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IMPLICATIONS OF SOCIAL FACTORS IN CONTROLLING MALARIA: A STUDY OF KALYANSINGHPUR BLOCK OF RAYAGADA DISTRICT, ODISHA

Public Health

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ABSTRACT

Rayagada district of Odisha is one of the high malaria burden districts of Odisha for the last two decades. Although, the API has come down from 64.85 in 2016 to 2.58 in 2022, malaria transmission continues to be persisted despite so many interventions. Therefore, there is need for better understanding of these social aspects w.r.t. for prevention and control of malaria. The study used a cross sectional mixed method approach i.e. used Lot Quality Assurance Sampling (LQAS) method for collecting data from 95 respondents across five supervision areas, along with analysis of malaria data and qualitative surveys like Focus Group Discussion(FGD) and Key Informant Interview(KII). The study analyses the correlation and linkages between various socio-cultural-economic factors for acceptance of different malaria control interventions. The study revealed that impoverish housing conditions, dependence on forest livelihood, shifting cultivation, outside sleeping makes the people more vulnerable to mosquito biting. Illiteracy, traditional socio cultural practices, dependence on traditional healers makes the tribal people more risky for malaria infections. There is a need to think about socio-cultural factors, health seeking behavior, community mobilization, area specific communication strategy, strategy to integrate traditional health care personnel in the malaria control programme to eliminate malaria from high burden tribal districts

KEYWORDS

Annual Parasite Incidence(API), Long Lasting Insecticidal Nets(LLINs) , Indoor Residual Spray(IRS), Malaria, Social Determinants, Tribal Health

INTRODUCTION

Malaria is an infectious disease caused due to bite of infected female Anopheles mosquito that may many times leads to acute life threatening disease and also it is poses a major global health threat. [1] Malaria also continues to remain a major public health concern despite World Health Organization (WHO) initiatives of removing India from the category of High Burden to High Impact (HBHI). The malaria burden in India characterized by tribal, remote, inaccessible, forested regions, who contributes disproportionate burden of Malaria. The case of Odisha is very same as it has many tribal, remote, inaccessible, forested regions, contributes 80% of the total malaria cases to the total cases of the State. Odisha has historically contributed a significant share India's malaria cases despite a sharp reduction from 2017 to 2022. The sharp decline was due to universal distribution of Long Lasting Insecticidal Nets (LLINs) in high malaria districts, implementation of Durgama Anchalare Malaria Nirakaran (DAMaN), improved awareness generation & community mobilization and strengthening surveillance. Despite this progress of declining malaria situation, three was resurgence of malaria cases from 2023, pointed out the possible vulnerabilities at the village level.

The story of Rayagada district is very much similar to the State of Odisha. Rayagada district is located in southern Odisha, having predominantly tribal, geographically remote, and socio-economically disadvantaged. Traditional socio-cultural beliefs, migration, low literacy. dependence on forest based livelihood etc generally shapes the health behavior of the people and influence the apprehension of malaria control intervention. Kalyansinghpur block of Rayagada district is also one of the high malaria burden block having tribal dominated population including Particularly Vulnerable Tribal Groups (PVTGs). This block remains vulnerable to malaria due to complex social, cultural and economic determinants that influences malaria prevention, control and transmission. The trend of Malaria over the last 10 year is same for Rayagada district and Kalyansinghpur. The epidemiological data of both the units given below;

Figure 1*:

Year	Rayagada			Kalyansinghpur		
	Malaria Positive	TPR	API	Malaria Positive	TPR	API
2015	68791	20.10	65.31	1106	2.01	15.88
2016	69867	18.92	65.22	5966	20.37	88.92
2017	52990	16.29	48.86	4472	15.14	66.27
2018	5128	1.99	4.73	655	2.34	9.71
2019	5719	1.89	5.25	474	1.61	6.96
2020	5392	1.63	4.95	470	1.36	6.91
2021	2790	0.70	2.50	266	0.53	3.82
2022	4998	1.01	4.48	318	0.63	4.57
2023	9925	1.70	8.89	653	1.20	9.38
2024	13835	2.19	12.36	1106	2.01	15.88

*Data Source: NVBDCP Odisha

So far as malaria transmission is concerned, people believe that they have strong body so they would not be effected by malaria. Being active, working hard, eating hot and spicy food, malaria can be flushed out [2]. People perceive that weak or low immune system due to one reason or other are the causes of malaria infection [2]. The cold and rainy weather also considered as factors for malaria transmission [2].

