Evaluation of

Use of Long Lasting Insecticidal Net (LLIN) by Pregnant Women under 'Mo Mashari' Scheme and Effectiveness of Behavior Change Communication (BCC) Messages

On behalf of

Department of Health & Family Welfare (DH&FW), Government of Odisha

Commissioned by

Technical and Management Support Team (TMST), Odisha

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CONTENTS

TABLES

ABBREVIATIONS

ABER	Annual Blood Examination Rate	LLIN	Long Lasting Insecticidal Net
ANC	Antenatal care	LS	Lady Supervisor
ANM	Auxiliary Nurse Mid-wife	LT	Laboratory Technician
API	Annual Parasitic Index	MO	Medical Officer
ASHA	Accredited Social Health Activists	MPHS	Multi Purpose Health Supervisor
AWW	Anganwadi Worker	MPW	Multi Purpose Worker
BCC	Behavior Change Communication	MTS	Malaria Technical Supervisor
BMI	Body Mass Index	NVBDCP	National Vector Borne Disease Control Program
BPL	Below Poverty Line	OBC	Other Backward Caste
DoH&FW	Department of Health & Family Welfare	OHSP	Odisha Health Support Plan
EDCT	Early Diagnosis and Complete Treatment	Pf	Plasmodium falciparum
FGD	Focused Group Discussion	Pv	Plasmodium vivax
FLW	Front Line Workers	RDK	Rapid Diagnostic Kit
FTD	Fever Treatment Depots	RDT	Rapid Diagnostic Test
GKS	Gaon Kalyan Samiti	SC	Scheduled Caste
GoI	Government of India	SLI	Standard of Living Index
GoO	Government of Odisha	SPR	Slide Positivity Rate
IEC	Information, Education and Communication	SPSS	Statistical Package for Social Science
IPC	Inter Personal Communication	ST	Scheduled Tribe
IRS	Indoor Residual Spray	TMST	Technical and Management Support Team
ITMN	Insecticide Treated Mosquito Net	TT	Tetanus Toxide
KBK	Undivided Koraput Bolangir and Kalahandi districts	VHND	Village Health and Nutrition Day
LHV	Lady Health Visitor	WHO	World Health Organization

KEY FINDINGS AT A GLANCE

Key Indicators	Study Findings	
	LLIN Received Pregnant Women / Households	Non-LLIN Pregnant Women / Households
A. Study Denominators		
No. of households covered in the study	801	528
No. of household members	4050	2364
Average household size	5	4
No. of women completed their pregnancy	611	259
No. of currently pregnant women	198	270
No. of index children	593	272
B. Socio-Economic Characteristics of Pregnant Women		
% of pregnant women belonged to ST&SC	76%	67%
% of pregnant women had no education (illiterate)	60%	55%
% of pregnant women in lowest Standard of Living Index (SLI)	75%	79%
C. Distribution of LLIN to Pregnant Women		
Period/Trimester of Pregnancy when the LLIN was given to pregnant women (in %)		
1st Trimester	9%	
2nd Trimester	43%	
3rd Trimester	42%	
Occasion / Event when Pregnant Women were given LLIN (in %)		
VHND	33%	
Immunization	17%	
Other than any fixed health days	43%	
% of eligible pregnant women given LLIN under Mo-Mashari scheme	84%	
Retention of LLIN by pregnant women under Mo-Mashari scheme (%)	99.5%	
D. LLIN /Any Net Possessed by Pregnant Women and Households		
% of households owned bed net/s	100%	57%
Average no. of LLIN possessed per household in Mo-Mashari + Cluster areas	1.9	
Average no. of LLIN possessed per household in Cluster Only areas	1.6	
Average no. of any net possessed per household	1.8	0.7
LLIN/Net use by Pregnant Women and Household members		
% of pregnant women reported sleeping under LLIN during pregnancy	89%	
% of pregnant women regularly using LLIN during pregnancy (out of those sleeping under LLIN)	96%	
% of pregnant women slept under LLIN in the previous night	91%	
% of index child slept under LLIN in the previous night	90%	
% of pregnant women with index child slept under LLIN in the previous night	88%	
% of household members slept under LLIN in cluster distributed areas	70%	
% of household members slept under any net	72%	38%
E. BCC Campaign		
% of households attended Nidhi Ratha Campaign in campaign villages	67%	
% of households attended Jatra / Folk Theater	66%	
BCC messages mostly received by people	Causes & symptoms of malaria & use of bed nets	
BCC messages least received by people	Proper use and maintenance of LLIN	
F. Outcomes		
% of pregnant women diagnosed with malaria	2%	4%
% of index children diagnosed with malaria	2.3%	3.8%
% of any anaemia amongst currently Pregnant Women (<11g/dl)	48.5%	68.5%
% of any anaemia amongst Women Completed Pregnancy (<12g/dl)	56.6%	70.5%
% of any anaemia amongst Young Children (mostly index child <2 years (<11g/dl)	77.7%	88.2%
% of underweight women (BMI <18.5)	33.8%	42.9%
% of severely / moderately thin women (BMI <17.0)	10.1%	20.2%
% of underweight children (Weight for Age) (< -2SD)	39.8%	41.5%
% of wasting children (Weight for Height) (< -2SD)	28.8%	31.7%
% of stunting children (Height for Age) (< -2SD)	41.4%	44.4%

