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**Lack of community awareness on malaria and its vectors can impede malaria control: A case study in Great Nicobar Islands**

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**Abstract**

Andaman and Nicobar Islands has historically been known for its high malaria transmission in the past. The aftermath of tsunami (2004), increased its risk and vulnerability, due to stagnant water bodies. *Anopheles sundaicus* is the predominant vector responsible for the perennial transmission of malaria in these islands. The Great Nicobar Island being one of the Tehsil of Nicobar District, is an important tourism centre attracting both national and international visitors in large numbers throughout the year. Community knowledge on malaria and its vectors is a pre-requisite for any successful malaria control programme. In order to determine the community knowledge regarding malaria transmission and control, a cross sectional survey was carried out in three villages of Great Nicobar Island, having high malaria incidence. A total of 170 individuals, viz., 70 Nicobarese (tribal) and 100 non-Nicobarese (non-tribal) were enquired. Both quantitative (KAP) and qualitative (FGD) survey methods were employed to collect the data. Among the Nicobarese, 98.6% were aware of the disease, 94.2% had knowledge of its symptoms. Similar observation was found among the non-Nicobarese community. However, knowledge on the bionomics of malaria vector and transmission was observed to be low in both the groups (17-23%). In the community based awareness campaign, field visits to the vector breeding sites is to be emphasized. Involvement of Self Help Groups and school children would facilitate easy dissemination of knowledge on vectors to the community. This improved awareness could help in reducing vector proliferation and form a basis for effective implementation of malaria control programme.

**Key words:** Awareness, FGD, KAP, Malaria, vector.

**1. Introduction**

Malaria is a public health problem throughout the world and continues to be a leading cause of morbidity and mortality. In the year 2015, there were 214 million cases of malaria with 4, 38,000 deaths globally. Even though malaria infection rates were observed to decline, India still has to fight against this disease and rely on a single drug

treatment due to wide spread resistance of other anti-malarial drugs (WHO., 2016).The control of malaria and other vector borne diseases mainly depend on the application of insecticides. Indoor residual spray (IRS), use of insecticide-treated bed nets (ITN) and larviciding are the most widely practiced effective strategies to prevent

transmission. It was suggested that malaria can be eliminated by creating awareness and in-depth knowledge on malaria in the communities (Bentham et al., 2006). An understanding of the knowledge, attitude and practices of the community helps to design appropriate Behavioral Change and Communication (BCC) strategy, thereby influence malaria control interventions (Luyiga et al., 2013). Lack of knowledge and poor socioeconomic factors in the community becomes an obstacle in the disease control strategies. Implementation of a sustainable control strategy requires the perception of the community towards malaria prevention and control (Wessen, 1972; Yadav et al., 1999; Collins et al., 1997).

Andaman and Nicobar islands is known to be malaria endemic for nearly a century. Presently, the malaria cases have declined drastically in Andaman districts. However, Nicobar district shows persistence of malaria. In this district, among the 3 tehsils, viz., Car Nicobar, Nancowry and Great Nicobar, the latter two recorded the highest cases, while negligible cases were found in the first tehsil (Sunish et al., 2015). The predominant vector in these Islands is *Anopheles sundaicus*, breeding in fresh as well as brackish water (Kumari & Sharma, 1994; Das et al., 1998). Great Nicobar is the largest island in the Nicobar district covering an area of about 1045 km<sup>2</sup>. This Island is inhabited by both tribals (Nicobarese) as well as non-tribal population living under different socioeconomic strata.

Elimination of malaria requires focus on community knowledge, awareness and practice on malaria control strategies. Inappropriate community understanding of malaria and its vectors can draw back all effort done by malaria control programmes. The present study envisages to determine the knowledge, attitude and practice of two heterogeneous communities regarding malaria. Sociological tools, viz., KAP and Focus Group Discussion (FGD) were employed to collect the data. Perception of the community on malaria

may vary in each community, however it can facilitate in designing effective and sustainable malaria control strategies (Chirebvu et al., 2013). The present study investigated the awareness of the community on malaria transmission, recognition of its signs and symptoms, treatment-seeking behaviour, preventive measures and practices followed, such as bed net and clearing of bushes around households, as well as their cultural practices.