Socio-cultural factors plays an important role providing amenable environment for transmission of malaria due to peoples style of living, beliefs & practices, behavior, education, economic status etc. These factors influence malaria transmission in both low socio-economic groups and high socio-economic groups [3]. Myths and misconception on malaria are common among the population which is more in the tribal communities. Tribals believe that there is powerful correlation between supernatural forces and malaria [4]. In the African country like Kenya and Gambia, it is believed that malaria in case of children supposed to be contracted due to devil or evil spirit[5].

People refused to do Indoor Residual Spray (IRS) for vector control for

malaria die to bad smell, very inconvenient, waste of time to shift the goods & logistics and as people are not aware of benefits of IRS, they think it useless[4]. The malaria control strategies should be communicated from top to bottom to the panchayat level and community should be major driver of the preventive aspect of the malaria programme [3].

Studies of similar kings have demonstrated that positive correlation between malaria and type of houses. Poor housing and the roofing materials of a house is significantly associated with risk of malaria among children less than five years of age [5, 9] . The major associated factors with malaria transmission in Sub Saharan Africa are socio-demographic factors i.e. age, gender, education, occupation, income and geographical location. The housing factor also associated with malaria transmission [6] . The behavior change communication(BCC) strategy, which is considered as fundamental tool used for malaria prevention is not making such huge impact in high malaria transmission areas. However, BCC campaigns will definitely crate demand generation for use of LLIN and allow to have IRS in the community for prevention and control of malaria in tribal and rural settings[6] .

Apart from educating community, there is also need of understanding the behavior of community [7]. Together with affordability, acceptability and compliance are also equally important form the provider's point of view[8]. Although various studies have been done to find out the and investigate the risk factors for malaria , but very few studies have been done to investigate social factors affecting malaria in particularly in India [10].

As social factors plays a determinate role in prevention and control of malaria, the present study was undertaken to investigate the selected social factors and its implication for the malaria programme. This study explores the implications of social factors on malaria control in Rayagada district, with a focused assessment in Kalyansinghpur block.

Rationale & Objectives

Various studies have demonstrated that malaria transmission in tribal areas is strongly associated with poverty, low educational attainment, forest-based occupations, and limited access to health services. Knowledge-Attitude-Practice (KAP) gaps are common, where awareness of malaria does not necessarily translate into sustained preventive behaviours. Resistance to IRS, improper use and maintenance of LLINs, and reliance on traditional healers has been reported across tribal settings in central and eastern India. Literature further emphasizes that elimination strategies must integrate social and cultural dimensions alongside biomedical interventions to achieve durable impact.

Objectives

- To identify key social factors influencing transmission of malaria and its control in Rayagada.
- To assess implications of these factors for ongoing elimination efforts.
- To recommend community-focused interventions.

Study Area

The study was conducted in Kalyansinghpur block of Rayagada district, Odisha. The block has a population of approximately 71,703, with Scheduled Tribes constituting around 64% of the population. Literacy stands at about 60%. The block comprises 226 villages served by 18 sub-centers. The terrain is largely forested and hilly, contributing to high potentiality of malaria transmission and logistical challenges for health service delivery.

Methodology

The study adopted a cross sectional mixed method design to provide a snapshot of social determinants of malaria control programme. Along with quantitative, qualitative data were also collected employing various tools. Structured interview schedules were used for getting quantitative data and Focus Group Discussions (FGDs), Key Informant Interviews (KIIs) were used for collecting qualitative data. So far as sampling methods is concerned, the study used Lot Quality Assurance Sampling (LQAS) method to assess the performance of the programme as well as practices of community with relation to social factors. As minimum 95 samples were required to estimate the average coverage of supervision areas[12], the Kaynasinghpur block was divided equally in to five supervision areas. With the aim of dividing the block into five supervision areas, geographically representative sampling method was used involving segmentation based on population distribution and physical boundaries[11] . As per LQAS methodology, 19 Samples from each supervision areas were selected making it to the total sample size of 95, the sample size ensured a confidence interval > $\pm$10, which allowed classification of supervision areas [13] .