SUMMARY BRIEF

1. Incidence of Malaria in Odisha

Odisha, one of the few States in India, is highly endemic to malaria. In year 2010, out of 52,40,458 persons underwent blood tests in the State 3,99,651 cases were found to be malaria positive. The proportion of *falciparum* malaria is significantly high in Odisha which causes complications and deaths (89% of malaria cases in 2010 were due to Pf parasite). The burden of malaria in the State can be gauged from the fact that in year 2010, 20% of malaria cases, 33% of *Pf* malaria cases and 25% of all malaria deaths reported in India were from Odisha, though Odisha is home to only 3.5% of total population in India. The Annual Parasitic Incidence (API-9.3) in Odisha was found higher in comparison to India (API-1.3).

2. Vulnerability of Pregnant Women to Malaria

Pregnant women and young children are highly vulnerable to malaria infection as pregnancy reduces a woman's immunity to malaria, making her more susceptible to infection and increasing the risk of severe anaemia and death. *Plasmodium falciparum* (most prevalent in Odisha) causes maternal anaemia and impaired foetal growth, both of which contribute to low birth weight in newborns. Asymptomatic malaria among pregnant women also leads to placental parasitaemia, which contributes to spontaneous abortion, stillbirth, premature birth and intrauterine growth retardation.

3. Malaria Control Strategies and Interventions in Odisha

Integrated Vector Control is one of the key program strategies adopted by the National Vector Borne Disease Control Program (NVBDCP) under the Department of Health & Family Welfare (DoH&FW), Government of Odisha for prevention and control of malaria. Among various measures undertaken by the State, Long Lasting Insecticide Treated Nets (LLIN) is a recent addition to the interventional tools for malaria control in Odisha. Around 19 Lakh LLINs have been distributed to the population in high malaria risk clusters during 2009-10 and another 19 lakh LLINs are being distributed (second phase) in the first quarter of 2012 under the support from Govt. of India. Along with LLIN distribution, massive health education and BCC campaign have been made to upscale regular use and maintenance of LLINs.

4. Mo-Mashari Scheme: Protection of Pregnant Women from Malaria

Before 2008, the National Drug Policy for malaria had recommended the use of Chloroquine as chemoprophylaxis in pregnancy i.e. 2 tablets weekly once after the 1st trimester and to continue till one month after delivery. Considering the widespread resistance of *falciparum* malaria to Chloroquine in India, the National Drug Policy 2008 did not recommend this anymore. Hence the use of Chloroquine as chemoprophylaxis has been stopped in India and Odisha after 2008.

But considering the maternal and child mortality burden in the state, it was decided to protect the pregnant women and young children form malaria infection by providing Long Lasting Insecticidal Nets (LLIN) in high malaria burden districts. Thus the state initiative 'Mo-Mashari' i.e. Protection of pregnant women by LLIN scheme was launched on November 18, 2009 in five districts of Odisha. This was implemented as a pilot intervention for a period of one year during which 1 lakh LLINs have been distributed to the pregnant women. Health massages on regular use and maintenance of LLINs through interpersonal communication channels (ASHA, AWW and female health workers) were also communicated to the pregnant women during and post distribution period.

