in 2021 ([WHO, Malaria, 2023](#)) ([WHO, Regional data and trends briefing kit World malaria report , 2022](#)) with 247 million cases reported compared to 245 million in 2020. ([WHO, Global messaging Briefing kit World](#)

[malaria report , 2022](#)) 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, ([WHO, Malaria, 2023](#)) ([UNICEF, 2023](#)) ([USAID & CDC, 2023](#)) 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.

### **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 [5,6], the country accounts for a significant burden of malaria cases in the WHO South-East Asia Region. ([WHO, Malaria, 2023](#)) 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. ([WHO, Malaria, 2023](#)) ([WHO, Regional data and trends briefing kit World malaria report , 2022](#))

Over the years, see (Table 1 History of Malaria Control in India) 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. See Figure 8 Malaria trend in India (2000-2021) (NRHM, 2015)

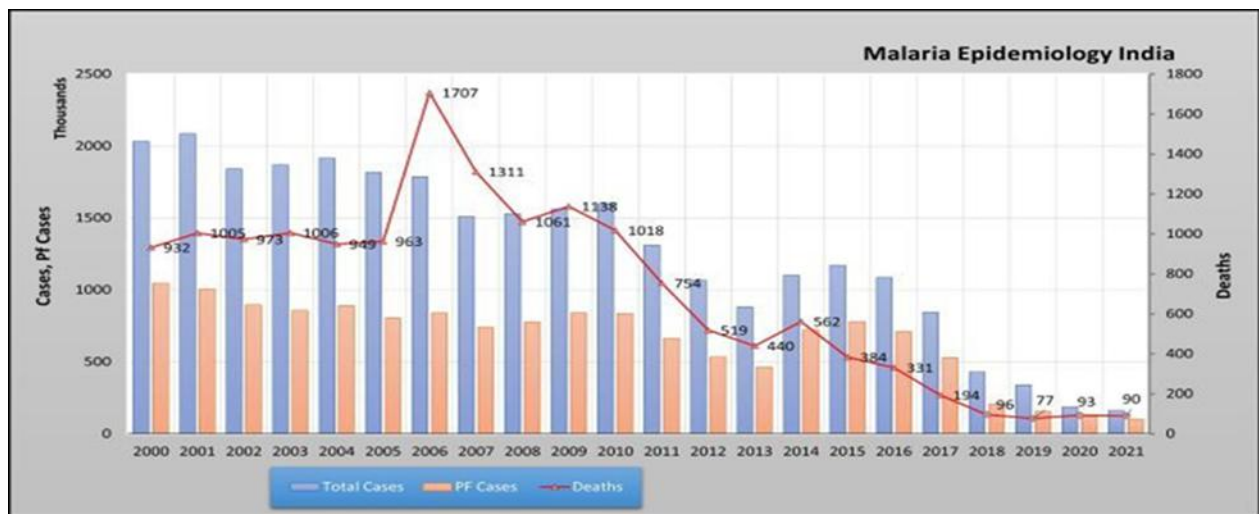


Figure 2 Malaria Trend In India

The National Vector Borne Disease Control Program (NVBDCP) (NCVBDC, 2023) 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. See Table 4 Epidemiological indicators for malaria in India (2001-2021)