Study Variables: The study used both dependent and independent variables

Dependent Variables: Questions on knowledge on malaria like cause, transmission, sign & symptoms, prevention, diagnosis & treatment, breeding sites, vector control measures, trust in health workers, acceptance of use of LLIN and IRS, severity of malaria, LLIN use & maintenance, IRS, fever management, use of govt. health services, source reduction were used as dependent variables

Independent Variables: Socio demographic and economic data like age, sex, gender, education, occupation, house type were used as independent variables.

Qualitative Data Collection: The present study used FGD and KII for qualitative analysis of social factors of malaria control programme. Through FGDs, the study tried to explore collective views, social norms, practices, common understandings and diverse practices. Through KII, expert onions, identification of key problems & challenges and community dynamics were gathered. A total of 5 FGDs were conducted i.e. one each in one supervision areas. The village as a unit was selected for FGDs. Out of five villages, three villages' high malaria burden and the remaining two are low malaria burden. The main purpose of the FGD was to investigate the local perception and identification of barriers. 20 respondents were chosen for the KKI. The respondents for the KKI were, 4 PRI members, 2 most active members of Gaon Kalyan Samiti (GKS) i.e. ASHA and Anganwadi worker, 2 Self Help Group (SHG) members, 5 front line health workers, ANM, male health worker & Community Health Officers, 2 local community opinion leader/influencer, 1 Vector Borne Disease Technical Supervisor, 1 Public Health Communication Officer, 1 Multipurpose Health Supervisor and 2 Medical Officers.

Data Collection: The study used a structured interview schedule adopting questions pertaining socio, demographic & economic status and questions relating to social factors mostly relating to Knowledge, Attitude and Practice related to malaria prevention and control. The interview schedule consists of four sections which are as follows;

1. Socio demographic & economic characteristics.
2. The second part consists of knowledge and perception of about malaria
3. The third part attitude towards malaria.
4. The fourth part is health seeking behaviors

Data Analysis and Synthesis:

Quantitative data were analyzed by using SPSS2 and descriptive statistics i.e. mean, median & proportions for deriving percentage and frequencies. Chi square test and Likert scale was used determine the correlation between socio demographic variables and Knowledge Attitude & Practice outcomes. Interview guides used for conducting FGDs and the entire process of FGDs were recorded with permission of the members participated in the FGDs. The outcomes of the FGDs were transcribed into English language for analysis. The FGD outcome and quantitative data were synthesized to find out the various implications on malaria programme.

Ethical Consideration and Data Collection Method

As the study was conducted by health department officials, so ethical consideration was not required. However, written informed consent was obtained from all the respondents for the study. The respondents were explained in detail regarding the purpose of the study.

RESULTS

Socio-Demographic and Economic Profile of the Respondents

A total of 95 respondents were included in the study. The age distribution showed that the largest proportion of respondents belonged to the 29–39 years age group (31%), followed by 40–50 years (25%). Respondents aged 18–28 years constituted 14%, while 17% were in the 51–61 years age group. Elderly respondents aged above 61 years accounted for 13% of the study population.

Regarding sex distribution, 55% of the respondents were male and

45% were female. In terms of educational status, the majority of respondents had primary education (64%), while 23% were illiterate and only 13% had education primary level and above.

Caste-wise distribution revealed that a predominant proportion of respondents belonged to the Scheduled Tribe (ST) category (68%), followed by Scheduled Castes (SC) (22%), and other categories (10%). Occupational status showed that most respondents were engaged in agriculture and forest-based activities (77%), whereas 14% were unemployed and 9% were involved in other occupations.