5. Evaluation of Mo-Mashari Scheme and Effectiveness of BCC messages

Having completed one year of pilot phase, the Mo-Mashari scheme was evaluated to estimate the use

of LLIN among the pregnant women. Apart from the same, health awareness campaign named *'Nidhi Mousa to Masari Ne'* was also evaluated to know its impact and effectiveness. The evaluation was commissioned by the Technical and Management Support Team (TMST), set up by DFID on behalf NVBDCP, Odisha under DoH&FW.

6. Methodology of Evaluation

The evaluation adopted a combination of exploratory and comparative study designs. Four districts were covered under the study out of which two are Mo-Mashari districts (viz. Kandhamal and Rayagada) and the others are Non Mo-Mashari districts (viz. Kalahandi and Nuapada). Type of areas covered in the evaluation is as follows:

a) 'Mo-Mashari Only' Areas: Distribution of LLIN was made for a period of one year to all the eligible Pregnant Women in Non-Cluster areas of Mo-Mashari districts.

b) 'Mo-Mashari + Cluster' Areas: One time distribution of LLIN was made to households based on need with an extra LLIN to Pregnant Women. Then, subsequent distribution was made to Pregnant Women for one year in Cluster areas of Mo-Mashari districts.

c) 'Cluster Only' Areas: One time distribution of LLIN was made to households based on need with an extra LLIN to Pregnant Women (no subsequent distribution to pregnant women).

d) 'Non-LLIN' Areas: Matching areas were covered in the study where LLINs were not distributed for comparative assessment.

Interviews were conducted in a total of 1329 sample households (801 LLIN received and 528 Non-LLIN households) selected from 109 villages in 32 Sub-centres of 11 Blocks in 4 study districts. A comparative assessment between LLIN received and Non-LLIN households was made in the evaluation to measure the output and outcome level changes brought in under the LLIN intervention.

The LLIN received households include 611 women who had completed pregnancy, 198 currently pregnant women (at the time of survey) and 593 young children (majority born to women after receiving LLIN). The Non-LLIN households have 259 women completed pregnancy, 270 currently pregnant women and 272 young children.

7. Findings of the Evaluation

7.1 Socio-Economic Characteristics of Study Respondents

The key socio-economic characteristics of pregnant women interviewed in the study are more or less similar.

- 76% in LLIN received households belong to ST&SC communities as compared to 67% in Non-LLIN households.
- 60% of pregnant women in LLIN received households are illiterate in comparison to 55% in Non-LLIN households.
- 75% LLIN received households were found to be in lowest SLI as compared to 79% in Non-LLIN households.

Majority of pregnant women in both the sample groups are backward in terms of their education, castes and standard of living.

7.2 LLIN Distribution to Pregnant Women

Different modes of LLIN distribution was adopted by Blocks covered under the study. The ANMs in Bissamcuttack and Ramanaguda Block of Rayagada district aimed to distribute LLIN during antenatal check-ups whereas administration of TT was targeted in Baliguda and Tikabali Block of Kandhamal district. The study revealed:

- Only 9% of pregnant women were given an LLIN during 1st Trimester (43% and 42% received during 2nd and 3rd trimester respectively). Late registration of pregnant women, absence from ANC services, etc. were found as reasons for lesser coverage during the 1st Trimester.
- ANM was found as the main conduit of LLIN distribution (84% of Pregnant Women were provided LLIN by ANMs). Left outs were given LLIN by ASHA / AWW at AWC or home.

- Only 33% and 17% of Pregnant Women were given LLIN during VHND and Immunization Day respectively. Maximum i.e. 43% were given LLIN on days other than any specified health day.
- 51% of Pregnant Women were given LLIN at the Sub-centre followed by 36% at AWC.

7.3 LLIN Coverage of Pregnant Women

84% of pregnant women were given an LLIN during the distribution period under Mo-Mashari scheme. The remaining 16% could not be given LLIN due to insufficient LLIN with ANM, absence of pregnant women during distribution and leaving out those who already received 1st ANC & TT, etc.

7.4 LLIN Retention by Pregnant Women and Households

The LLIN of almost all i.e. 99.5% was visually verified by the evaluation team which indicates complete retention of LLIN by pregnant women. Also majority i.e. 96% of LLINs possessed by households in cluster distributed areas were visually verified by the team.