### **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. See (Figure 6)

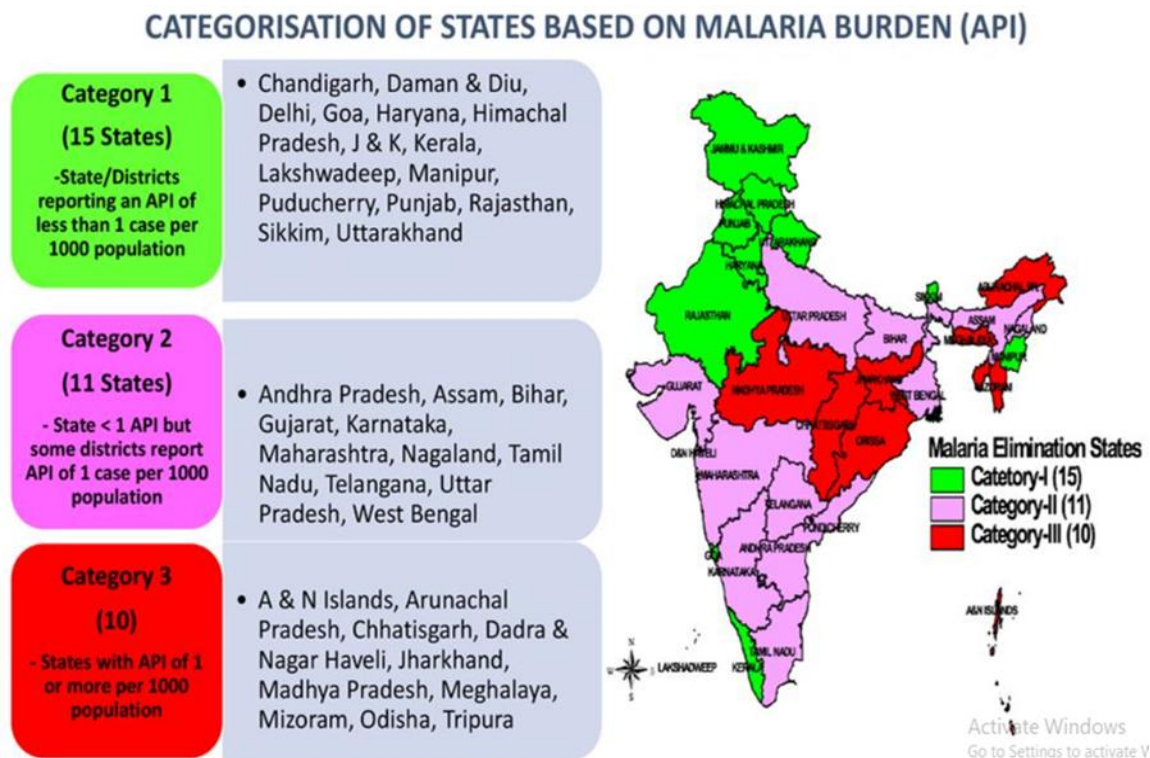


Figure 3 Categorisation Of States Based On Malaria Burden (API) Source NCVBDCP

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. (NCVBDC, 2023)

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. (NCVBDC, 2023)

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. (NVBDCP, DGHS, & MoH&FW India, 2016) (NCVBDC, Magnitude Of The Problem, 2023)

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

### **Malaria in Rajasthan context:**

In the context of malaria in Rajasthan, based on data from 2014, (Kothari, 2022) the state falls into Category 1, 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.

*Table 1 Malaria Situation 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      |

However, there has been a decrease in surveillance at the national level in Rajasthan. (NVBDCP, DGHS, & MoH&FW India, 2016) (NCVBDC, NCVBDC, 2023) 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 see Table 5,6,7,8

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. (Singh, Mehra, Kumar, & Gaurav, 2017) (NCVBDC, MMIS-January , 2023)

