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Research Article

A Qualitative Assessment of a Malaria Elimination Project in the Tribal District of Mandla, Madhya Pradesh

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A B S T R A C T

The Asia Pacific has committed to the regional goal of malaria elimination by 2030. In the year 2021, India constituted 10% of the total malaria burden in the region, with more than 2/3rd malaria cases concentrated in tribal pockets. In 2017, a public-privatepartnership known as the Malaria Elimination Demonstration Project was initiated in the tribal district of Mandla in central India to demonstrate malaria elimination and share lessons withthe rest of the country and the region. The present study focused on understanding the complex stakeholder dynamics including the community of Mandla, local healthcare workers, programme managers, and technical experts. The study has revealed interesting findings related to the effect of vertical health programmes on existing health systems; gaps, challenges, and opportunities for core interventions, and the importance of community participation towards making malaria elimination a reality by 2030.

Keywords: Malaria Elimination, Community Participation, Tribal Malaria

What We Already Know

- India is committed to the Asia Pacific target of malaria elimination by the year 2030. More than 50% of malaria cases are concentrated in the tribal areas of India
- A model Malaria Elimination Demonstration Project (MEDP) was initiated by the State Government of Madhya Pradesh, Indian Council of Medical Research, and Foundation for Disease Elimination and Control of India to demonstratethe elimination of indigenous malaria from one of the highly malaria-endemic tribal district 'Mandla' located in central India. The learnings of this project were envisaged to help the national programme and develop replicable and sustainable models for malaria elimination
- Large-scale model demonstration projects have been recommended by the 'Lancet Commission for Malaria Eradication' with a special focus on operational accountability, monitoring, sustainability, and replicability

What This Article Adds

- This study assesses the qualitative feedback on the model Malaria Elimination Demonstration Project from various stakeholders consisting of malaria-positive cases (community), local healthcare workers,

programme managers, scientists, and technical experts
- The findings of this study reveal the overall performance of the project with a special focus on replicability and sustainability, which is achieved by successful community engagement and integration into the existing health systems
- The study extends beyond the quantitative indices and reveals deep observations through in-person qualitative interviews and guides the future of malaria elimination in India through sustainable interventions

Introduction

Malaria, an ancient vector-borne deadly disease, affected 241 million cases in 2020, which was an increase of 14 million cases from 2019. The disease also claimed 69,000 lives more than the previous year. The increase was mainly attributed to the disruptions caused due to the COVID-19 pandemic.[1] India was the only country amongst the High-Burden to High-Impact group (HBHI) to have reported a decline in malaria cases and deaths even during the pandemic.[1]

In India, during the 15-year period of 2000-2015, the malaria burden was reduced by 44%, whereas, in the last six years from 2015-21, a remarkable reduction of 86.5% was achieved in the malaria prevalence. The annual rate of reduction in malaria burden increased from 3% in 2000-2015 to 14% in 2015-21. In 2021 (provisional), 133 districts reported zero indigenous malaria cases.[2] While the progress is promising, two-thirds of malaria mortality and morbidity is still concentrated in the tribal areas of the country. They are known as the 'heartlands for malaria'.[3]

The National Center for Vector Borne Diseases Control (NCVBDC) is the nodal agency of the Ministry of Health and Family Welfare, Government of India responsible for the elimination of malaria from the country by 2030. Currently, the National Strategic Plan for Malaria Elimination is under development as the present plan comes to an end in 2022. To support the national programme, the Malaria Elimination Demonstration Project (MEDP) was launched in 2016 by the Government of Madhya Pradesh, Indian Council of Medical Research, and the Foundation for Disease Elimination and Control of India (a CSR subsidiary of Sun Pharmaceutical Industries Ltd.) in malaria endemic tribal district of Mandla in the central state of Madhya Pradesh in India. This project achieved a 91% reduction in indigenous malaria within three years of its field operations and ceased the field operations in 2021 after reporting zero indigenous transmission of malaria cases in the district.[4,5]

The success of any disease elimination programme depends on the acceptance by the community for its sustenance and continuity. External aid and special support from partners help in kick starting the initiatives, which must be carefully translated into sustainable community interventions to get the desired results. The present study was conducted to assess the perception and acceptance of the community, local health staff, and scientific and programme experts of the interventions deployed by the MEDP.