7.5 LLIN/Nets Owned by households

Due to LLIN distribution by the government, the average no. of any nets possessed by LLIN-received households (1.5 nets in Mo-Mashari only, 2.1 in Mo-Mashari + Cluster and 1.7 in Cluster only areas per household) was found to be much higher than the nets possessed by Non-LLIN households (0.7 nets per Non-LLIN household).

7.6 LLIN / Net use by Pregnant Women

- In Mo-Mashari + Cluster areas, 89% of women reported sleeping under LLIN during pregnancy and 96% of them were regular users.
- 91% of pregnant women in LLIN-received households slept under LLIN in the previous night.
- 88% of pregnant women slept under LLIN last night with their children under 2 years.
- Individual attention by frontline workers; importance given to pregnant women & young children by family members; etc. were found as key reasons behind higher use of LLIN by pregnant women.

7.7 LLIN / Net use by Household members

- While the use among pregnant women and young children is so high, the use rate is lesser (70%) among family members in villages where LLN has been distributed to the entire population.
- It is evident from the same that the household members, excluding the pregnant women and young children, less used the LLIN.
- Inadequate LLIN; smaller room size; social relations of family members; lack of individual attention were found as reasons behind lesser use of LLIN among household members.

7.8 Effectiveness of BCC

- More than 96% of people received prior information about date and venue of LLIN distribution in comparison to 81% received information on time of distribution.
- The dissemination of the Nidhi Ratha / BCC campaign was found higher in campaign villages in comparison to the tagged villages.
- 67% in campaign villages attended Nidhi Ratha campaign as compared to 26% in tagged villages. Near about similar percentages of people in campaign and tagged villages attended the video show.
- Messages on causes, symptoms, preventive methods, importance of using LLIN and retention of LLIN have reached to highest percentages of people in both campaign and tagged villages.
- But messages relating to maintenance of LLIN have reached to fewer people.

7.9 Key Outcomes of LLIN Use by Pregnant Women and Young Children

Incidence of Malaria Parasitemia

- The percentage of pregnant women diagnosed having malaria is only 2% in LLIN-received

households in comparison to 4% in Non-LLIN households.

- Similarly percentage of malaria was detected in 3.8% of young children in Non-LLIN households as compared to only 2.3% in the LLIN-received households.

Status of Anaemia

- Only 48.5% anaemia cases was found amongst currently pregnant women in LLIN received households as compared to 70.5% observed in Non-LLIN households, which is 20% lower in LLIN received households (research evidence across the world shows that protection from malaria helps reducing anaemia).
- Similar evidence of change in anaemia was observed in women who completed pregnancy (56.6% in LLIN received households as compared to 70.5% in Non-LLIN households) and children less than two years (77.7% in LLIN received households as compared to 88.2% in Non-LLIN households).

8. Suggestions / Recommendations

Coverage of Target Population

- Scaling-up distribution of LLIN to Pregnant Women
- Expansion of Mo-Mashari scheme to all malaria high burden districts
- Coverage of all pregnant women (current + new); requires clear mention in the guideline
- Coverage of all mothers with below 1year child
- Coverage of floating population

Planning

- Assessment of LLIN requirement of sub-centers based on past registration of pregnant women
- Concurrent assessment of increase in family population in cluster areas (covering newly married brides, new born, etc.)
- Keeping into account the relation & age of family members for proper assessment of LLIN requirement of households
- Supply of blue color LLIN to pregnant women (less maintenance, hence family members give more importance)

Supply & Logistics of LLIN

- Regular & adequate supply of LLIN from State to District and below
- Avoid equal and population based distribution to SC (get less/more than requirement)
- Proper storing facility of LLIN at Sub-Centre
- Providing LLIN immediately after knowing that the woman is pregnant (need not wait for 1st ANC/TT/VHND/Immunization Day)
- Engagement of MPW (M) for transportation of LLIN from CHC to SC and then to distribution point
- Periodic tracking and replenishment of LLIN

Monitoring

- Concurrent monitoring of LLIN distribution by MTS/BPMU/LS
- Monitoring of LLIN use by ANM/ ASHA/AWW during Home Visits
- Home visit to monitor the maintenance of LLIN
- Inclusion of LLIN Receipt in the MCH Card
- Periodic monitoring and evaluation studies on use and outcomes of LLIN applying LQAS and other methods

