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## **Usage Pattern and Socio-Demographic Determinants of Personal Protection Measures against Mosquitoes in Rural Area of District Jhansi of India**

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### **Abstract**

Mosquito-borne diseases (MBDs) constitute an important cause of morbidity and mortality. So MBDs are important public health problems. Personal protective measures (PPM) are an effective tool in control of mosquito-borne diseases. In present study an attempt has been made to study the prevalence, reasons for the usage / non usage of personal protective measures and also identify the pattern of usage and their association with socio-demographic variables. A cross sectional study was conducted during April to June 2014 among rural area of Jhansi. A total of 100 families were selected for this study by systematic random sampling. For data collection house to house survey was done using a semi structured pretested questionnaire. The results were analyzed using Epi Info 7. Chi-square test was used for qualitative variables to find association. Most of (90%) families were actually using at least one personal protection measure against mosquitoes. Among the study population the reasons for preference of their own methods were convenience of the method followed by cost. 67% were using the personal protective method daily. Statistically significant association was observed between the pattern of usage and socio economic status, type of house. This attitude should be changed by appropriate health education.

**Keywords:** Personal protective measures, Mosquito born diseases, Mosquito control

### **Introduction**

The vector-borne diseases especially those spread through mosquitoes constitute an important cause of morbidity and mortality. Mosquito borne diseases affect in excess of 40 million people in India every year<sup>1</sup>. There are a number of diseases borne by mosquitoes. These include are Malaria, Filariasis, Dengue Fever, Japanese Encephalitis and Chikungunya. Mosquito borne diseases are one of the most important public health problems affecting both urban and rural areas of India. Three-fourth of population lives in malaria risk areas with 1.86 million disability adjusted life years (DALYs) lost annually<sup>2</sup>. Similarly, dengue which is endemic in around 112 countries worldwide is on a rising trend affecting mainly urban areas of tropical and subtropical regions with about 2.5 billion people at risk of acquiring infection, Indian metropolitan cities and towns are no exception<sup>3,4</sup>. To make the situation even worse in India, chikungunya, Japanese encephalitis, and filariasis outbreaks occur from time to time almost throughout the country.

In 2003-04, Government of India approved the National Vector Borne Diseases Control Program (NVBDCP), which now comes in the purview of National Rural Health Mission (NRHM). Integrated Vector Control is the chief strategy of this programme. The components of Integrated Vector Control methods are Source reduction, Chemical and Biological vector control, Personal Protection and Health Education<sup>5</sup>. Integrated Vector Management (IVM) is an approach that improves the efficacy and cost effectiveness of vector control measures<sup>6</sup>. Personal protection, as the term denotes, is a responsibility vested at the level of the individual and the family. The use of personal protective measures (PPM) like bed nets, mats, repellents, liquid vaporizers, mosquito coils, and so forth has been advocated an effective tool in control of mosquito-borne diseases, but data about the reasons for the usage / non usage of personal protective measures is still scarce.

### **Objectives**

1. To study the prevalence and reasons for the usage / non usage of personal protective measures against mosquito bites among rural area of Jhansi.
2. To identify the pattern of usage of personal protective measures and their association with socio-demographic variables.

### **Materials and methods**

A community based cross-sectional study was carried out in rural area of Jhansi. The minimum sample size calculated using formula  $n = 4pq/l^2$  by Lwanga and Lameshow<sup>7</sup> where prevalence of usage of personal protective measures was taken 84% after getting through literature<sup>8</sup>. Sample size was estimated to be 76, to give an allowance for refusal rate, 100 participants, on safer side studied by using systematic sampling. The study period was from 1 April to 30 June 2014. A pretested, semi-structured questionnaire was used to study socio-demographic variables, personal protective methods and the reasons for usage and non-usage. Socio Economic status was assessed using the Modified B.G.Prasad's classification.

Study was conducted in Chirgaon block of district Jhansi by house-to-house survey and from each family, one individual was selected. Every effort was made to interview the head of the family. In case head of the family was not available, then any person more than 18 years of age was selected. When house was found locked even after three visits, next house was selected without disturbing the overall sampling procedure. The data was entered in Excel sheet and analyzed using Epi Info 7. The results were expressed as proportions and percentages. Chi square test was used for qualitative variables to find association and  $P$  value  $<0.05$  was considered significant.