Material and Method

Study Sites and Population

The cross-sectional study was conducted in the Mandla district of Madhya Pradesh in India (Figure 1). The state has been divided into ten administrative divisions. Mandla is a part of the Jabalpur Division and the administrative headquarter of the district. The district has an area of 8771 km² and a population of 1,140,765. The Mandla district has 9 development blocks and 1233 villages. Most of the population is tribal including Gonds. The study population consisted of residents of Mandla district, Accredited Social Health Activists (ASHAs), Auxiliary Nurse Midwives (ANMs), malaria supervisory staff and programme manager from the Government of Madhya Pradesh, technical and programme experts from ICMR NIRTH and MEDP. The inclusion criteria included those who were able and willing to provide informed consent and the requisite information.

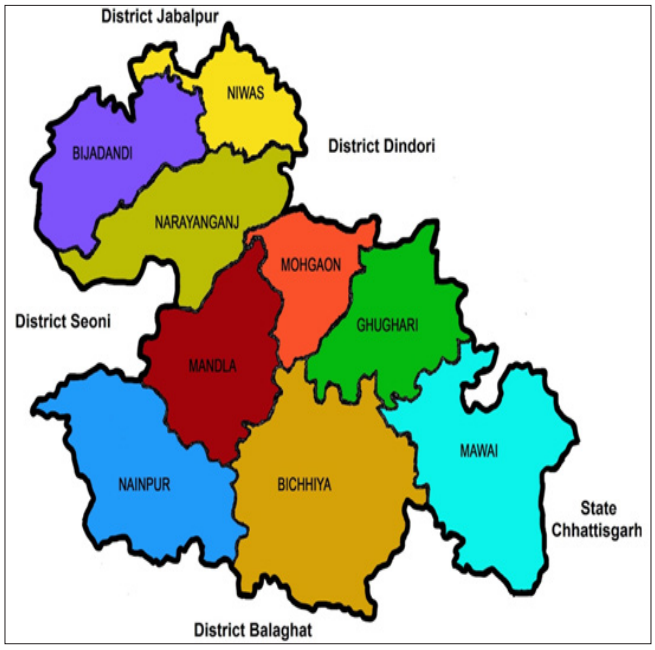

Figure 1.A Map of the Study District 'Mandla' Showing the Nine Blocks in different Colours along with Neighbouring Districts and States

Sampling

From the nine blocks of Mandla district, a list of all sub-centres having malaria cases in 2019 was obtained and they were included as study units. Malaria cases in 2019 were reported from 71 sub-centres having a total population

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of 2,75,764. The 71 sub-centres were divided into nine groups corresponding to their nine blocks. A total of 86 villages had positive cases from these sub-centres. Study subjects were enrolled from one village each from each sub-centre. Villages having the highest number of positive cases or highest population (in case of the same number of positives) were selected from these 71 sub-centres. The total number of selected villages was 71. Two types of assessments were performed from these samples. For the quantitative assessment, one ASHA and one ANM from each sub-centre and all malaria-positive cases in 2019 were selected for the interview. The findings from the quantitative assessment were published as part of a separate manuscript. For the present study, the qualitative assessment was performed through in-depth interviews, that were used to collect data from a sample of 10 ASHAs, 10 ANMs, three MTS (Malaria Technical Supervisor)/MI (Malaria Inspector), one DMO (District Malaria Officer), three technical and programme experts from ICMR NIRTH and MEDP, and 30 malaria positive cases of 2019. These samples were equitably and randomly distributed in all nine blocks from 71 villages of Mandla district.

Analysis

The manual thematic analysis technique was used for data analysis. The interviews were transcribed and validated using the corresponding voice recordings. A pilot survey was conducted to validate the survey tools and to sensitise the team on the study procedures and complexities that might arise during data collection, following which, the transcripts and the embedded quotations were translated into English language by the principal investigator, who is fluent in the language of original recordings (Hindi) and English. The transcribed data were further verified with the voice recording to ensure the accuracy of the transcription.[6]

Further, the transcribed notes were coded using grounded theory,[7] and themes were identified and recorded in Microsoft Excel 365. The respondents were asked to rate the work of MEDP staff in different areas against a maximum score of 100. Likert scale was also used for the assessment of the level of satisfaction of respondents for various services provided by MEDP.[8]

Result

Background Characteristics of the Respondents

This study comprised a total of 57 in-depth interviews. The gender distribution of the respondents was 54.30% females and 45.6% males. More than half of respondents (64.90%, 37/57) belonged to the Scheduled Tribes, followed by 14.03% (8/57) belonging to Scheduled Caste, 10.52% (6/57) belonging to Generalcaste and 7.01% (4/57) belonging to Other Backward Castes groups. For ASHAs, the mean age was 33.96 years and their educational qualification ranged from class 8th to graduate. For ANMs, the mean age was 39.38 years with education varying from class 12th plus diploma to graduation. For MTS/MI, the mean age was 42.50 years and all were graduates. The DMO/DVBDC mean age was 35 years with post-graduate qualification. For malaria-positive cases, the mean age was 36.5 years and education ranged from illiterates to graduates. For technical/programme experts, the mean age was 54.5 years with education ranging from post-graduation to doctorate (Table 1).