Housing conditions indicated that a substantial majority of respondents (77%) resided in kuccha houses, while 23% lived in pucca houses, reflecting the overall low socio-economic status of the study population. There is more risk of biting of mosquitoes in kuchha houses. There is need of intensified malaria control interventions like regular use of LLINs, quality IRS as well as convergence with housing improvement scheme.

Table 1: Socio-Demographic and Economic Profile of Respondents (N = 95)

Variable	Category	n	Percentage
Age group (years)	18–28	13	14
	29–39	30	31
	40–50	24	25
	51–61	16	17
	>61	12	13
	Total	95	100
Sex	Male	52	55
	Female	43	45
	Total	95	100
Education	Illiterate	22	23
	Primary	61	64
	Primary & above	12	13
	Total	95	100
Category	ST	65	68
	SC	21	22
	Other	9	10
	Total	95	100
Occupation	Unemployed	13	14
	Agriculture/Forest produce	73	77
	Other	9	9
	Total	95	100
House type	Kuccha	72	77
	Pucca	23	23
	Total	95	100

Knowledge About Malaria

Among the 95 respondents, 77 (81%) correctly identified mosquito bites as the mode of malaria transmission. However, misconceptions persist, as 16 (17%) attributed malaria transmission to polluted water and 2 (2%) cited other causes. Regarding mosquito biting time, 72 (76%) respondents correctly reported night-time biting, while 21 (22%) believed mosquitoes bite during the daytime and 2 (2%) were unsure.

Knowledge of malaria signs and symptoms was moderate, with 73 (77%) respondents identifying fever as a key symptom, followed by headache reported by 14 (15%), while 8 (8%) mentioned other symptoms. Awareness of mosquito breeding sites showed that 71 (75%) respondents correctly identified clean stagnant water as breeding sites, whereas 15 (16%) believed mosquitoes breed in dirty or polluted water and 9 (9%) had no knowledge.

In terms of preventive measures, 74 (78%) respondents reported the use of bed nets or LLINs for malaria prevention, while only 8 (8%) mentioned indoor residual spray (IRS), and 13 (14%) reported other preventive methods. Awareness regarding the consequences of untreated malaria was relatively high, with 72 (76%) respondents reporting death and 16 (17%) reporting complications, although 7 (7%) were unaware of the outcomes.

Table 2: Knowledge About Malaria of Respondents (N = 95)

Knowledge Domain	Response	n	%
Mode of transmission	Mosquito bite	77	81
	Polluted water	16	17
	Other	2	2
	Total	95	100
Mosquito biting time	Night	72	76
	Day	21	22
	Don't know	2	2
	Total	95	100
Signs and symptoms	Fever	73	77
	Headache	14	15
	Other	8	8
	Total	95	100
Mosquito breeding sites	Clean and stagnant water	71	75
	Dirty/polluted water	15	16
	Don't know	9	9
	Total	95	100
Preventive measures	Sleeping under bed net/LLIN	74	78
	Indoor residual spraying (IRS)	8	8
	Other	13	14
	Total	95	100
Outcome if not treated early	Death	72	76
	Complications	16	17
	Don't know	7	7
	Total	95	100

Attitude Towards Malaria

As shown in Table 3, 60% of respondents perceived malaria as a severe and life-threatening disease, whereas 36% considered it to be not serious. With respect to treatment-seeking behaviour, 60% reported a preference for government health facilities, while 40% sought care from traditional healers or private healthcare providers. Nearly two-thirds of respondents (67%) acknowledged the need for malaria preventive measures. Despite this, willingness to accept indoor residual spraying (IRS) remained low, with only 45% expressing acceptance, while 55% were not in favour of IRS.

The findings indicate that a significant percentage of the population underestimates the severity of malaria, which may contribute to delays in timely care-seeking. The continued influence of traditional healers highlights their important role within the community and suggests the need to engage them as partners in early referral of malaria cases. Furthermore, inconsistent risk perception underscores the necessity for targeted behaviour change communication strategies. The high level of resistance to IRS emphasizes the importance of sustained community engagement and trust-building efforts to improve acceptance of vector control interventions.