### **Results**

Subject studied and categorized by socio-demographic characteristics were given in Table 1. Majority of the respondents (61%) were in the age group of 18-40 years, males (69%) and educated up to middle school (50%). Pertaining to socioeconomic status of the respondents majority were belonging to middle class (59%), living in

nuclear family (68%) and residing in pucca house (58%). Regarding the disposal of waste from houses 57% subjects were using the public dustbin and 59% had open drainage in their houses.

Subject studied for usage of personal protective measures is given in Table 2. Majority of the respondents (90%) were using at least one of the methods. Mosquito coils were used by 39%, followed by Liquid Vaporizers, Mosquito nets, Fumes, Fan, Repellents, Insecticidal spray and mosquito bats.

Among the study population the reasons for preference of their own methods were Convenience of the method (58%) followed by cost (22%) and perception of good control (20%) of mosquitoes. The reasons for not using any method were Economic Problems (60%) for most of respondents, allergy to some methods (30%) for some and according to 10% it was government responsibility (Table 3).

In the study 67% were using the personal protective method daily. There was a statistical significant association of pattern of usage with gender ( $P=0.03$ ), socio economic status ( $P=0.04$ ), type of family ( $P=0.00$ ), type of house ( $P=0.01$ ) and waste disposal ( $P=0.04$ ). The usage was regular among those who belonged to middle socio economic status, living in nuclear family, residents of pucca house and those who used the public dustbin for disposal of wastes from the house. The low economic condition of those living in kutchra house may be the cause for the poor usage. Those who used to throw their wastes in front and around the houses are the one who actually need the PP methods because of increased mosquito breeding. But in this study their usage was low (Table 4).

## Discussion

In this study it was found that 90 % were using any one of the personal protective measures against mosquito bite. Similar observation was reported by Anand T et al<sup>9</sup> from Delhi where 90% of study participants were using one or other personal protective measures. Pandit N et al<sup>10</sup> from Gujarat , Surendran S et al<sup>12</sup> from Sri Lanka and Mayavanathan J et al<sup>14</sup> from Chennai revealed that 97%, 96%, 93% of participants were using any one of the personal protective measures against mosquito bite respectively . But Babu BV et al<sup>8</sup> from Orissa and Snehalatha et al<sup>11</sup> from Pondicherry reported that 84% and 73% of respondents were found to use some form of personal protection measure against mosquito bite respectively.

The most common methods used in this study were Mosquito coil followed by Liquid Vaporizers. The similar findings were seen in the studies by Boratne A et al<sup>2</sup>, Snehalatha et al<sup>11</sup>, Babu BV et al<sup>8</sup> and Surendran S et al<sup>12</sup>. Anand T et al<sup>9</sup> from Delhi reported that most common method used by study population was liquid vaporizer. But study from Pondicherry by Deepa VK et al<sup>15</sup> reported that traditional method of burning dried dung or vegetation indoors, specifically to create smoke to drive away mosquitoes was most common. Thus there is evidently varying practices against mosquito bite from place to place.

When enquired for the reason of not using any personal protective measures most people reported that they could not afford them and few perceived allergy to some methods. The similar observations were seen in the studies by Snehalatha et al<sup>11</sup>, Babu BV et al<sup>8</sup> and Mayavanathan J et al<sup>14</sup>. In the study among the users (90%) only 67%

were using the method regularly which was similar to the study conducted by Mayavanathan J et al<sup>14</sup> from Chennai. But Snehalatha et al<sup>11</sup> from Pondicherry revealed that only 40% of participants used personal-protection measures daily. In the rural population the pattern of use of different types of personal protective measures was influenced by the type of family and method of waste disposal as well as income of the family which shows that socioeconomic status is a predictor of selecting various personal protection measures which was found in many studies<sup>13,14</sup>.

## Conclusions

This study found that the overall usage was high among the study population. The most common methods used in this study were Mosquito coil and Liquid Vaporizers. Among the study population the reasons for preference of their own methods were convenience of the method followed by cost and perception of good control of mosquitoes by the methods. The reasons for not using any method were economic problems, allergy to some methods. In the study many of the respondents were not using the methods regularly. Irregularity in use was associated with lower socioeconomic status, joint family and wrong method of waste disposal.