BCC

- Nidhi Ratha campaign and Folk Theater in all the villages should continue with higher coverage plan
- Involvement of GKS and SHGs in community mobilization, proper use and reiteration of messages
- IPC by frontline workers before and after LLIN distribution (during home visit, VHND, Blood Test, Immunization Day, etc.)
- Extra emphasis on maintenance of LLIN during Nidhi Ratha campaign/IPC
- A checklist of messages (in printed form) to FLWs for communication (more emphasis on use and maintenance of LLIN)
- Inclusion of Malaria focused IPC in the job chart of FLWs
- Knowledge building or orientation of FLWs - develop understanding on LLIN distribution, use, maintenance and IPC

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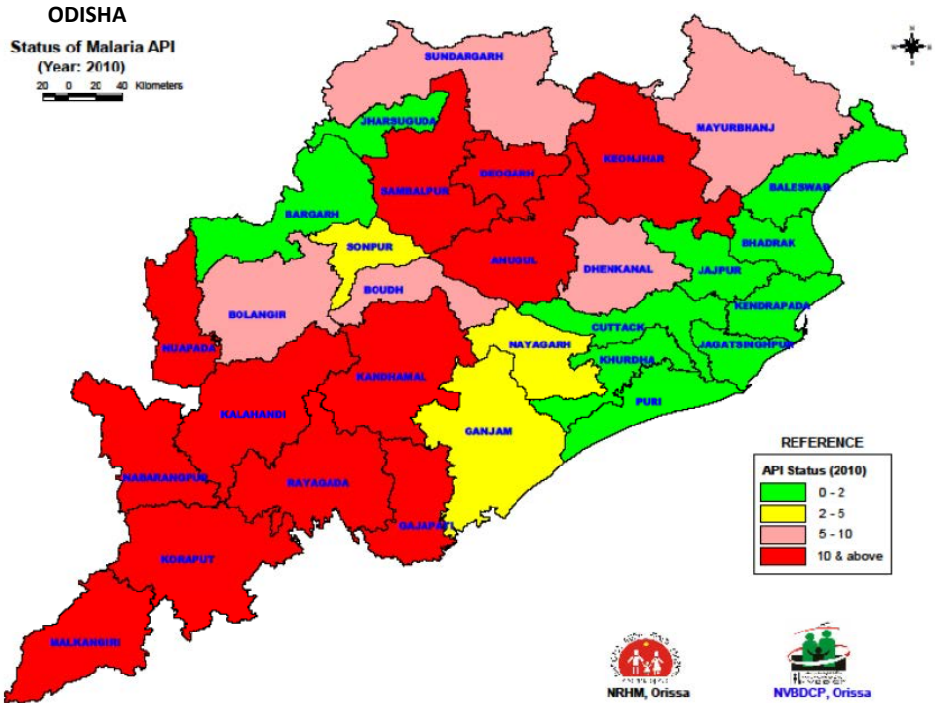
CHAPTER I

CONTEXT & STRATEGY FOR MALARIA CONTROL IN ODISHA

- Burden of Malaria in Odisha
- Vulnerability of Pregnant Women and Young Children to Malaria
- Trend of Malaria Prevalence in Odisha over the last ten Years
- Malaria Control Strategy and Interventions in Odisha
- Distribution and Use of LLIN: A Strategy to Control Malaria
- Mo-Mashari Scheme: An New state Initiative to Prevent Malaria during Pregnancy
- Behavior Change Communication (BCC) for use of LLIN

1.1 Burden of Malaria in Odisha



Odisha located in eastern India, is highly endemic to Vector borne diseases like – Malaria, Dengue, Chikungunya and Filaria. The tropical climate of the State provides the most favorable and conducive environment for the growth and development of vector population responsible for perennial transmission of the communicable diseases. Malaria is caused by five types of Malaria Parasite (P. Falciparum, P. Vivax, P. Ovalae, P. Malariae, P. Knowlesi).

The temperature (0^0C – 48^0C), rainfall (average 1451.2mm) and optimal humidity (>60%) are highly favorable for breeding of vectors and development of parasite that makes Odisha highly vulnerable to malaria and other vector borne diseases.

The climate in many parts of the state is favorable for the perennial transmission of malaria[1].

