



A comparative study about the use of malaria control interventions in Mewat and Rohtak districts of Haryana

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ABSTRACT

Malaria is the disease of poor tropical and subtropical areas of the world especially those countries with poor health infrastructure. The aim of the study is to assess the use of malaria control interventions, by knowledge, prevention and severity in Mewat and Rohtak of Haryana. A cross-sectional study of the local community of 825 respondents from different communities was conducted to determine the responder knowledge in a cluster of six chosen villages in the Rohtak and Mewat region of Haryana, which has a high prevalence of malaria in relation to usage of Insecticide Treated Nets (ITNs) and targeted Indoor Residual Spray (IRS). The obtained results were statistically processed and analysed using STATA version 10 software. It was found that 77.3% of individuals in both study areas had heard about malaria. The data revealed that approximately 32% of respondents in Rohtak study areas and 10% in Mewat study areas were aware of the route of malaria transmission, which was directly related to the level of education. Beside this, 24.1% respondents in Mewat region and 18.9% in Rohtak region had accepted the use of at least one ITN in their households. About 72% of the Rohtak respondents study areas and 47% in Mewat study areas confirmed acceptance for IRS in their households. Therefore, promoting the usage of ITN and acceptance of IRS among communities by quantitative monitoring of these interventions in malaria prone areas could reduce the incidence and prevent the resurgence of malaria in future.

Keywords: Malaria, Rohtak Mewat, ITN, IRS

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INTRODUCTION

Malaria is one of the most well-known and oldest chronic diseases that has been proven to be a frightening impediment to the cultural and socioeconomic growth of human populations in tropical, subtropical, and monsoon-prone areas around the world. It is one of the major public health issues that needs to be addressed in developing countries. There were an estimated 241 million malaria cases and 627 000 deaths due to malaria in the world in 2020 according to World Malaria Report 2021. As there are about 14 million more cases and 69 000 more deaths than in 2019.. India accounted for 83% of estimated cases and about 82% of all malaria deaths in the WHO South-East Asia Region [1]. In Haryana, a study was conducted during 2008-2013 in Rohtak district and Mewat district to analyze the malaria data of six years for observing trends of malaria incidence which reveals that malaria situation in both districts still persists casting a gloomy picture [2]. Moreover, in 1996, Malaria caused 1300 deaths in the Mewat region alone which were reported due to an outbreak [3].

A community-based cross-sectional survey was also conducted to assess attitudes, awareness, and practises toward malaria and its control, as well as respondent knowledge about malaria and other mosquito-borne diseases in a highly malaria endemic cluster of six selected villages in Haryana's Rohtak and Mewat regions. [4]. The study revealed and emphasised the importance of using indoor residual spraying (IRS), insecticide-treated nets (ITNs), and long-lasting insecticide-treated nets (LLINs) to effectively reduce adult mosquito population density and longevity. [5]. Many studies that have been conducted earlier revealed that high

coverage of ITNs and LLINs have effectively reduced malaria transmission up to 90% in a number of settings [6,7,8,9], thereby providing community-level protection [10,11]. However, other studies reported that usage of IRS and ITNs in combination rather than ITNs alone as they are more effective and found to be reducing the vector population and interrupting transmission [12,13,14,15,16].

As per available information, no study has been conducted in Haryana in relation to the effectiveness of using insecticide-treated nets (ITNs) and targeted indoor residual spray (IRS). Hence present study will assess the impact of usage of ITNs and IRS on public health in Rohtak and Mewat Districts of Haryana.

Material and Methods

Study Area

As per Census 2011, Haryana's Mewat district is located between 26° and 30° North latitude and 76° and 78° East longitude, adjacent to Gurgaon, and has a total population of 1,089,263 with an average annual rainfall of 336-440 mm [17], while Rohtak district has a total population of 1,058,683 and is located between 28.89° North latitude and 76.57° East longitude with an average rainfall of 458 mm [18]. The total number of literates in Mewat district is 454,222 (41.7%) [19], while in Rohtak district the number of literates is 749,548 (70.8%) [20]. Both districts experience a rainy season (from July to September), which provides ideal conditions for mosquito breeding and coincides with the peak season for malaria transmission due to high temperatures and humidity. Other important factors in disease transmission include socioeconomic status, poor living conditions, a lack of awareness, sanitation, and education level.

