Perception of a Tribal Dominated Population towards use of Impregnated Bed Net for the Control of Malaria in Dungarpur District, Rajasthan

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Abstract

The studies have been carried-out in two villages of Dungarpur district, which is one of the five districts selected under 'Enhanced Malaria Control Programme (EMCP) of the country for conducting trials of insecticide impregnated bed nets for the control of perennial malaria. The investigations were confined to collect information mainly on the perception of the inhabitants in respect of practices and attitude towards the use of bed nets. The data at house-hold (HH) level was collected on the coverage, duration of usage, preferred season, protection of family members & vulnerable groups e.g. infants and pregnant women, protection period and sharing of bed nets, besides their viewpoint on advantages of bed nets and practices of storage during day time, washing intervals and re-impregnation of the bed nets. The results of the analysis in relation to coverage of bed net distribution, percentage of HHs with adequate bed nets, duration of bed net usage, reasons for whole family not using nets, protection to infants/children & pregnant women, time of pitching the nets, sharing, advantages and re-impregnation have been discussed in this paper. The entomological data collected during the investigations has been correlated with the practices of bed net usage by the inhabitants.

Introduction

Malaria threatens the lives of 3.2 billion people globally and leads to over one million deaths annually (World Health Organization, United Nations Children Fund, 2005). In the absence of a vaccine, the only method of malaria control, suitable for implementation at PHC level, is treatment of clinical cases as early as possible, chemoprophylaxis and vector control (Cruz Natalie De La et al, 2006). As far as the vector control is concerned, in the recent years besides indoor residual spray (IRS), which had been a definite tool to curb the episodes of malaria, insecticide treated bed nets (ITBs) have emerged as a promising tool to reduce the rising incidence of malaria in highly endemic areas (Lengeler, Cattani, Savigny Don de, 1996). Strong convincing evidences are now available to document the beneficial impact of ITBs on malaria disease episodes particularly in children (Binka et al, 1996; Nevill et al, 1996). Most of the ITB trials have been carried-out under strict control and with substantial financial, human and technical resources and the conditions hardly resembling those in which a control programme must be delivered and sustained at PHC level. However, the cost, effectiveness, sustainability and practical feasibility of routine ITB implementation programmes have yet to be documented (Lengeler, Cattani, Savigny Don de, 1996). ITB programmes, being complex and costly, are not easy to implement mainly because of several operational components related to financing, distribution, periodic impregnation, replacements and above all people's perception, which may be regarded as a single factor responsible for the success or failure of an ITB intervention programme (Lengeler, Cattani, Savigny Don de, 1996; Aikins et al, 1993). Several studies have been carried-out to understand the social aspects of bed net usage, with particular emphasis on human behaviour, habits and perception towards the diseases as well as the intervention programme and found out that these aspects vary

from place to place and are area-specific (Aikins, Pickering, Greenwood, 1994; Binka, Adongo, 1997; Winch et al, 1997). It is now perceived that for a successful programme implementation, the local attitude to malaria, its treatment and prevention and feelings about nets are essential components to achieve and ensure the social acceptability of the implementation strategy ((Lengeler, Cattani, Savigny Don de, 1996; Aikins et al, 1993). The present study was formulated to study the perceptions of a tribal dominated population of Dungarpur district of Rajasthan, where ITBs have been introduced on trial basis for the prevention and control of malaria and the results of the investigations have been discussed in the present paper.

Material and Methods

1. Study area: The studies were conducted in Dungarpur district, which is situated on the east-western border of Rajasthan state. Out of the 10 tribal districts of the State, Dungarpur pre-dominantly consists of tribals in all the five Block PHCs. The district due to its ecological and bioclimatic factors and availability of vector fauna harbours bulk of malaria cases including *P. falciparum* too. It was also covered under erstwhile '*Plasmodium falciparum* containment programme'. This district represents a perennial type of malaria transmission due to the presence of multiple anopheline vector species. This is the only district in the state which has been selected out of the five districts of the country covered under 'Enhanced Malaria Control Programme' for conducting trial of insecticide impregnated bed nets for the control of perennial malaria. The district received 10.000 bed nets. The bed nets were single bed, white coloured and made up of synthetic material. Deltamethrin 2.5% SC (Flowable formulation) was supplied for the impregnation of bed nets. The dose for impregnation was 25 mg/m^2, at 6 monthly intervals.