In 2010, 52, 40,458 persons have undergone blood tests for malaria out of which 3, 99,651 cases were found to be malaria positive[2] which is 20% of the total malaria cases reported in the country[3]. In majority i.e. 89% of the cases were due to the *Pf* parasite responsible for malaria in Odisha while it

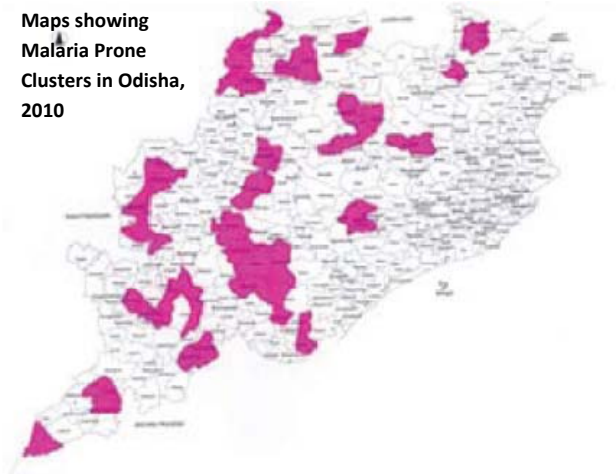
[1] Ranjit, 2006
[2] Odisha-NVBDCP epidemiological data, 2001 to 2010
[3] NVBDCP Website, GoI

is only 52% in India. Odisha is one amongst the few States of India where all 4 *Plasmodium* species (viz. *vivax, falciparum, malariae* and *ovale*) of human malaria have been reported from the state[4], although the incidence of *Plasmodium Malariae and Ovale* is negligible.

In 2010, the Annual Parasitic Incidence (API-9.3 per one thousand population) in Odisha[5] was found higher in comparison to India (API-1.3 per one thousand population)[6]. The burden of malaria in Odisha can be gauged from the fact that 25% of all malaria deaths and 33% of *Pf* malaria cases reported in India in 2010 were from Odisha[7], though Odisha is home to only 3.5% of total population in India[8]. While in the year 1996, Odisha was the major contributor to malaria burden of India with 50% of all malaria deaths, 43% of *Pf* malaria cases and 22% of malaria cases reported in the country[9] were from the State (1996).

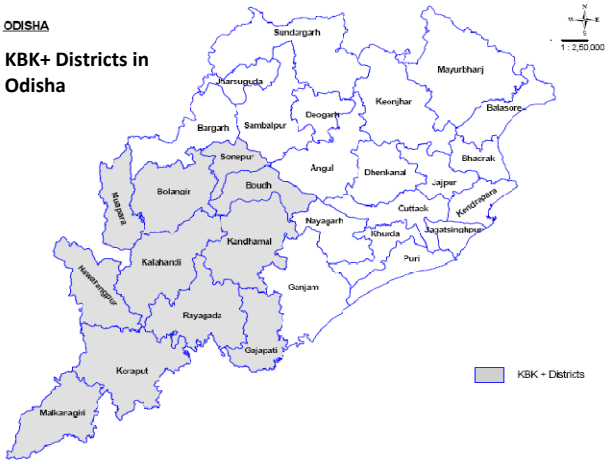
Majority of malaria cases in Odisha are being reported from the Southern, Western and Northern belt of the State which are mostly covered with forests, forest fringed areas and hilly terrains largely inhabited by ethnic or Scheduled Tribe (ST) communities. As shown in the map, 17

Maps showing Malaria Prone Clusters in Odisha, 2010



clusters have been identified as highly malaria prone areas in the state of Odisha. These clusters are spread over 27 districts out of 30 districts having API more than five. Out of these, 15 clusters are located in the Southern, Western and Northern part of Odisha. In contrast, the Eastern or coastal plains in Odisha have meager concentration of malaria clusters.

Out of the 30 districts, the KBK+ districts (11) located in the Southern and Western parts of Odisha are included under the bracket of high API



zones. The KBK+ districts with 25% of State population and 50% tribal population, contribute. 66% of malaria caused deaths in Odisha.