Table 1.Socio-demographic Findings of the Study Participants

Participants (N)	Sex		Caste Category				Age (Years)			Education	
	M	F	ST	SC	OBC	GEN	Mean	Min	Max	Min	Max
ASHAs (10)	0	10	8	1	1	0	33.96	28	52	8th	Graduate
ANMs (10)	0	10	7	2	0	1	39.38	32	56	12+Diploma	Graduate
Malaria-positive cases of 2019 (30)	19	11	22	5	2	1	36.50	26	54	No formal education	Graduate
MTS/MI (3)	3	0	2	0	1	0	42.50	34	55	Graduate	
DMO/DVBDC (1)	1	0	0	0	0	1	35.00	35	35	Post-graduate	
Technical and programme experts (3)	3	0	0	0	0	3	54.50	40	62	Post-graduate	Doctorate
TOTAL	26	31	37	8	4	6					

Perception of Frontline Workers (ASHAs and ANMs) towards the Frontline Staff of MEDP

ASHAs acknowledged the role played by MEDP field staff in extensive outreach and the coordination of MEDP with the government health system. However, they highlighted a conflict of interest. ASHA is an incentive worker, and when a malaria case was identified by a MEDP malaria worker, the incentive due to ASHA for identifying and treating a malaria patient was lost to her. Also, it was pointed out that providing training to health workers was not enough and

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systemic issues like the availability of test kits and medicines with ASHA needed to be streamlined for the training to have any substantive impact on malaria elimination.

"During the MEDP period, people called MEDP workers when they felt sick. However, we were never been informed so we lost our incentives." (ASHA 1)

"MEDP workers always had sufficient stock of drugs and diagnostics whereas sometimes we faced stock-out of drugs and diagnostics." (ASHA 2)

Perception of the Malaria-Positive Cases towards MEDP

The community members reported a high level of satisfaction with the services provided by MEDP. A key highlight was the availability of test kits for diagnosis and drugs for treatment. The community was also found to be well-versed in the causes and preventive measures of malaria. Clean surroundings, removal of stagnant water, and use of bed nets were cited by most malaria-positive patients as the means to control malaria spread.

"During the MEDP period, we got the treatment at our doorstep. Now that the MEDP is closed we have to visit Mandla for treatment, which is about 35 km away. This is not only expensive but time-consuming as well. Most of the time two or three visits are required for complete treatment."(Malaria-Positive Case 1)

"A few years ago, when MEDP did not exist, almost every family suffered from fever with chills and rigour due to malaria. Now there is no malaria case to our knowledge."(Malaria-Positive Case 2)

Perception of the MTS/ MI towards MEDP

Malaria Inspectors/ Malaria Technical Supervisors agreed that MEDP has been a catalyst for the rapid decline of malaria cases in the district. They also acknowledged that MEDP had integrated itself well with the government health care system at the grass-root level and that the MEDP field staff had good coordination with the government health workers (ASHA/ANM/ICDS workers). They credited MEDP for developing systems of active surveillance which resulted in early diagnosis and prompt treatment at the doorstep. The malaria patient load on the government's secondary/ tertiary health facilities was significantly reduced.

"Due to prompt diagnosis and treatment provided during MEDP, the transmission was checked and patients recovered early and serious illnesses did not develop. Their regular access to hard-to-reach areas was indeed impressive." (MI/ MTS 1)

"ASHA/ ANM have multiple health programmes to manage, while the MEDP personnel were focused on malaria, this has resulted in much better targeting on malaria elimination."(MI/MTS 3)

Perception of the DMO/ DVBDC and Technical/ Programme Officers towards MEDP. The role of MEDP including the robust accountability and monitoring systems developed by the project was appreciated by the programme officers. The additional manpower deployed as part of the project was attributed as a key driver towards the drastic decline of malaria in the district by 70% of the respondents (40/57). The efforts of the project towards developing a plan to integrate the best learnings into the existing system with no additional cost were noted by very few respondents (17.5%, 10/57).