## **2. Materials and methods**

### **2.1. Study area**

This study was carried out during the month of November/December 2015 in the villages of Campbell Bay at Great Nicobar Islands. This island (93.8<sup>o</sup> East and 7.03<sup>o</sup> North), is a hilly area, stretching over 921km<sup>2</sup> and is largely covered by tropical rain forest. It is the southernmost part of India with a population of 8,790 (as per 2011 census). Main crops grown in this region are rice, coconut, areca nut and banana, in addition to other forest produce. Both tribals and non-tribals are reside here. Shompens and Nicobarese comprise the tribals, while those from mainland India speaking Hindi, Telugu, Tamil, Malayalam and Punjabi form the non-tribals. The land soil/ paddy fields which are in contact with mangroves, increase the salinity of the land thereby leading to the proliferation of *An. sundaicus*, the incriminated vector of malaria parasite. Great Nicobar is reported to have the highest malaria cases among all the Islands of Andaman and Nicobar. The Annual parasite incidence (API) for the year 2009 was 174.2, while for the subsequent five years it was 55.6 , 100.2, 41.4, 27.9 and 10.35 during the years 2010, 2011, 2012, 2013 and 2014 respectively.

### **2.2 Study design**

This was a cross sectional study that employed both quantitative and qualitative method of data collection. Quantitative data were collected by

means of assessment of knowledge, attitude and practice (KAP) using a structured pre-tested questionnaire, while qualitative data were collected through Focus Group Discussion (FGD). The KAP survey was carried out by visiting the households in Nicobarese and non-Nicobarese settlement. Focus group discussions were carried out separately for the Nicobari and Non-Nicobari mothers from the selected three villages, viz., Rajiv Nagar, Kamal Basthi and Govind Nagar. Prior consent was obtained from the village Head (Captain) for carrying out both KAP and FGD.

### **2.2.1 KAP assessment survey**

For KAP survey, a total of 170 respondents consisting of 70 Nicobarese and 100 Non-Nicobarese were interviewed. The individuals were selected at random from three villages, which reported high prevalence of malaria during the past five years. The eldest family member or those respondents above the age of 18 years were interviewed to ensure respondent comprehension of the questions. In the questionnaire, a total of 27 questions were prepared and was grouped into three sections, viz., demographic characteristics, knowledge on malaria, vector bionomics including the usage of mosquito repellents. Questions were asked in the local language to get reliable answers from the respondents.

### **2.2.2 Focus Group Discussion (FGD)**

In FGD, mothers were targeted, as they are the primary caregivers at home and are the key players in improving family health. Two FGDs were carried out, one each in tribal and non-tribal community. Each FGD had eight individuals between the ages, 23 and 55 years. Verbal consent was obtained from the participants. FGDs were conducted by two staffs; a moderator who conducted the discussion and a note taker who also tape-recorded the discussion. The questions for discussion were translated into Nicobari language under the guidance of a tribal staff. The questions

dealt with socio-demographic characteristics, local perceptions on malaria, health seeking behavior, knowledge on the cause and symptoms of malaria, its vectors and control/preventive measures. Tape-recorded version of the qualitative data were first transcribed and then translated in to English for analysis.

### **2.3 Data analysis**

The data collected during the survey was digitalized and analysed using SPSS ver 11.0. All the variables had options for multiple responses. All questions on knowledge of mosquitoes and malaria were scored with one mark for correct answer, so as to categorize participants with '*good knowledge*'. Zero was given for incorrect answers and those participants giving incorrect answers were categorized as having '*poor knowledge*'. For awareness; participants who got correct answers were categorized as being '*aware*' and those participants got incorrect answers were categorized to be '*not aware*'. Chi square test ( $\chi^2$ ) was used to test for significance and the association was considered statistically significant if  $p$  value was  $<0.05$ .

## **3. Results**

### **3.1 Survey on knowledge, Attitude and Practice (KAP) related to malaria**

#### **3.1.1 Demographic characteristics of study participants**

A total of 170 individuals consisting of 70 Nicobarese and 100 Non-nicobarese respondents were interviewed for KAP survey. The Nicobari respondents consisted of 55 (78.6%) males and 15 (21.4%) females, whereas non-Nicobari included 63 males (63%) and 37 females (37%). The majority were in the age group of 31-70 years. Graduates were the highest qualified respondents, consisting of 2(2.9%) Nicobarese and 4(4%) non-Nicobarese.

The family size of the study population ranged from 2 to 6. Majority had a family size of 4-5, which included 29 (41.4%) Nicobarese and 56(56%)

Table 1. Socio demographic characteristics of respondents.