Table 3: Attitude Towards Malaria of Respondents (N=95)

Attitude Domain	Response	n	%
Perceived severity of malaria	Severe & life-threatening	57	60
	Not a serious disease	38	36
	Don't know	5	4
	Total	95	100
Treatment-seeking behaviour	Government health service provider	57	60
	Traditional healer / private provider	38	40
	Total	95	100
Need for preventive measures	Preventive measures required	64	67
	Not required	31	33
	Total	95	100
Attitude towards IRS	Want IRS in the house	43	45
	Do not want IRS	52	55
	Total	95	100

Results: Practice Towards Malaria

According to the survey findings, approximately two-thirds (67%) of participants reported that they slept under a long-lasting insecticidal net (LLIN) on the last night. Indoor residual spray (IRS) coverage was lower, as only 49% of households allowed spraying during the most recent campaign. In contrast, 37% refused spraying and 14% were not present at the time. Among households that accepted IRS, just over half (51%) prepared their homes by plastering the walls with mud prior to spraying.

With regard to health-seeking behavior, 62% of respondents reported using government health facilities for treatment, while the remaining 38% sought care from traditional healers or private providers. In terms

of LLIN care practices, most respondents (84%) stated that they washed their nets more than three times in the previous six months; however, only about half (52%) adhered to recommended washing and drying procedures. Participation in community sanitation activities was reported by less than half of the respondents (44%), suggesting that community participation in vector control interventions remains limited.

Table 4: Practice for Malaria Prevention of Respondents (N = 95)

Practice Domain	Response	n	%
Slept under LLIN last night	Slept	64	67
	Not slept	31	33
	Total	95	100
Allowed IRS during last round	Allowed	47	49
	Not allowed	35	37
	Absent	13	14
	Total	95	100
Mud plastering of walls for IRS*	Mud plastered	26	55
	Not mud plastered	21	45
	Total	47	100
Health service utilization	Government health service provider	59	62
	Traditional healer/private provider	36	38
	Total	95	100
Frequency of washing LLIN	>3 times in last 6 months	79	84
	<3 times in last 6 months	8	8
	Other	8	8
	Total	95	100
Washing and drying of LLIN	Correct	49	52
	Not correct	46	48
	Total	95	100
Participation in sanitation drive	Participated	42	44
	Not participated	53	56
	Total	95	100

Results of Qualitative Analysis: The results of the qualitative analysis were derived from the 20 KIIs and 5 FGDs.

The study revealed limited interest and engagement of men in malaria prevention activities, as evidenced by their minimal involvement during initial programme implementation. This lack of participation and sense of ownership contributed to the perception that malaria primarily affects others, particularly women, children, and older adults. Consequently, men were more likely to spend extended periods in outdoor social spaces, including local gathering points, without adopting personal protective measures against mosquito bites.

Access to health services emerged as another major barrier. Respondents reported travelling long distances to reach healthcare facilities and lacking financial means for transportation or private care. Poor road infrastructure, weak mobile network coverage, and limited access to digital information further restricted healthcare utilization. These barriers discouraged timely health-seeking behaviour and, in some cases, reinforced reliance on traditional preventive practices and home-based remedies practiced discreetly within communities.

Practical challenges were also noted in the use of bed nets within traditional housing structures, where sleeping arrangements made it difficult to properly hang nets. Moreover, mosquito nets were not always perceived as an immediate priority, as households faced competing needs.

The government efforts of engaging community in the malaria control programme have lost its momentum over the years. Malaria programme at the village level lost its primary focus due to over burden of programme with ASHA workers. Although the Gaon Kalyan Samiti (GKS) is headed by Ward Members, many a time ward members are not playing active role in functioning of GKS.

DISCUSSION

The social factors play a key role in prevention and control of malaria[14] .The present study also highlights significant influence of social determinants in prevention and control of malaria. Despite there is moderate to good knowledge on various aspects of malaria programme, persistent socio cultural factors emerge to halt the adoption of preventive practices and utilization of interventions that are required for control of malaria. Similar findings were also reported in other studies across the world mainly in Africa and India [15,16] .