"MEDP Mandla work was good. NGOs should come forward to eliminate malaria. Government health staff are involved in multiple health programmes, so separate human resources are a mandatory requirement for elimination."(DMO)

"As per my experience, MEDP has beautifully managed everything, not only the surveillance and treatment parts, but also preventive care such as IEC/ BCC and capacity building. They have demonstrated that malaria elimination is possible if the country has the commitment to do so."(Scientist 1 from ICMR NIRTH)

Key Observations regarding the Indoor Residual Spray (IRS) as a Vector Control Intervention

All the respondents reported that IRS is a key vector control intervention used by the national programme in selected areas as per their Annual Parasite Incidence (API). The other tool is the Long Lasting Insecticidal Nets (LLINs). However, two out of three technical experts mentioned that untrained manpower, poor monitoring, inadequate coverage, and erratic community acceptance were the pressing challenges against optimal utilisation of the IRS in the district. MEDP helped resolve these challenges by providing supportive supervision, ensuring the training of manpower, community awareness activities to improve acceptance, and working with the state to plan the IRS rounds effectively and efficiently.

"Some years, the rains may come early, and some years rain may come late, so if we fix a time, then IRS may have less impact. We should tailor the strategies based on monsoon forecasts." (Scientist 1 from ICMR NIRTH)

"Mosquitoes are developing in various areas, so they are developing rapid resistance to insecticides. Only one insecticide cannot fulfil our requirements, so it should be replaced from time to time. IRS is not efficient in tribal areas because of poor coverage, which should be at least 80%. Hence, we should focus more on LLINs." (Scientist 2 from ICMR NIRTH)

Overall Stakeholders' Perception towards MEDP

All the stakeholders gave high marks (80-100 range) towards the work performance of MEDP field staff. The

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roles and responsibilities included disease surveillance, case management, IEC/ BCC activities, capacity building, and monitoring of vector control activities. Regarding the conduct and behaviour of the MEDP field staff, the stakeholders scored them in the range of 88-100 marks. MEDP actively assisted the Government of MP in other health activities beyond malaria elimination and was rated between 66 and 92 marks. The stakeholders were also asked to rate their satisfaction (Likert scale) with the overall performance of MEDP from NS (not satisfied) to HS (highly satisfied). A total of 67% of ASHAs were satisfied, 67% of ANMs were highly satisfied, 55% of malaria-positive cases were highly satisfied, all MTS/ MI were highly satisfied, DMO/ DVBDC was satisfied, and 66% of technical and programme experts were satisfied. None of the respondents reported a performance below 'satisfied' (Table 2).

Table 2.Results of the Analysis of Qualitative Responses received from Various Study Groups and their Rating into a 'Satisfaction Scale'

Stakeholders	N	Average Score Out Of 100					Satisfaction Scale (%)				
		Work performance of MEDP Staff	Behaviour of MEDP Staff	IEC/ BCC activities	Capacity building of frontline health workers	Assistance in other health activities	NS	SS	Neu-tral	S	HS
ASHAs	10	82	96	75	82	75	0	0	0	67	33
ANMs	10	74	100	70	NA	92	0	0	0	33	67
Malaria-positive cases of 2019	30	88	98	89	NA	77	0	0	0	45	55
MTS/MI	3	100	100	90	NA	66	0	0	0	0	100
DMO/DVBDC	1	83	91	83	66	73	0	0	0	100	0
Technical and programme experts	3	80	88	72	53	81	0	0	0	66	33
NS:Not satisfied, SS: Somewhat satisfied, S: Satisfied, HS: Highly satisfied											

Few respondents (0.05%, 3/57) reported lapses in surveillance by MEDP due to the irregular presence of field staff in hard-to-reach areas. Since some of the community members were not always present at their residences due to work commitments, instances of missed tracking of these individuals were also reported.

"Each MEDP village worker had to work in 4 to 5 villages and they were late because of the distance between the villages. By this time, the villagers had gone to work and were missed by the workers. There was also an irregular presence of field staff in hard-to-reach areas."(MTS 1)

Discussion

This study was conducted for the assessment of community-based strategies under the Malaria Elimination Demonstration Project (MEDP) for the reduction of malaria cases in a tribal district of Madhya Pradesh, India. The MEDP has published the learnings from the project including detailed operational and technical findings.[4,5,9,18] Despite the impressive reduction in malaria cases and achieving elimination of transmission of indigenous malaria within four years of field operations, it was important to assess the project's performance through qualitative assessments of the community.