2. Distribution pattern of nets: The bed nets were distributed by state government mainly in the rural areas. For the distribution of bed nets Bicchiwara block PHC was selected and from this block PHC two PHCs *viz*. Kanba and Deval were considered. From Kanba PHC, two villages Naval Shyam and Thana were selected for the inclusion in the programme, as where from Deval PHC only one village Bori was included. The selection criteria of the villages were malaria incidence, geographical location (approachability, presence of pond, canal and forested area in the vicinity of the village) and availability of all the castes. In the villages, each household was given bed nets according to the beds available or as per their demand. The total number of bed nets distributed in Naval Shyam was 2740 in 620 house holds, while 1960 bed nets were distributed in 275 house holds of Bori villages (Table 1). A token charge of Rs.20/- was fixed for each bed net. No charges for impregnation & re-impregnation were made. The bed nets were distributed in May 2001.

3. Study Design: For conducting the investigations two villages namely Naval Shyam and Bori were selected on the basis that these two villages had completed two years of bed nets distribution with 100% coverage. For the acceptability of bed nets and information on other operational aspects a household survey was conducted using a well designed questionnaire, covering 25-30% households in each village (Cruz Natalie De La et al, 2006; Winch et all, 1997; World Health Organization, 1987). The HHs were selected covering whole village proportionately from all castes and socio-economic strata.

Table 1: Details of population, households (HHs) and distribution of insecticide impregnated bed nets in study villages

Village	Total Populn.*	Total HHs*	Total B'nets Distri-buted*	Total HHs Surveyed	Populn. Of Surveyed HHs	Total B'nets recorded	% HHs With B'nets	% HHs With Adequate B'nets
Naval Shyam	4832	620	2740	158 (25.5%)	989	668	96.2	55.3
Bori	2400	275	1960	79 (28.7%)	511	294	94.9	49.3

*State Govt. Data

Results

1. Socio-Demographic characteristics of respondents: The socio-demographical characteristics of the respondents have been shown in Table 2. Among the respondents 54.8% were illiterate and 6.8% graduate/post graduate. Occupation-wise the maximum respondents were engaged in agriculture (65.4%), followed by service and labour class. Regarding their income the majority of them had the annual income between 5000 and 9000 (36.7%), followed by the category 10,000 to 19,000 (30.4%). As far as their demographic profile is concerned 6.5% population were less than 2 years and 22.3% between 2 to 9 years.

2. Bed net coverage: Based on the house to house survey, the coverage of bed nets distribution was found 96.2% in Naval Shyam and 94.9% in Bori village (Table 1), however, the percentage of the HHs with adequate bed nets was 55.3 and 49.3 % respectively.

3. Duration of usage: Regarding the duration of bed nets usage, it was found that 4.2% were not using the bet nets at all. In majority of the cases (92.4%) the bed nets were being used since last 2 years (Table 3). The most important reason for whole family not using bed nets was 'not having the bed nets in sufficient numbers' (83.3%). In some cases poor air circulation and curiosity of feasibility were also observed (Table 3). The most preferred season for bed net usage was rainy season (35.2%), followed by throughout the year except winter (31.7%). In Bori village the maximum usage was in rainy season, while in Naval Shyam it was throughout the year except winter season.

4. Sleeping time & protection by bed nets: Regarding the time of villagers going to bed it was observed that in majority of the cases it was between 9.00 and 10.00 PM (Table 4). The majority of the villagers (61.7%) preferred to pitch the bed nets at the time of sleeping (Table 4). In Bori village the bed nets were pitched permanently in comparatively higher cases (36.0%) than Naval Shyam village (13.8%), which may be attributed to tribal life-style of people to give protection to their children during day time while working in the fields. The sharing of the bed nets was observed in 74.9% cases, which was due to the shortage/non-availability of adequate numbers of bed nets to them (Table 4).

Table 2: Socio-demographical characteristics of the respondents

Characteristics	N	%
Sex :		
Male	191	80.6
Female	46	19.4
Caste		
Rajput	03	1.2
Brahmin	35	14.8
Patel	55	23.8
Bheel	117	49.4
Kalal	08	3.4
Others	07	3.0
Education		
Illiterate	130	54.8
Up to 8th	66	27.8
Up to 12th	25	10.6
Graduate	07	3.0
Post graduate	09	3.8
Occupation		
Agriculture	155	65.4
Service	44	18.6
Labour	15	6.3
Shopkeeper	06	2.5
Others	17	7.1
Annual Income		
<5000	03	1.3
5000-9000	87	36.7
10000-19000	72	30.4
20000-50000	43	18.1
>50000	32	13.5

5. Advantages of bed nets: Regarding the people's perception about the advantages of bed nets, most of them (32.9%) were of the opinion that it prevents mosquito bite, followed by other insects bites (Table 5). Only 11.9 % people did not know the use of bed nets at all.