## Recommendations

The overall usage was high among the respondents in the study, but they were not using the methods regularly. This attitude should be changed by appropriate health education. BCC activities should be involved to promote the usage of personal protective measures. Community participation is an essential component for the reduction of mosquito borne diseases. Regarding the reasons for non-usage economic problem played an important role. To overcome this Government may give subsidy to get any form of PP methods in addition to their regular insecticidal spray. Apart from the regular usage of PP measures, the other methods like minor engineering measures, chemical methods etc should also be done for effective control of mosquitoes and mosquito borne diseases.

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**Table-1 Socio-demographic determinants of study subjects**

<b>Characteristics</b>		<b>Participants (N=100)</b>	<b>%</b>
<b>Age(years)</b>	18-40	61	61
	41-60	31	31
	>60	8	8
<b>Gender</b>	Male	69	69
	Female	31	31
<b>Education</b>	Illiterate	24	24
	Primary school	26	26
	Middle school	26	26
	High school	15	15
	Post high school and above	9	9
<b>Occupation</b>	Unemployed	16	16
	Unskilled worker	33	33
	Semiskilled worker	23	23
	Skilled worker	19	19
	Semiprofessional	6	6
	Professional	3	3
<b>Socio-economic status</b>	Upper	14	14
	Middle	59	59
	Lower	27	27
<b>Family type</b>	Nuclear	68	68
	Joint	32	32
<b>Type of house</b>	Kutchra	20	20
	Pucca	58	58
	Semi pucca	22	22
<b>Waste disposal</b>	Public dustbin	57	57
	Throwing	24	24
	Collection	19	19
<b>Drainage</b>	Open	59	59
	Underground	41	41

**Table-2 Usage of personal protective measures among study population**

<b>Personal protective measures</b>		<b>Participants (N=100)</b>	<b>%</b>
Using any method (N=100)	Yes	90	90
	No	10	10
Type of PPM (N=90)	Liquid vaporizers	20	22
	Mosquito coil	35	39
	Mosquito nets	14	16
	Bats	1	1
	Fumes	10	11
	Repellent creams	3	3
	Insecticidal spray	2	2
Fan alone	5	6	

**Table-3 Reasons for usage and non-usage of personal protective measures among respondents**

<b>Personal protective measures</b>		<b>Participants (N=100)</b>	<b>%</b>
Reasons for the usage (N=90)	Easy to use	52	58
	Cost	20	22
	Good control	18	20
Reasons for the non-usage (N=10)	Economic problems	6	60
	Allergy to some methods	3	30
	Government responsibility	1	10

**Table-4 Association of socio-demographic variables with pattern of usage of personal protective measures**

Variables		Pattern of usage		Chi square value	df	P value
		Daily N=60(%)	Not daily N=30(%)			
Age(years)	18-40	40(44)	17(19)	0.96	2	0.62
	41-60	16(18)	12(13)			
	>60	4(4)	1(1)			
Gender	Male	48(53)	17(19)	4.33	1	0.03*
	Female	12(13)	13(14)			
Education	Illiterate	13(14)	9(10)	0.75	4	0.94
	Primary school	16(18)	7(8)			
	Middle school	17(19)	8(9)			
	High school	8(9)	5(5)			
	Post high school and above	6(7)	1(1)			
Occupation	Unemployed	9(10)	4(4)	0.29	5	0.99
	Unskilled worker	21(23)	10(11)			
	Semiskilled worker	14(16)	8(9)			
	Skilled worker	10(11)	7(8)			
	Semiprofessional	4(4)	1(1)			
	Professional	2(2)	0(0)			
Socio-economic status	Upper	7(8)	3(3)	6.18	2	0.04*
	Middle	43(48)	14(16)			
	Lower	10(11)	13(14)			
Family type	Nuclear	50(56)	13(14)	13.39	1	0.00*
	Joint	10(11)	17(19)			
Type of house	Kutchra	9(10)	8(9)	8.72	2	0.01*
	Pucca	43(48)	12(13)			
	Semi pucca	8(9)	10(11)			
Waste disposal	Public dustbin	42(47)	13(14)	6.01	2	0.04*
	Throwing	10(11)	9(10)			
	Collection	8(9)	8(9)			
Drainage	Open	40(44)	16(18)	0.99	1	0.31
	Underground	20(22)	14(15)			

\* P value &lt;0.05 i.e. statistical significant