In this study, it was noticed that the work of MEDP in Mandla district through its Village Malaria Workers posed a challenge towards malaria diagnosis and treatment incentives of the ASHAs. As per the guidelines of the National Health Mission, the ASHAs are not paid a flat remuneration but receive an incentive for delivering maternal and child care services, immunisations, diagnosis and treatment of malaria etc.[19]

These incentives are INR 15 [0.19 USD (INR 1=0.013 USD)] for diagnosis of malaria and INR 75 (0.98 USD) for providing complete treatment of each malaria-positive case as per national and state guidelines.[20] As compared to the incentive-based model of the NHM, the Village

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Malaria Workers of the MEDP Mandla were paid monthly remunerations, irrespective of the number of fever cases screened or malaria cases treated. The duties extended beyond diagnosis and treatment, and included supportive supervision for vector control interventions, capacity building of the ASHAs, assisting the state with other health programmes, social and behavioural change communication activities etc.[5] It is worth mentioning that MEDP also focused on capacity building of the ASHAs by conducting a needs-assessment survey in Mandla district, followed by the development of a customised job-aid for the ASHAs, and training them in malaria elimination strategies.[16]

The inadequate health-seeking behaviour of the communities residing in tribal areas due to poor awareness, insufficient health infrastructure, hard-to-reach areas, and lack of trust towards the formal healthcare system in the community has been previously documented.[21,23] The project has worked extensively toward improving the community's knowledge and understanding of malaria treatment and prevention modalities.[4,5,21] The findings of the present study validated these claims. Lessons from other disease elimination programmes such as 'polio' inform us of the importance of building a self-reliant community to sustain disease elimination efforts.[24]

The development of a robust and sensitive surveillance system to ensure early diagnosis and treatment is the key to malaria elimination. Several countries such as China, and Sri Lanka have tested different strategies which embody the same principle and have been successful in the elimination of malaria and prevention of reintroduction.[25,26] In order to develop such a system, MEDP used additional manpower and this was seen as a potential challenge towards the replication of strategies in other parts of the state and the country. This issue has been raised repeatedly at multiple forums, however, MEDP has developed and proposed a plan that addresses these challenges and ensures the replication of best practices at no additional cost.[15]

It should be also noted that the last mile of elimination requires significant resources because a thorough investigation of each case is required. In such scenarios, the authors of the present study recommend the introduction of additional manpower in selected districts based on their categorisation as per the national plan.[27] This manpower will assist the overburdened ASHAs and help them prioritise malaria elimination efforts in their villages. However, we will have to be careful to ensure a smooth integration of this additional manpower with the already existing health systems, similar to the strategy of MEDP, where they regularly assisted the state government in activities (immunisations, larval surveys etc.) beyond malaria elimination.

The present study reported dissatisfaction with the Indoor Residual Spray practised as a vector control intervention in the district. In another study published by the project, the authors attempted to improve the spray acceptance and technique of the IRS through supportive supervision and achieved promising results. The authors reported a 44% increase in proper spraying preparations, 32% improvement in spraying technique, improvement in 30-day post-spraying mosquito knockdown rate through cone-bioassays, and reduction in reported side-effects of using IRS and LLINs with proper awareness and counselling of the community.[13,14]

Conclusion

The high levels of satisfaction (more than 80%) from the community and public health system towards the services offered by MEDP Mandla have provided proof of the potential success of large-scale disease elimination demonstration projects. The rating of more than 75/100 towards the assistance of public health systems towards other health programmes has shown that the MEDP project can be translated and replicated in other settings. The uptake of services by the community remains the best way to achieve and sustain disease elimination. Additionally, the mechanism of monitoring and accountability demonstrated in Mandla can serve as the bedrock of India's malaria elimination journey by 2030.

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Abbreviations

ASHA: Accredited Social Health Activist; CQ: Chloroquine; FDEC: Foundation for Disease Elimination and Control of India; GoMP: Government of Madhya Pradesh; ICMR: Indian Council of Medical Research; IEC: Institutional Ethics Committee; MCH: Maternal and Child Health; MEDP: Malaria Elimination Demonstration Project; NHM: National Health Mission; NIRTH: National Institute of Research in Tribal Health; NVBDCP: National Vector Borne Disease Control Programme; OBC: Other Backward Caste; SC: Scheduled Caste; SPSS: Statistical Package for Social Sciences; ST: Scheduled Tribe; WHO: World Health Organization.

Ethical Clearance

This study was cleared by the Institutional Ethics Clearance

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