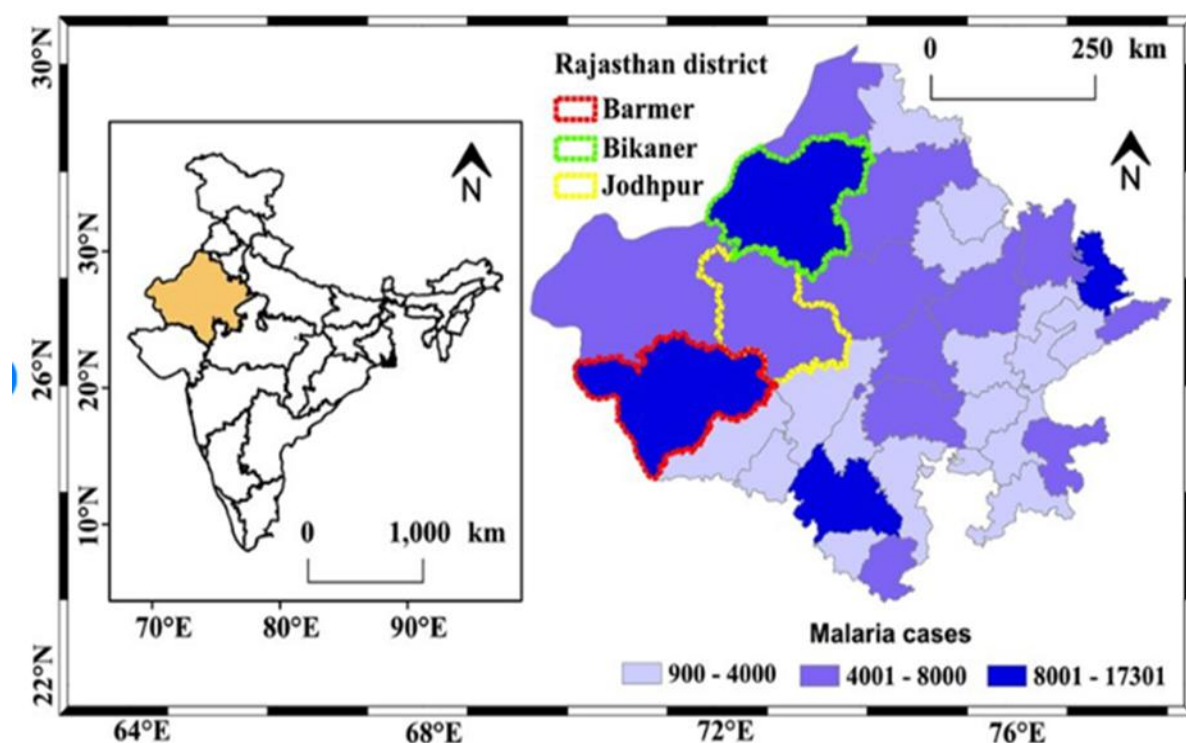


Figure 4 Rajasthan Mapping for Malaria Distribution Source NCVBDC

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.

### **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.

(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.