Variables	Respondent	Nicobarese (n=70) Number (%)	Non Nicobarese (n=100) Number (%)
Sex	Female	15(21.4)	37(37)
	Male	55(78.6)	63(63)
Age	Youth (18-30)	15(21.4)	20(20)
	Adult (31-50)	39(55.7)	56(56)
	Mature(>51)	16(22.9)	24(24)
Education	Illiterate	9(12.9)	27(27)
	Primary	18(25.7)	21(21)
	High school	43(61.4)	51(51)
	Graduation	2(2.9)	4(4)
Family size	Two to one	7(10.0)	16(16)
	Three	15(21.4)	14(14)
	Four to five	29(41.4)	56(56)
	Six or more	18(25.7)	14(14)
House type	Mud wall house	14(20.0)	0
	Thatched roof with brick wall	1(1.4)	2(2)
	Concrete roof with brick wall	5(7.1)	0
	Tiled/asbestos roof with brick wall	25(35.7)	47(47)
	Permanent shelter	25(35.7)	51(51)
	Tin walled	0	0

Table 2. Awareness and knowledge of respondents on malaria and its vectors

Sl. no	Queries	Nicobari		Non-Nicobari	
		(n=70)	%	(n=100)	%
<b>1</b>	Aware on malaria				
	a) Yes	69	98.6	100	100
	b) No	1	1.82	0	0
<b>2</b>	Whether affected by malaria				
	a) Yes	13	18.6	25	25
	b) No	57	81.4	75	75
<b>3</b>	Symptoms of malaria				
	a) Fever	62	88.6	81	81
	b) Headache	45	64.3	56	56
	c) Chillness	14	20	31	31
	d) Vomiting	8	11.4	27	27
	e) Sweat	7	10	14	14
	f) Loss of appetite	1	1.4	1	1
	g) Don't know	8	11.4	15	15
<b>4</b>	Health seeking behavior				
	a) Home remedy	1	1.4	0	0
	b) Traditional healer	1	1.4	0	0

	c) Local medical shop	1	1.4	0	0
	d) Doctor at hospital	66	94.3	100	100
<b>5</b>	Whether malaria can be cured				
	a) Yes	70	100	100	100
	b) No	0	0	0	0
<b>6</b>	Vulnerability of malaria				
	a) Infants (<5yrs)	4	5.7	3	3
	b) Children(≤12 yrs)	1	1.4	3	3
	c) Adult male	6	8.6	3	3
	d) Adult female	4	5.7	5	5
	e) Those who work outside	10	14.3	18	18
	f) All	45	64.3	73	73
<b>7</b>	Mode of transmission				
	a) Mosquitoes	47	67.1	83	83
	b) Others	23	32.9	17	17
<b>8</b>	Name of mosquito transmitting malaria parasite				
	a) Anopheles	10	14.3	16	16
	b) Aedes	1	1.4	6	6
	c) Culex	0	0	2	2
	d) Don't know	59	84.3	76	76
<b>9</b>	Breeding place of Anophelines				
	a) Overhead tanks	2	2.9	5	5
	b) Open stagnated water	10	14.3	18	18
	c) Around garbage and bushes	1	1.4	2	2
	d) Decayed fruits and vegetables	3	4.3	4	4
	e) Drains	8	11.4	6	6
	f) Discarded containers	1	1.4	15	15
	g) Ponds/lakes	3	4.3	3	3
	f) Don't know	42	60	47	47
<b>10</b>	Biting time of Anopheles mosquito				
	a) Day	2	2.9	1	1
	b) Night	27	38.6	58	58
	d) Day and night	25	35.7	12	12
	e) Don't know	14	20	27	27
<b>11</b>	Use of mosquito repellants				
	a) Yes	70	100	100	100
	b) No	0	0	0	0
<b>12(A)</b>	Personal protection measures				
	a) Bed net	54	77	74	74
	b) Repellent cream	4	5.7	0	0
	c) Liquid vapourizer	47	67.1	78	78