6. Protection to vulnerable groups: Regarding the protection given to infants/children and pregnant women by bed nets, it was found that they were given protection in 81.9% cases, whereas, the pregnant women in 71.9% (Table 5). The infants/children were given more protection in Bori village than Naval Shyam, whereas, the pregnant women were given more attention in Naval Shyam in comparison to Bori village.

Table 3: Information on duration and season of usage along with the reason for whole family not using the bed nets

Bed net information	N	%
Duration of use		
Not Using	10	4.2
<1 year	03	1.3
1 year	03	1.3
2 year	219	92.4
>2 years	02	0.8
Season of usage		
Throughout the year	33	14.5
Throughout the year except summer	35	15.4
Throughout the year except winter	72	31.7
Rainy season	80	35.2
Summer season	03	1.3
Use some times	04	1.8
Reason for whole family not using		
Poor air circulation	12	11.1
Bed nets not in sufficient nos.	90	83.3
Not having enough money to get bed nets	01	0.9
Difficult to erect	02	1.9
Old people do not like	01	0.9
Issued less to see feasibility	02	1.9

7. Storage of bed nets: Regarding the storage of the bed nets during day time, it was found that most of the people (29.5%) preferred to keep them wrapped along with bedding, followed by hanging them in room (22.9%) and keeping permanently pitched (18.5%) (Table 6). In the Bori village the number of permanently pitched bed nets was found quite high.

8. Washing of bed nets: The washing of bed nets was observed in 38.8% cases. In majority of cases, the washing was preferred before re-impregnation (77.3%), while in 11.4% it was done when net gets dirty (Table 6).

Table 4: Information on time of going to bed, time of pitching the nets and their sharing

Parameters studies	N	%
Time of going to bed		
Before 9.00 PM	26	11.5
At 9.00 PM	130	57.3
At 10.00 PM	68	29.9
After 10.00 PM	03	1.3
Time of pitching bed nets		
At the time of sleeping	140	61.7
In the evening	39	17.2
Always pitched	48	21.1
Bed net sharing habit		
Yes	170	74.9
No	57	25.1

Table 5: Data on the advantages of bed nets and protection given to vulnerable groups

Parameters studied	N	%
Advantages of bed nets		
Prevent mosquito bites	74	32.9
Prevent mosquito and other insects' bites	64	28.2
No fever/No malaria	05	2.2
No Cold	05	2.2
No mosquito bite and fever	44	19.3
No diseases	06	2.6
Prevents all bites including snake	02	0.8
Don't know	27	11.9
Protection to infants/children	59	81.9
Yes	13	18.1
No		
Protection to Pregnant women	46	71.9
Yes	18	28.1
No		

9. Re-impregnation of bed nets: Regarding the re-impregnation of the bed nets, it was observed that the percentage of re-impregnation was reduced with each re-impregnation schedule and an overall reduction of 72.6% was observed till 3rd re-impregnation (Table 6). At individual village level, the reduction in re-impregnation was higher and regular in Naval Shyam in comparison to Bori village, where the re-impregnation rate was found maintained between 2nd and 3rd re-impregnation schedules. The important reasons for not going for re-impregnation was 'No information regarding re-impregnation camps', followed by no time to go for re-impregnation every time and own carelessness (Table 6).

Table 6: Information on storage, time of washing, re-impregnation and reasons for not going for re-impregnation of bed nets

Bed net Information	N	%
Place of Storing		
Along with bedding	67	29.5
Inside almirah	27	11.9
Inside Box	16	7.0
Hanging in room	52	22.9
Permanently pitched	42	18.5
Keeping anywhere	08	3.5
Inside plastic bag	10	4.4
Time of washing		
Before re-impregnation	68	77.3
During winter	04	4.5
Every two months	04	4.5
Every month	02	2.3
When dirty	10	11.4
Re-impregnation		
First impregnation	951	100.0
First re-impregnation	673	70.8
Second re-impregnation	455	47.5
Third re-impregnation	265	27.4
Reasons for not re-impregnating		
No time for re-impregnation	47	22.1
No information about camp	66	30.9
Own carelessness	24	11.3
No Reply	36	16.9
Out of station	17	7.9
No knowledge of re-impregnation	14	6.6
Don't use regularly	09	4.2