Educational attainment emerged as a critical social determinant influencing malaria-related knowledge and preventive practices [17] . The high proportion of respondents with limited formal education appears to have contributed to persistent misunderstandings about malaria transmission, mosquito breeding habitats, and appropriate care and upkeep of long-lasting insecticidal nets (LLINs). Low literacy levels may also hinder effective understanding of routine information, education and communication (IEC) messages, thereby constraining the adoption of recommended preventive behaviours.

Socio-economic factors, particularly occupation and housing conditions, also shaped malaria prevention practices [18, 19] . Most respondents were involved in agricultural and forest-dependent livelihoods and lived in kuccha dwellings, both of which increase exposure to mosquito breeding sites and nocturnal vector contact. Substandard housing structures not only elevate transmission risk but also influence the acceptability of vector control interventions, including indoor residual spray (IRS), as reflected in hesitancy to permit spraying and inadequate wall preparation prior to IRS.

Cultural beliefs and customary health-seeking patterns continue to majorly affect malaria control efforts [20] . A notable segment of the population reported reliance on traditional healers or private healthcare providers instead of public health facilities, potentially leading to delays in diagnosis and appropriate treatment. These choices are often shaped by social trust, ease of access, and perceived quality of care, especially in tribal and rural contexts.

Gender dynamics and levels of community involvement also surfaced as important social considerations [21] .Although participation across genders was relatively balanced, engagement in sanitation and vector control activities remained limited. Factors such as prevailing social norms, competing livelihood demands, and a lack of perceived ownership of malaria control programmes may contribute to weak community participation in collective preventive actions.

The resurgence of malaria cases in Rayagada as well as in kalyansinghpur which has shown sharp decline from 2017 to 2022 pointed out the weakness of malaria elimination gains as the social factors are not addressed properly and effectively. Various literatures mentioned that as malaria transmission declines and the residual cases clusters among the socially and economically marginalized groups [22] . In the absence of socially supported strategies, the high malaria burden pockets may continue with heavy malaria transmission and resurgence.

Poverty and poor housing increases the exposure to mosquito bites. Low literacy and health awareness became a barrier to seek preventives services and timely health care. Forest based occupation expose the people to night bite by mosquitoes. Villages and hamlets in remote and inaccessible pockets reduce the accessibility of surveillance leading to under reporting.

In summary, the findings demonstrate that malaria control extends beyond biomedical interventions and is strongly influenced by social, cultural, and economic determinants. Overcoming these barriers requires culturally appropriate behaviour change communication, strengthened community engagement, improved accessibility and responsiveness of health services, and coordinated intersectoral efforts to ensure sustainable malaria control and progress toward elimination in endemic regions.

CONCLUSION

It is evident that social along with cultural and economic factors influence to a considerable extent for malaria transmission and control in Rayagada district. Lack of equal access to malaria preventive & curative services, cultural beliefs, reluctance to accept good behavior is undermining the malaria elimination efforts. Keeping the technical aspects of malaria control intact, there is need of paradigm shift i.e. intervention centric approach to micro level localized strategies that integrated the social factors and insights of socially related things. In order to gain sustained high impact, there is need of building trust, community ownership and cultural alignment. The programme needs sustained multi sectoral coordination with other government department like Tribal Welfare, Women & Child Development, Mission Shakti, Education and Forest. Social mapping of vulnerable

communities is highly essential to develop planning and guide intervention. Malaria control in the high malaria burden and tribal areas need to be on the priority list of comprehensive primary health care system.

The success of malaria programme is potentially rests on the quantum of community engagement. The traditional headers and other faith healers should not be treated as enemy of the programme, rather they should be integrated in to the programme to upscale the referral mechanism especially in tribal and remote areas. Interpersonal communication strategy, use of local language/dialect, visual aids which are culturally appropriate should be used. In order to succeed in improving IRS acceptance, there is need of grievance redressal mechanism at the community level with pre IRS discussion with the community.

Integration of social, cultural and behavioural factors need to be integrated into the National Vector Borne Disease Control Programme (NVBDCP) framework for sustain malaria elimination efforts. The foundation of malaria free Odisha are the empowered and informed communities. Further research is required with focus on interventions that address social factors for the prevention and control of malaria [14].

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