	d) Mosquito coil	34	48.6	39	39
	e) Burning leaves	3	4.3	12	12
	f) Window/door screen	7	10	85	85
	g) Cover with bedsheet	14	20	26	26
	h) Electric fan	67	95.5	100	100
<b>(B)*</b>	How many bed nets do you have?				
	a) 1	18	25.7	25	25
	b) 2	9	12.9	31	31
	c) >3	27	38.6	21	21
<b>(C)</b>	Are the bed nets insecticide treated?				
	a) Yes	2	2.9	21	21
	b) No	40	57.1	75	75
	c) Don't know	12	17.1	4	4
<b>(D)</b>	Whether the bed nets are purchased/Govt. supply?				
	a) Purchased	4	5.7	21	21
	b) Govt. supply	50	71.4	62	62
<b>(E)</b>	Who sleeps under mosquito net?				
	a) All	51	72.9	73	73
	b) Children	1	1.4	2	2
	c) Old age	2	2.9	3	3
<b>(F)*</b>	When do you use bed net?				
	a) All year around	51	72.9	74	74
	b) Rainy season	3	4.3	3	3
<b>13</b>	Mosquito control measures taken by the local public health department				
	a) Fogging	13	18.6	5	5
	b) Spraying	68	97.1	98	98
	c) Source reduction campaign	2	2.85	3	3
	d) Nothing	4	5.7	11	11

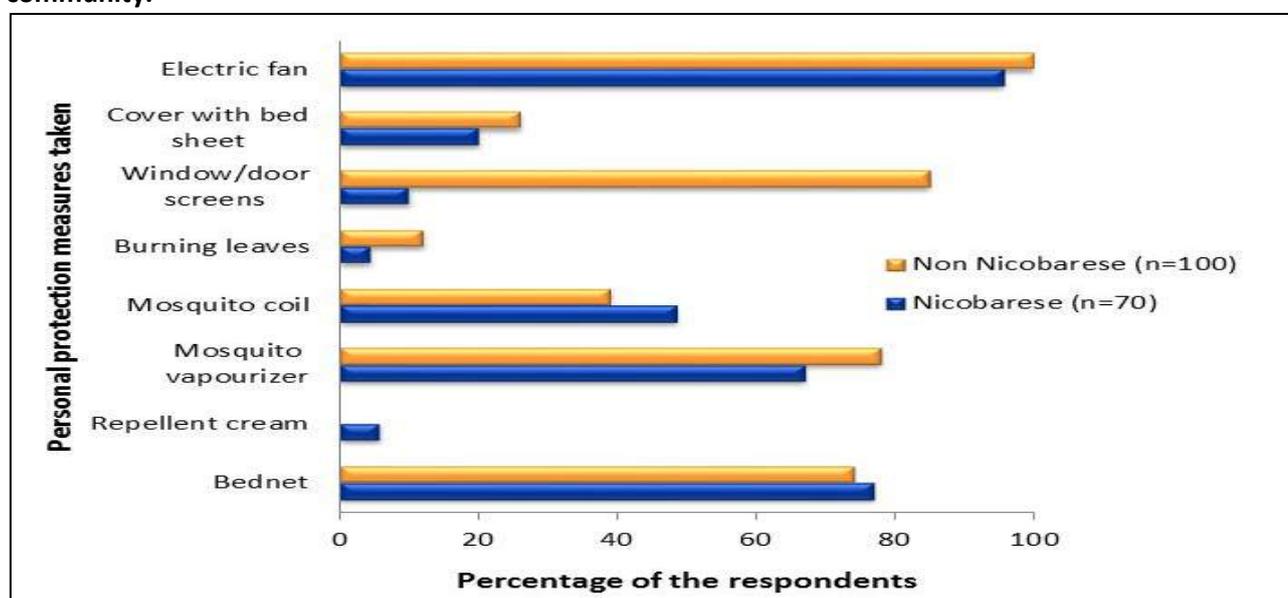
\*As there were 54 & 74 respondents reported of having bed-nets, they alone were enquired for query nos. 12B to 12F.

**Table 3. Analysis of knowledge on malaria between males and females of Nicobarese and non Nicobarese respondents.**

Sl. No	Parameters	Nicobarese					Non-Nicobarese				
		Male	%	Female	%	p-value	Male	%	Female	%	p-value
1	Awareness on malaria										
	1. Yes	55	100.00	14	98.00	0.0538	63	100.00	37	100.00	0.1957
	2. No	0	0.00	1	6.67		0	0.00	0	0.00	
2	Affected by malaria										
	1. Yes	8	14.55	5	33.33	0.0972	21	33.33	4	10.81	0.012
	2. No	47	85.45	10	66.67		42	66.67	33	89.19	