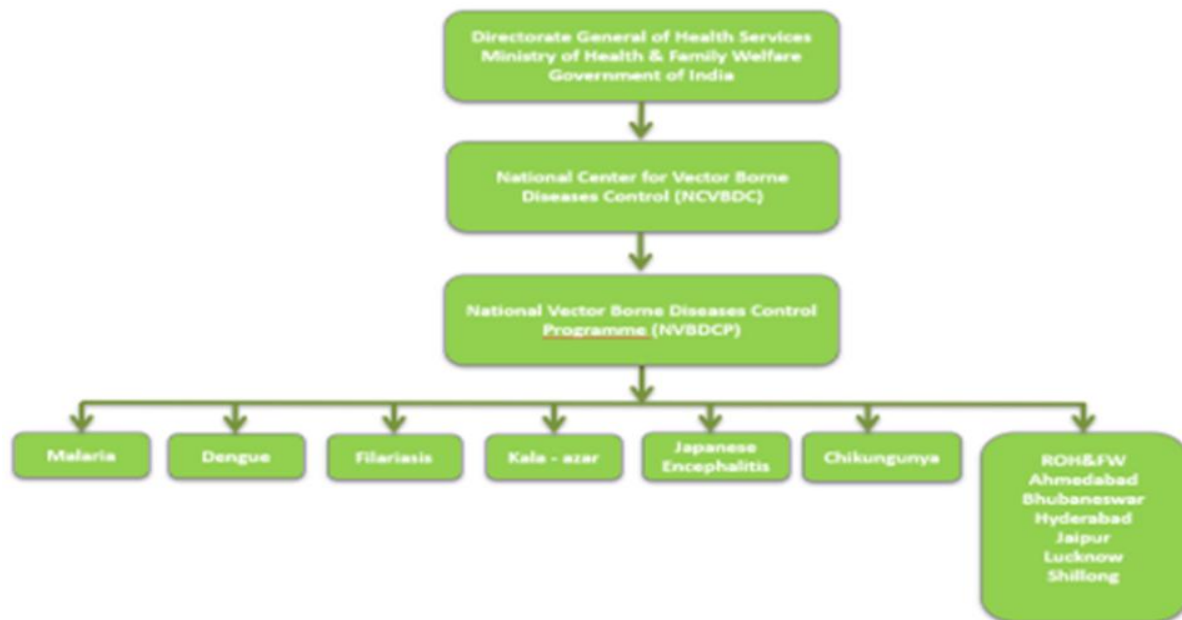
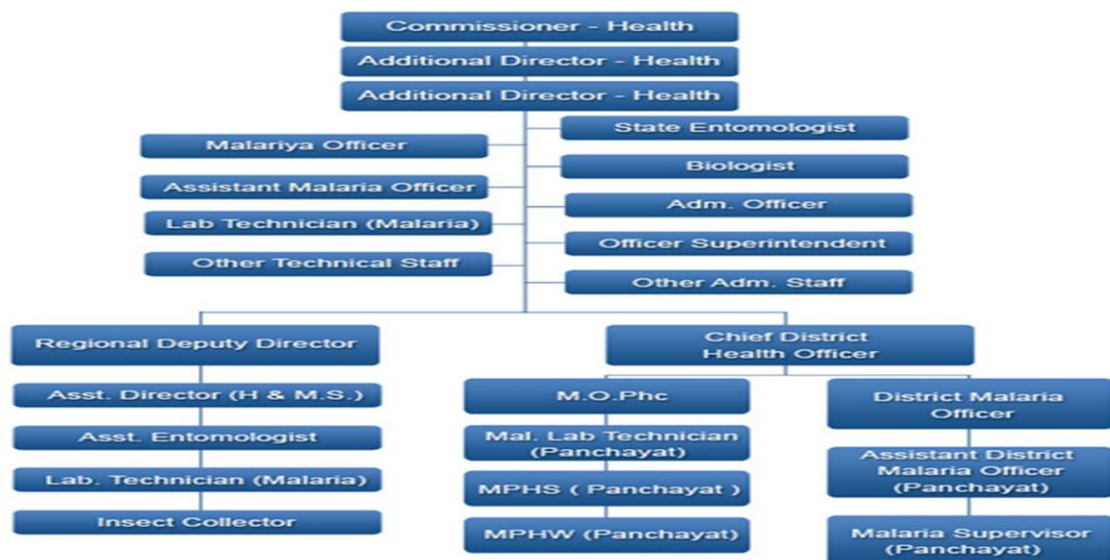


Figure 5 NCVBDC organogram Source NCVBDCP



- 
- ```

graph TD
    Start([Govindgarh (PHC)]) --> Reg[Registration (age-gender-main complaint)]
    Reg --> Dec1{1  
OPD for Examination and temperature measurement (fever ++)}
    Dec1 -- YES --> Lab[Send to LAB for Malaria testing (blood smear-RAT) +VE]
    Dec1 -- NO --> TreatSev{Treat the case sever?}
    Lab -- NO --> TreatSev
    Lab -- YES --> MildMod[Mild/moderate]
    MildMod --> Pharm[To Pharmacy for Malaria treatment]
    Pharm --> ASHA([ASHA])
    ASHA --> Lab
    ASHA -- 2 slid from subcentres --> Lab
    MildMod -- Mild/moderate sever? --> MildModSev{Mild/moderate sever?}
    MildModSev -- Mild/moderate --> Pharm
    MildModSev -- sever --> NoFacility[No facility]
    NoFacility --> Transfair([Transfair])
    TreatSev -- YES --> NoFacility
    TreatSev -- NO --> Outpatient[Treat as outpatient]
    Outpatient --> Transfair
    
```
- Patient Flow in Govindgarh (PHC)**
- The flowchart illustrates the management process for malaria patients at Govindgarh (PHC). It begins with registration and an OPD examination. If a patient has fever, they are sent for malaria testing. Depending on the results and severity, patients are either treated as outpatients, sent to a pharmacy for treatment (with ASHA support), or referred to a higher facility (Transfair) if no facility is available.