Study Outline

This community-based cross-sectional survey was conducted in six villages between October and December 2013, three in Mewat and three in Rohtak district. The villages were selected based on the data collected from the District Malaria Officer, where more cases were reported during the last five years. The villages selected from Mewat region were Ujina (28.088 N; 77.023 E), Nagina (27.917 N; 76.983 E), Pinangwan (27.9 N; 77.1 E) while from Rohtak district were Kalanaur (28.83 N; 76.4 E), Meham (28.98 N; 76.3 E) and Bhault (28.9 E; 76.7 E). Malaria transmission rate as observed was highest in Ujina village followed by Pinangwan and Nagina as compared to villages in Rohtak district.

Data collection

A suitable sample of 825 respondents from divergent professions and age groups, representing all kinds of the group from all the selected villages of study areas was selected for data collection which investigated the knowledge of malaria; its transmission, prevention and curability; and the ownership and use of ITN along with acceptance for IRS by the respondents in all the selected villages from both study areas using a pre-structured questionnaire. Informed and free consent of all the respondents was obtained prior to the study. The classification for Households was on the basis of ITN.

- If a household did not have any mosquito nets or only had untreated nets, it was classified as not having an ITN.
- Households with at least one ITN for every two people who slept in the house the night before the survey were considered to have a sufficient number of ITNs.

The authors with the help of *Accredited Social Health Activists* (ASHA) workers and others in the selected villages of Rohtak and Mewat districts of Haryana did the data collection.

Statistical analysis

The collected data was statistically analysed using STATA version 10. The Chi-Square test was used to compare characteristics between the villages of Rohtak and Mewat. A P-value of less than 0.05 was deemed significant.

RESULTS

Respondents Knowledge and perception of malaria in relation to usage of ITN and IRS

Of the 825 respondents interviewed from both study areas 638 individuals had heard about malaria. Out of these, only 108 respondents from three selected villages of Mewat district *i.e.* Nagina, Ujina, Pinangwan and 167 respondents from three selected villages of Rohtak district *i.e.* Meham, Kalanaur, Bhault had reported that malaria is a communicable disease. However, there was a significant difference in the number of respondents from both the regions who had knowledge about the route of transmission of malaria in both the regions ($P < 0.05$) (Table 1.1 & 1.2). Further, a large proportion of individuals *i.e.* about 55% from Mewat region and 81% from Rohtak region had mentioned that malaria is a serious disease and a curable disease.

Characteristics	IRS (n=286)	Re-plastered (n=28)	Owns at least one ITN (n=152)	Uses at least one ITN (n=60)	p- value
Heard about malaria (n=374)					
Yes	231 (80.7)	22 (78.5)	139 (91.4)	54 (90.0)	0.012
No	55 (19.3)	06 (21.5)	13 (8.6)	06 (10.0)	
Malaria is a communicable disease (n=167)					
Yes	157 (54.9)	18 (64.4)	72 (47.4)	35 (58.3)	0.001
No	121 (42.3)	05 (17.8)	63 (41.4)	19 (31.7)	
I don't know	08 (2.8)	05 (17.8)	17 (11.2)	06 (10.0)	
Malaria transmission route (n=265)					
Mosquito bite	214 (74.8)	21 (75.0)	86 (56.6)	38 (63.3)	0.003
Others	72 (25.2)	07 (25.0)	66 (43.4)	22 (36.7)	
Malaria is a disease that can be avoided. (n=324)					
Yes	198 (69.3)	20 (71.4)	108 (71.1)	45 (75.0)	0.48
No	62 (21.6)	05 (17.8)	34 (22.4)	08 (13.3)	
I don't know	26 (9.1)	03 (10.8)	10 (6.5)	07 (11.7)	
Malaria is a severe diseases (n=304)					
Yes	243 (85.0)	15 (53.6)	127 (83.5)	48 (80.0)	0.002
No	31 (10.8)	10 (35.7)	14 (9.2)	10 (16.7)	
I don't know	12 (4.2)	03 (10.7)	11 (7.3)	02 (3.3)	
Malaria is a treatable illness. (n=294)					
Yes	271 (94.7)	22 (78.5)	137 (90.1)	53 (88.3)	0.008
No	15 (5.3)	06 (21.5)	15 (9.9)	07 (11.7)	
I don't know	00 (0.0)	00 (0.0)	00 (0.0)	00 (0.0)	

Ownership/Use of Insecticide Treated Bednet (ITN) and Acceptance of IRS

Besides having knowledge about the severity of malaria, 53.3% of respondents in Mewat study areas and 48.1% in Rohtak study areas had agreed the possession of at least one ITN in their households and of these, 24.1% in Mewat region and 18.9% in Rohtak region had accepted the use of at least one ITN in their households during the peak malaria transmission season according to Figure 1. Respondents cited cost, heat, and discomfort while sleeping under the net as reasons for not using ITN. Furthermore, some of them claimed that mosquitoes bite them before going to bed. However, 72 percent of respondents in Rohtak study areas and 47 percent in Mewat study areas accepted IRS, which was significantly related to the difference in educational level between the two regions (P 0.05)..