3	Awareness on symptoms										
	1. Yes	47	85.45	15	100.00	0.1165	48	76.19	36	97.30	0.0054
	2. No	8	14.55	0	0.00		15	23.81	1	2.70	
4	Whether malaria can be cured										
	1. Yes	55	100.00	15	100.00	0.1452	63	100.00	37	100.00	0.0274
	2. No	0	0.00	0	0.00		0	0.00	0	0.00	
5	How malaria transmitted										
	1. Mosquito bite	39	70.91	8	53.33	0.1989	56	88.89	27	72.97	0.0408
	2. Others	16	29.09	7	46.67		7	11.11	10	27.03	
6	Name of mosquito transmitting malaria parasite										
	1. Anopheles	4	7.27	6	40.00	0.0013	12	19.05	4	10.81	0.278
	2. Others	51	92.73	9	60.00		51	80.95	33	89.19	
7	Where do malaria mosquitoes breed										
	1. Fresh water	7	12.73	5	33.33	0.0605	8	12.70	10	27.03	0.0718
	2. Others	48	87.27	10	66.67		55	87.30	27	72.97	
8	Biting time of Anopheles mosquito										
	1. Night time	15	27.27	12	80.00	0.0001	33	52.38	25	67.57	0.1374
	2. Others	45	81.82	3	20.00		30	47.62	12	32.43	
9	Any control measures taken by local health Dept.										
	1. Yes	54	98.18	14	93.33	0.3177	56	88.89	34	89.19	0.6289
	2. No	1	1.82	1	6.67		7	11.11	3	10.81	

Figure 1. Personal protection measures used to prevent mosquito bites in Nicobarese and Non-Nicobarese community.



non-Nicobarese (Table-1). About 14(20%) respondents reported that they were residing in houses made of mud wall, which indicated the poor economic status of the tribal community. However, majority of the respondents had permanent shelters (36% and 51% among Nicobarese and non-Nicobarese respectively), followed by tiled/asbestos roof with brick wall provided by the Andaman & Nicobar Administration, during the post-tsunami period.

### **3.1.2 Knowledge on Malaria and preventive measures**

Respondents were enquired for their knowledge on malaria and its preventive measures. Of the 70 Nicobarese, 98.6% were aware of malaria, as the area was endemic for the past few years. Among them, 13(18.6%) had the history of malaria and 47 (67%) reported that malaria parasite is transmitted through mosquito bite (Table 2). Few Nicobari respondents (3=4.3%) reported that malaria is a contagious disease and transmits through close contact with the patient. Regarding the symptoms, majority of Nicobarese (62 =88.6%) mentioned that fever is the common symptoms of malaria besides others, while 12% were unaware of it. In terms of treatment seeking behavior, 66 (94.2%) of them depended on local hospital. Few (3 =4.3%) reported that they depend on local medical shop, home remedy and self medication for fever and visit hospital if not relieved. About 14.3% of the respondents remarked that *Anopheles* is the mosquito transmitting malaria parasite. Few of them (15 =21%) were aware that the breeding habitat of *Anopheles* was clean water (overhead tanks, open stagnating water and ponds). Almost 60% did not know the breeding place of *Anopheles*.

Among non-Nicobarese, almost all were aware of malaria, 25(25%) of them had the history of malaria at least once in their life time. Almost all the respondents among non-Nicobarese reported of seeking help from local doctor at hospital. And

83% were aware of the role of mosquito in malaria transmission, in contrast to 67% among Nicobarese ( $P<0.05$ ). However, as observed for Nicobarese, the non-tribals also had negligible knowledge on the name of the mosquito transmitting malaria parasite. Similarly, the potential breeding habitat was also reported by only 18% of non-Nicobarese. The biting time of the vector was known to 58% of this community as against 38.6% among Nicobarese ( $P<0.05$ ).

Gender wise analyses showed that among non-Nicobarese, there was a significant difference ( $p>0.05$ ) between male and female in terms of how malaria is transmitted and symptoms of malaria (Table 3). Females had higher knowledge ( $p=0.005$ ) on symptoms, while males showed relatively more knowledge ( $p=0.04$ ) on malaria transmission. Among Nicobarese, knowledge of the mosquito name responsible for transmitting malaria parasite and the biting time were significantly more among females (Table 3). In both the communities, all reported of using, one of the preventive measures against mosquito bites (Figure 1). Almost all respondents reported that insecticides are sprayed on the walls of their houses to control malaria, twice a year. However, the knowledge on the name of malaria vectors, potential breeding habitat, etc. were lacking in both the communities.