Discussion

A token charge for each bed net has deprived many persons from getting the bed nets in adequate numbers for their families due to financial constrains, whereas few over procured. In such cases where token charge is taken, the time of distribution must coincide with the season of cash flow to the inhabitants or bed nets should be available for the distribution throughout the year. In the bed net trial, though the attempt has been made to cover 100% HHs, but still there were some HHs without bed nets. The percentage of HHs with adequate bed nets was approximately 50%, which was largely due to the non-availability of bed nets in sufficient numbers. The main reasons for this were that the nets were distributed as per the number of cots available in each family, not the number of members.

The percentage of bed net users throughout the year was low. This can be increased by imparting health education about importance of impregnated bed nets. This was mainly due to the fact that people believe that mosquito bite is associated with rains and in summer the bed net causes suffocation. In other studies also it has been found that the inhabitants used bed nets only in rainy season and not in summer and dry seasons (Frey et al, 2006; Tanzania, 2004). Seasonality is an important consideration in bed net usage, not only in how it affects the use of nets, but also in the perceived risk of malaria related to when the mosquito population is largest. Perception about risk of malaria transmission may be associated with mosquito density even if the link between malaria and mosquitoes is not made (Winch et al, 1994). The studies have revealed that the bed net usage was high in the village which has more tribal population which reflects that the ethnic groups have comparatively higher tendency to use bed nets (Aikins, Pickering, Greenwood, 1994; MacCormack, Snow, 1986).

The protection to infants/children and pregnant women by bed nets has been given in majority of the cases in both the villages. Infants and children under five years of age have not yet developed protective levels of immunity due to limited exposure to malaria and in the endemic areas they are both at high risk of malaria infection and vulnerable to severe malaria when infected (World Health Organization, 2003). Hence they constitute one of the main target groups for malaria control interventions. In the present study it was found that this group has been given protection in majority of the cases (81.9%). Pregnant women are also in the category of target group for malaria control interventions as the protective immunity, developed in adults is impaired during pregnancy (World Health Organization, 2003). In such areas pregnant women with symptomatic malaria often have severe anemia and low birth weight is a common outcome. In the areas with low transmission when adults do not develop protective immunity malaria infection in pregnant women is associated with severe disease and high maternal and perinatal mortalities. Hence their protection is of utmost importance. In the present study area this aspect has been well attended and the pregnant women were given protection from mosquito bites in majority of the cases (71.9%).

In majority of the cases the bed nets were pitched at the time of going to bed. Though this is not a good practice, but in this area, keeping in view the biting time of the vector species *An. culicifacies* during whole night human bite collection was observed only after midnight and early morning hours. Hence the total protection from mosquito bites can be achieved using bed nets.

The sharing of bed nets was observed in approximately 75% cases, which may be considered high as the chances of total protection from mosquito bites reduce in the cases where sharing is done.

The percentage of re-impregnation of bed nets was found reducing regularly at each re-impregnation schedule. The reduction in the rate of re-impregnation may be attributed to the publicity and awareness creation of re-impregnation. The important reason for not going for re-impregnation was 'No information regarding re-impregnation camps', which can be sorted out at programme implementation level.

It is important to find out what motivates people to use nets and what prevents. In the study area the important finding is that majority of the people (61.1%) have perception that bed nets protect them from the bites of mosquitoes and other biting insects. This is regarded as a positive perception and has been correlated with the success of the implementation programme in several studies (Odongo, Kirkwood, Kendall, 2005). The main reason for whole family not using the nets was 'not having sufficient in numbers', however, few expressed the reason as poor air circulation a negative perception. The token taken as cost of the bed net was also found responsible in certain cases for not having the bed nets in sufficient numbers, for whole family.

Conclusion

The studies revealed that the knowledge of use of bed nets for the prevention of the bites of mosquitoes and other insects and the practices of protecting the children and pregnant women were the positive perceptions, which can be regarded as important factors necessary to switchover from efficacy trials to effectiveness programmes in the study areas. When developing interventions the traditional beliefs and culturally defined behaviours should be classified as positive, harmful, neutral. The programme planners and implementers should reinforce positive beliefs and behaviour and find out means and ways to modify harmful ones. This should be incorporated in the health education modules and the provision should be made in the initial stage of the planning.

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