Characteristics	IRS (n=202)	Re-plastered (n=42)	Owns at least one ITN n=(165)	Uses at least one ITN n=(75)	P-value
Heard about malaria (n=264)					
Yes	157 (77.7)	14 (33.3)	142 (86.0)	61 (81.3)	0.0001
No	45 (22.3)	28 (66.7)	23 (14.0)	14 (18.7)	
Malaria is a communicable disease (n=108)					
Yes	99 (49.0)	28 (66.6)	101 (61.2)	58 (77.3)	0.001
No	83 (43.0)	12 (28.6)	43 (26.1)	12 (16.0)	
I don't know	20 (10.0)	02 (4.8)	21 (12.7)	05 (6.7)	
Malaria transmission route of (n=82)					
Mosquito bite	67 (33.2)	28 (66.7)	52 (31.5)	51 (68.0)	0.0001
Others	135 (66.8)	14 (33.3)	113 (68.5)	24 (32.0)	
Malaria is a preventable disease (n=142)					

Yes	145 (71.8)	18 (42.8)	112 (67.8)	41 (54.6)	
No	12 (5.9)	03 (7.2)	34 (20.7)	18 (24.0)	0.00001
I don't know	45 (22.3)	21 (50.0)	19 (11.5)	16 (21.4)	
Malaria is a severe diseases (n=234)					
Yes	187 (92.6)	15 (35.7)	135 (81.8)	55 (73.3)	
No	10 (5.0)	14 (33.3)	19 (11.5)	18 (24.0)	0.0001
I don't know	05 (2.4)	13 (31.0)	11 (6.7)	02 (2.7)	
Malaria is a curable disease (n=264)					
Yes	178 (88.2)	31 (73.8)	109 (66.1)	70 (93.3)	
No	12 (5.9)	09 (21.4)	17 (10.3)	03 (4.0)	0.0001
I don't know	12 (5.9)	02 (4.8)	39 (23.6)	02 (2.7)	

DISCUSSION

According to the findings of these studies, high levels of knowledge about malaria, particularly the link between mosquitoes and malaria, corresponded to a high percentage of ITN ownership and IRS coverage, respectively. It has been observed that IRS coverage was higher (72%) in Rohtak compared to the Mewat study areas (47%). As a result, the majority of households in Mewat study areas did not receive the full benefit of the intervention. However, a small proportion of the houses got their walls re-plastered following the spray, mainly due to some social reasons or fear that chemicals may cause some harm to them or their cattle. Beside this, ownership of ITN was found to be more among the individuals in Mewat region as compared to the Rohtak which was contradictory regarding the knowledge on malaria. It may be due to the high number of malaria cases in the Mewat region especially in Ujina which is directly related to a higher number of ITNs distributed by the Govt. hospitals. However, around 50% of respondents in Mewat region use at least one ITN during the malaria transmission season but this percentage was quite lower in Rohtak. This could be attributed to differences in eco-epidemiological strata as well as access to malaria-related health services.

Characteristics		Rohtak	Mewat	Overall
Age (years)	0-5	06 (6.3)	05 (6.3)	11 (8.9)
	6-15	07 (15.5)	33 (41.7)	40 (32.2)
	15 above	30 (66.7)	36 (45.7)	66 (53.2)
	Pregnancy	02 (4.5)	05 (6.3)	07 (5.7)
Gender	Male	25 (55.5)	41 (51.9)	66 (53.2)
	Female	20 (44.5)	38 (48.1)	58 (46.8)
Educational Status	Illiterate	15 (33.4)	19 (24.1)	34 (27.3)
	Matric	13 (28.8)	23 (29.1)	36 (29.1)
	Graduation	07 (15.5)	17 (21.5)	24 (19.4)
	Post-Graduation	04 (8.9)	02 (2.5)	06 (4.8)
	Other	06 (13.4)	18 (22.8)	24 (19.4)
Economic status	< 5000	20 (44.4)	32 (40.5)	52 (41.9)
	5001 - 10,000	16 (35.5)	27 (34.2)	43 (34.7)
	10,001 - 20,000	07 (15.5)	17 (21.5)	24 (19.3)
	20,001 - 50,000	02 (4.6)	03 (3.8)	05 (4.1)
Family Type	Nuclear	26 (57.7)	35 (44.3)	61 (49.2)
	Joint	19 (42.3)	44 (55.7)	63 (50.8)