### **3.2 Focus Group Discussion (FGD)**

Of the 16 mothers involved in the discussion, all Nicobari mothers were home makers in the age group of 23-50 years. Among the eight non-Nicobari mothers, 5 were home makers and the rest 3 were social workers, daily wage worker and Anganwadi worker in the age of 27-55 years.

#### **3.2.1 Local perceptions of malaria and health seeking behavior**

Malaria, tuberculosis, diabetes, hypertension, scabies, hepatitis-B, were reported to be the most common health problems in both the

communities. Both groups did not rely on traditional healers completely. The following responses from mothers describe their health seeking behavior.

“All health facilities are available in PHC but we have to wait for half an hour to one hour to consult the doctor, hence we depend on home based remedies for treating fever, cold and cough and approach the medical only when not relieved’, a 32yr Nicobari explained.

A non-Nicobari mother of 35 years briefed “When any of my family member gets fever, we go to the nearby PHC and consult the doctor. Health facilities are good in the hospital and working system is satisfactory”. However, some of them reported that they do self medication through medicines obtained from the local medical shop.

### **3.2.2 Knowledge on the cause of malaria and symptoms**

Majority of the Nicobari mothers were ignorant of the fact that malaria parasite spreads through mosquito bite. They opined that all age groups are equally vulnerable to malaria. In addition to the knowledge on how malaria is transmitted; they had a relative knowledge on its symptoms such as fever, nausea, headache and shivering. Most of them reported that malaria mosquito bite all the time and they can breed in stagnated fresh or dirty water.

Non-Nicobari mothers had a relative knowledge on how malaria transmits. A mother of age 49 expressed that shivering and cold are the symptoms for malaria. Two of them reported that fever and headache are the common symptoms found in patients. However, nobody could answer either the name of mosquito which transmits malaria or its biting time.

### **3.2.3 Opinion on the malaria control / preventive measures adopted by the community**

A few of the Nicobari mothers reported that malaria is preventable if the breeding sites of

mosquitoes are destroyed. The control strategies suggested were, clearing the stagnated areas, keeping the surroundings clean and tidy and sleeping under mosquito nets at night. Majority of them used personal protection measures such as bed net or liquid vaporizers. All age groups use bed nets and possess them in the ratio of one bed net for 3 persons. Insecticide treated bed nets were provided once by the health department. A few of them described the anti larval spraying carried out by the local health department at fortnightly intervals. During a query of DDT spray, they reported that they did not allow spraying of DDT inside their houses due to the pungent odour associated with spraying. Therefore they were letting them to spray on the walls of the houses from outside.

Almost all non-Nicobari households were using liquid vapourizer as repellent. Few of them use bed nets, when the mosquito nuisance is more. They also followed a conventional method of burning leaves to keep away mosquitoes. There was no difficulty among non Nicobarese with DDT spray being done yearly twice. They were aware of the problem and had the feeling that the disease can be controlled. Malaria can be cured if treated well. 'Mosquito nuisance is the major problem here and we cannot stay outside the house after sunset, one or two unused water bodies are here in the surroundings', said a non-Nicobari mother of 40 years.

## **4. Discussion**

Nicobari respondents were migrants from different islands of Nicobar district and reside at Great Nicobar in temporary shelters under unhygienic conditions. Almost 41% of the family consists of 4-5 members and 25.7% of the households have 6 or more members. However, few are Government servants living in Govt. quarters. Poor living conditions and poor health seeking behavior make them vulnerable to malaria frequently. Among non-Nicobarese, 51% are living

in permanent shelters (Tsunami shelters) with relatively better hygienic condition. None of them are living in huts even though they are economically backward. Socio-economic condition of the community plays a significant role in the implementation of disease control strategy for malaria.

A study from Bangladesh showed that poverty and level of schooling are the important determinants of malaria knowledge and practices (Ahmed et al., 2009). In the present study, literacy was moderate among the Nicobari respondents, with 25.7% at primary level and 61.4% at high school level of education. This may be due to special concession to this community for free education, provided by the Andaman administration.

Earlier studies had shown that improved community knowledge on malaria and its transmission, promoted the adoption of preventive and personal protective measures (Ahorlu et al., 2006; Tatem & Smith, 2010). There was no significant difference between Nicobarese and non-Nicobarese, regarding the awareness on malaria and its symptoms. Non-nicobarese had higher awareness (almost 83%) on the role of mosquitoes in transmission. However, there was gender wise difference ( $P=0.040$ ) on the knowledge of its transmission. The community identified malaria mainly by its symptoms such as fever, headache, chill, sweating, vomiting and weight loss. Studies from Tanzania also reported similar observations (Mazigo et al., 2010; Kinung'hi et al., 2010).