## **Methodology**

Both primary and secondary 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:

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 from the doctor, 2 from the laboratory technician, 2 from the pharmacy, 1 from the ASHA, 1 from the director of the center, and 3 from 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

Interviews: 5 interviews were conducted with key healthcare providers at the Govindgarh Center and 3 community members, these interviews focused on gathering insights into the malaria control program, its implementation, and the challenges faced. The interviewees included:

*Table 2 Tubular Interview Format Source Filed Visit*

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

## Expected Outcomes

The assessment aims to provide a comprehensive understanding of the current strategies employed by the NVBDCP for malaria control in Govindgarh, Jaipur. The findings will contribute to the identification of strengths and weaknesses in

the program, as well as the challenges faced in implementation. Based on these findings, recommendations will be generated to improve the effectiveness of malaria control efforts.

### Findings and Recommendations

Based on the information provided, it appears that the National Vector Borne Disease Control Program (NVBDPC) 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.

Table 3 Objectives Measurement

| Objectives         | Indicators                                                                                     | Result                                                           |
|--------------------|------------------------------------------------------------------------------------------------|------------------------------------------------------------------|
| <b>Objective 1</b> | 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                                               |
| <b>Objective 2</b> | Existence and functionality of surveillance systems for malaria in the region.                 | 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                                                 |
| <b>Objective 3</b> | 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                                                          |

Table 4 Observation & assessment checklist Source Filed Visit

| Laboratory                                                              | Options                                                   |                                   |                                                     | Notes              |
|-------------------------------------------------------------------------|-----------------------------------------------------------|-----------------------------------|-----------------------------------------------------|--------------------|
| Lab Technician Availability                                             | Partial from 9 am-3 pm then on call                       |                                   |                                                     |                    |
| Blood Microscopy for Malaria                                            | Yes, Being Done                                           |                                   |                                                     |                    |
| Maximum Testing Load for Malaria (Per Day)                              | Number of Slides 15-30                                    | RAT is available in the subcentre |                                                     |                    |
| Reporting of Blood Test for Malaria                                     |                                                           |                                   |                                                     |                    |
| The usual Time taken to give the report                                 |                                                           |                                   |                                                     |                    |
| OPD Samples                                                             | 6Hrs                                                      |                                   |                                                     |                    |
| Field Samples                                                           | 24Hrs                                                     |                                   |                                                     |                    |
| Documentation                                                           | No positive reported cases in the last 5 years back       |                                   |                                                     |                    |
| OPD Samples                                                             | 6HRs                                                      |                                   |                                                     |                    |
| Field Samples                                                           | 24HRs                                                     |                                   |                                                     |                    |
| RDT for Malaria (Antigen                                                | They do RDT for all Conditions                            |                                   |                                                     |                    |
| Training of LTs in the past five years                                  | No specific training program last training before 3 years |                                   |                                                     | irregular training |
| Resource Availability                                                   |                                                           |                                   |                                                     |                    |
| a) Functional Microscope                                                | Yes, available but with bad quality and lens opacity      |                                   |                                                     |                    |
| b) Reagents                                                             | Yes, available                                            |                                   | Yes, there is Supply Issues / Stockouts in the Past |                    |
| c) Glass Slides                                                         | Yes available                                             |                                   | Yes, there is Supply Issues / Stockouts in the Past |                    |
| d) Lancets                                                              | Yes available                                             |                                   |                                                     |                    |
| Hollow/Injection Needles used for Finger Prick                          | Yes available                                             |                                   |                                                     |                    |
| RDTs for Malaria                                                        | Yes, available but it is expired                          |                                   | Both Local Purchase and national                    |                    |
| There is an arrangement for the segregation of BMW at the session site. | Yes                                                       |                                   |                                                     |                    |
| OPD and Service Provision Area                                          |                                                           |                                   |                                                     |                    |