Malaria and Associated Diseases	Rohtak	Mewat	Total
Malaria and Pregnancy	2	8	10
Malaria and Typhoid	5	10	15
Malaria and Diarrhea	6	7	13
Malaria and Diabetes	4	1	5
Malaria and Heart Disease	2	1	3
Malaria and Kidney Diseases	2	2	4
Malaria and Metabolic Disease	1	0	1

5. CONCLUSION

The present study revealed that respondents' knowledge and perception of malaria in relation to ownership and usage of ITN and acceptance of IRS was higher in Rohtak region as compared to Mewat region which was probably associated with education level of the respondents in both study areas.

It is suggested that bolstering ongoing interventions such as indoor residual spray (IRS) and insecticide-treated nets (ITNs) in conjunction with malaria elimination will be critical, as it could reduce the frequency and prevalence of malaria and other vector-borne diseases. Such efforts will necessitate effective monitoring in order to assess implementation and provide a framework for evaluating decision making and policy formulation for malaria control elimination.

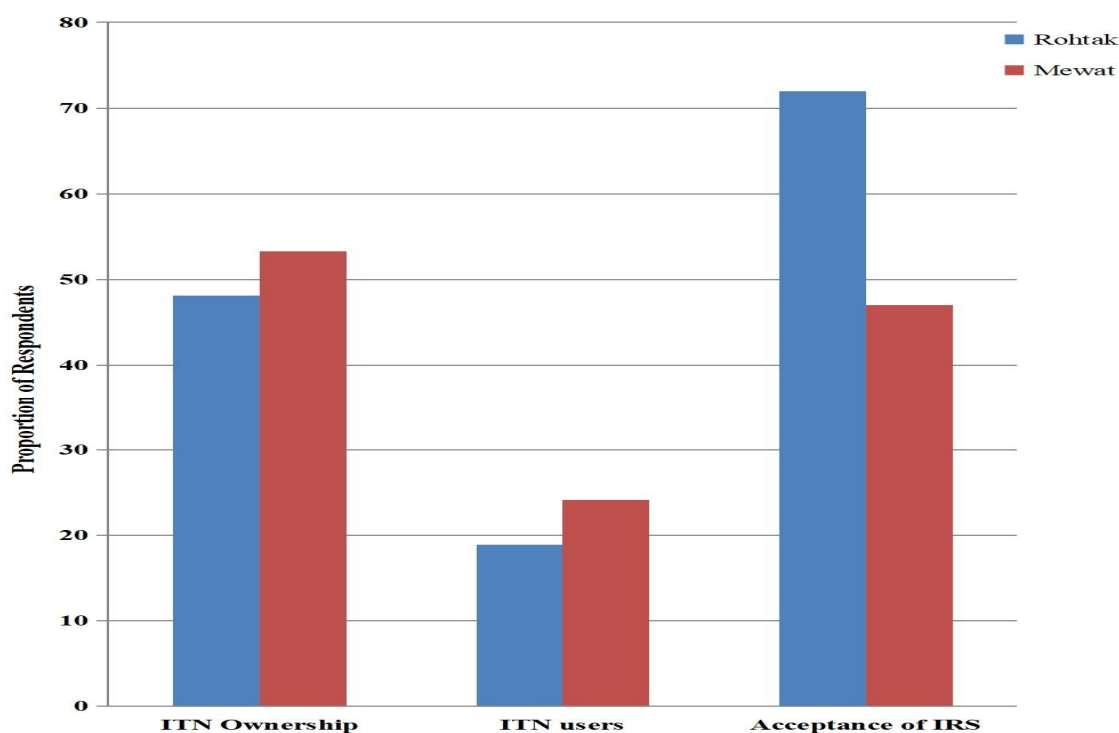


Figure 1. Proportion of respondents in Rohtak and Mewat districts who owned or used ITNs and their acceptance of IRS.

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