Studies from India and Tanzania recorded lack of community knowledge on the breeding sites of malaria vectors (Mary et al., 2016; Madne et al., 2014). In Bihar, India, 66.67% of the respondents reported that malaria is transmitted by mosquito bite and 26.53% reported mosquitoes to breed in clean water (Singh & Dhiman, 2013). In the present study, respondents had poor knowledge on the breeding sites of malaria transmitting mosquito in

both the community groups. It is important that advocacy campaigns aimed at enhancing community knowledge on malaria should focus on the vector bionomics and its control, in order to make the control programme more effective. Field trips for the school students to the mosquito breeding sites could be a significant step towards improved awareness. School children were observed to have better knowledge on malaria and mosquitoes than adult respondents (Mary et al., 2016).

The study participants were found using one or other personal protective measures against mosquito bites. Usage of fan as a protective method for mosquito bite was the common response from both the groups, followed by bed net, liquid vaporizer, usage of window/door screen, coil and burning of leaves. Use of repellent cream was less common among both the groups. Bed net (almost 75%) and liquid vaporizers were observed to be used commonly by both groups. Majority of the households owned more than one bed net and had purchased them from shops. Only 21% of the non-Nicobari households and 5.7% of the Nicobari households were using insecticide impregnated bed nets distributed by the local Primary Health Centre (PHC). The use of bed net was an encouraging observation among the community and made their home safer from mosquito bites. The reports of various studies proved that the use of nets treated with insecticides is an effective tool against mosquito bites which reduced morbidity and mortality due to malaria (Takken, 2002; Govella et al., 2010).

In the two FGDs conducted for Nicobari and non-Nicobari mothers, discussion revealed that the latter had sufficient knowledge on malaria with a better understanding of its control and preventive measures. Previous studies have shown that mothers' understanding of malaria and related issues is a key factor in achieving effective malaria control in endemic communities (Ibidapo, 2005). Given the prime roles played by mothers, there is a

need to integrate them into malaria control programme, especially in preventing water stagnation in their house premises. Most of the Nicobari mothers did not believe much in hospital treatment, may due to their strong belief in home based remedies. Socio-cultural beliefs about the causation of the disease and its curability have direct correlation with the treatment seeking behaviour of the people (Oberlander & Elverdan, 2000). Cultural beliefs and social life of the two communities are entirely different in this area, which are likely to reflect in their attitude towards health related issues. Participants of both groups had a moderate level of understanding on malaria symptoms, since the study area is endemic for the disease. In addition to the knowledge on breeding places of other mosquitoes, non-Nicobari mothers were aware of the breeding places of malaria transmitting mosquitoes. Most of them did not allow insecticide spray inside their houses. Community acceptance of an intervention plays a major role in the success of any control strategy. Sustainability and success of community based intervention largely depend on social, cultural and economic aspects of the target population (Aikins et al., 1993; Binka & Adongo, 1997). Cleaning the surroundings, filling unused water bodies, burning leaves were the methods suggested by the non-Nicobari participants to control malaria. Our study among mothers was meant to determine the knowledge on various aspects of malaria, as it is their sole responsibility to take care of the entire family. The mothers in both communities had relatively good level of knowledge on malaria and its control and prevention. However, the knowledge of the mosquito vector and their biting time was negligible.

## **5. Conclusion**

Our study revealed that community at Great Nicobar Island had moderate knowledge regarding malaria, its causes, symptoms and preventive measures. Both the Nicobari and non-Nicobari are

aware of its pros and cons, though the Nicobarese are socially and economically backward. Those who were prone to this disease and overcame it were much aware of its symptoms and treatment than others. The respondents participated in KAP and FGD reported of adopting at least one method of personal protection measure to prevent mosquito bite. This study explores the need to create awareness on vector bionomics, treatment seeking behavior and source reduction to the community through effective participation, thereby enhance the impact of malaria control programme. Self Help Group (SHG) with 10-15 female members in each village is an ideal medium through which the awareness on malaria and its vectors could be imparted, so as to reach each household. Frequent IEC campaigns in schools can facilitate the control programmes, as children can impart their knowledge on vectors to their immediate family members.

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