|                                                                        |                            |                       |      |                           |                                                       |
|------------------------------------------------------------------------|----------------------------|-----------------------|------|---------------------------|-------------------------------------------------------|
| IEC Related to NVDCP displayed in Facility                             | Yes                        |                       |      |                           |                                                       |
| Display of treatment guidelines for Malaria                            | Yes                        |                       |      | only poster no guidelines |                                                       |
| Provision for temperature measurement of Fever Cases                   |                            |                       |      |                           |                                                       |
| Thermometer                                                            | Yes                        |                       |      |                           |                                                       |
| Temperature being Measured                                             | Yes                        | Only in case of fever |      |                           |                                                       |
| Recording and reporting of Fever Cases (Check registers/ask Providers) | Yes                        | Done by the LAB       |      |                           |                                                       |
| Drug Availability                                                      |                            |                       |      |                           |                                                       |
| Chloroquine Tablets                                                    | Yes available (300 TAB)    |                       |      | No Supply Issues          |                                                       |
| Artesunate Combination Therapy                                         | Yes available (2 KIT)      |                       |      | No Supply Issues          |                                                       |
| Injection Artesunate                                                   | Not available              |                       |      | Supply Issues: yes        |                                                       |
| Quinine Tablets                                                        | Not available              |                       |      | Supply Issues: yes        |                                                       |
| Quinine Injection                                                      | Yes available but Not used |                       |      | No Supply Issues          |                                                       |
| Microscopy                                                             |                            | 2020                  | 2021 | 2022                      | Remarks                                               |
| 1. Total Blood Smear Examined                                          |                            | 2160                  | 3693 | 4636                      | Decrease NO. of BST in 2020 Because of covid pandemic |
| 2. Malaria (Microscopy -P Vivax Test +ve)                              |                            | 0                     | 0    | 0                         |                                                       |
| 3. Malaria (Microscopy -P Falciparum Test +ve)                         |                            | 0                     | 0    | 0                         |                                                       |
| Malaria RDT                                                            |                            |                       |      |                           |                                                       |
| 4. RDT conducted for Malaria                                           |                            | 146                   | 202  | 19                        | No RDT available in 2022                              |
| 5. Malaria RDT Conducted P Vivax Test +ve)                             |                            | 3                     | 16   | 2                         |                                                       |
| 6. Malaria RDT Conducted P Falciparum Test +ve)                        |                            | 0                     | 0    | 0                         |                                                       |
| 7. Patients Treated on Outpatient Basis for Malaria                    |                            | 3                     | 16   | 2                         |                                                       |
| 8. Patients admitted with Malaria                                      |                            | 0                     | 0    | 0                         |                                                       |
| 9. Deaths Due to Malaria                                               |                            | 0                     | 0    | 0                         |                                                       |

Slide collection was recorded during a field visit to a Community Health Center (CHC): the first table shows monthly data for the year 2022, and The second 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

*Table 5 Malaria Slide Recorded in CHC 2022*

| Months       | Active | Passive | Total | Positive | Negative |
|--------------|--------|---------|-------|----------|----------|
| <b>Jan</b>   | 130    | 218     | 359   | 0        | 359      |
| <b>Feb</b>   | 164    | 192     | 356   | 0        | 356      |
| <b>Mar</b>   | 152    | 229     | 381   | 0        | 381      |
| <b>Apr</b>   | 109    | 206     | 315   | 0        | 315      |
| <b>May</b>   | 139    | 218     | 357   | 0        | 357      |
| <b>Jun</b>   | 145    | 194     | 339   | 0        | 339      |
| <b>Jul</b>   | 125    | 307     | 432   | 0        | 432      |
| <b>Aug</b>   | 207    | 524     | 731   | 0        | 731      |
| <b>Sep</b>   | 172    | 452     | 624   | 0        | 624      |
| <b>Oct</b>   | 147    | 279     | 426   | 0        | 426      |
| <b>Nov</b>   | 101    | 247     | 348   | 0        | 348      |
| <b>Dec</b>   | 37     | 157     | 194   | 0        | 194      |
| <b>Total</b> | 1628   | 3223    | 4851  | 0        | 4851     |

*Table 6 Malaria Slide Recorded In CHC 2023*

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

*Source Field Visit Observation 1 Malaria Slide Recorded In CHC 2023*

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

Table 7 The Finding Challenges & Enablers

| <b>Challenges</b>                                                                                                                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Availability and utilization rate of diagnostic tools: RDT (Rapid Diagnostic Test) is 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 the region: Not available.                                                                                                                                                             |
| Capacity and training of healthcare personnel involved in malaria control activities: Need training.                                                                                                                                                      |
| Coordination and collaboration among various stakeholders involved in malaria control efforts: Ministry of Health and Family Welfare (MoH&FW), NCVBDC (National Center for Vector-Borne Diseases), state level, district level, and healthcare providers. |
| 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.                                                                                                         |
| <b>Enablers</b>                                                                                                                                                                                                                                           |
| Availability of financial resources allocated for malaria control activities: Available.                                                                                                                                                                  |
| Potential for improvement in community engagement and awareness efforts.                                                                                                                                                                                  |
| Ministry of Health and Family Welfare (MoH&FW) is a stakeholder in malaria control.                                                                                                                                                                       |
| National Center for Vector-Borne Diseases (NCVBDC) as a stakeholder in malaria control.                                                                                                                                                                   |
| Collaboration and coordination opportunities at the state level, district level, and with healthcare providers.                                                                                                                                           |
| Opportunities for capacity building and training of healthcare personnel involved in malaria control.                                                                                                                                                     |
| Availability of insecticide-treated bed nets.                                                                                                                                                                                                             |
| Availability of financial resources for malaria control activities.                                                                                                                                                                                       |
| Potential for support in establishing monitoring and evaluation mechanisms.                                                                                                                                                                               |
| Potential for improvement in research and development efforts.                                                                                                                                                                                            |

Table 8 Main five challenges

|   |                                                       |
|---|-------------------------------------------------------|
| 1 | Availability and utilization rate of diagnostic tools |
| 2 | Weak Laboratory Infrastructure                        |
| 3 | Capacity and training of healthcare provider          |
| 4 | Lack of guidelines and protocols                      |

|   |                                    |
|---|------------------------------------|
| 5 | Community awareness and engagement |
|---|------------------------------------|

| 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<br>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                      | Develop and implement comprehensive guidelines for malaria control, including diagnosis, treatment, and surveillance                                 | Challenging | Medium   |
| Community awareness and engagement                    | Launch community awareness campaigns on malaria prevention and control.<br>Engage local community leaders and organizations to promote participation | Swift       | Medium   |

Table 9 Main Five Enablers

|   |                                                                                                                |
|---|----------------------------------------------------------------------------------------------------------------|
| 1 | Availability of financial resources allocated for malaria control activities                                   |
| 2 | Ministry of Health and Family Welfare (MoH&FW) as a stakeholder in malaria control                             |
| 3 | National Center for Vector-Borne Diseases (NCVBDC) as a stakeholder in malaria control                         |
| 4 | Collaboration and coordination opportunities at the state level, district level, and with healthcare providers |
| 5 | Opportunities for capacity building and training of healthcare personnel involved in malaria                   |

Table 10 The recommendations

| 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 | Develop and 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 patients and 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 programme, 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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