Table 1. Proportion of KBK+ districts to State population and malaria deaths

	Odisha	KBK+	% in KBK+
Population[10]	41,947,358	10,398,356	24.8
Malaria Deaths[11]	247	163	66.0

In KBK+ districts, 42% of the areas are covered with forests[12]; only 33% of the inhabited villages have paved road[13]; 55% of people are Scheduled Tribe and Scheduled Caste communities[14]; and as high as 72% of families live Below the Poverty Line (BPL). The poverty ratio is at least two and half times higher in southern region (72.7%) and two times

[4] Ranjit, 2006
[5] Odisha-NVBDCP epidemiological data, 2010
[6] NVBDCP Website, GoI
[7] NVBDCP Website, GoI
[8] Census of India, 2011 (Provisional)
[9] Sharma et al. 1996

[10] Census of India, 2011 (Provisional)
[11] Odisha-NVBDCP epidemiological data, 2010
[12] CCF, Odisha, 2004
[13] Census of India, 2001
[14] Census of India, 2001

higher in northern region (59.1%) than the Coastal region (27.4%) of the State[15]. At least 15 districts in Southern, Western and Northern part of Odisha are declared as extremely and severely food insecure[16]. In brief, people in high malaria burden areas in Odisha are less developed and more marginalized in terms of accessing health services which adversely contribute to their vulnerability to malaria.

1.2 Vulnerability of Pregnant Women and Young Children to Malaria

Among the adults, pregnant women are highly vulnerable to malaria as pregnancy reduces a woman's immunity to malaria, making her more susceptible to infection and increasing the risk of severe anaemia and death. Also malaria during pregnancy increases the risk of spontaneous abortion, stillbirth, premature delivery and low birth weight[17]. *Plasmodium falciparum* (the type of malaria that is most prevalent in Odisha) can cause maternal anemia and impaired fetal growth, both of which contribute to low birth weight in newborns. Asymptomatic malaria among pregnant women also leads to placental parasitemia, which contributes to spontaneous abortion, stillbirth, premature birth and intrauterine growth retardation[18].

In India and Odisha less number of studies has been conducted on pregnancy related malaria and thus the non-availability of adequate study findings on pregnancy related malaria makes it difficult to estimate the true morbidity and mortality burden of malaria among pregnant women and infants. One demography study conducted on malaria in 2007 reported approximately 125 million pregnancies in the world occurring in areas with *Pf* and/or *Pv* transmission, resulting in 83 million live births; representing 60% of all pregnancies globally. Approximately 85 million pregnancies occurred in areas with *Pf* transmission while 93 million occurred in areas with *Pv* transmission and 53 million occurred in areas where both species co-exist. Near about 77 million at-risk pregnancies occurred in Southeast Asia and the Western Pacific areas of the world (India had the most pregnancies at risk of both *Pf* and *Pv* malaria)[19].

In 2007, WHO estimates that, around 10% to 50% of maternal deaths, high rates of miscarriage (up to 60% in Pf infection) and 0.2 million infant deaths take place in different malaria endemic areas of the world due to malaria infection during pregnancy.

Therefore, this warrants for protection of women from malaria during antenatal period. Particularly, in malaria endemic State like Odisha with high percentage of *Pf* transmission, pregnant women and their young child are at greater risk of malaria morbidity and mortality.

1.3 Trend of Malaria Prevalence in Odisha over the Last Decade

The review of epidemiological data of the last ten years on malaria in Odisha show a declining trend in all the major indicators viz. number of malaria cases, number of deaths due to malaria, Annual Parasitic Incidence (API) and Slide Positivity Rate (SPR). Overall, the State's contribution to the number of malaria cases (22% in 1996 and 20%% in 2010), *Pf* malaria (43% in 1996 and 33% in 2010) and malaria deaths (50% in 1996 and 25% in 2010).

[15] Calculated from unit level data, NSS 61st round, 2004-05
[16] Food Security Atlas of Odisha, 2008
[17] WHO 2007
[18] Office of Health and Nutrition, USAID

[19] Quantifying the Number of Pregnancies at Risk of Malaria in 2007: A Demographic Study; Stephanie Dellicour, Andrew J. Tatem, Carlos A.Guerra, Robert W. Snow, Feiko O. ter Kuile

While an upward trend (i.e. an increase from 41,31,141 in 2001 to 52,40,458 in 2010) is observed in blood tests conducted for malaria, reverse or downward trend (i.e. reduction from 378,065 in 2001 to 3,99,651 in 2010) is observed in the number of cases found malaria positive in the State. The SPR which is a better indicator at low level of surveillance has also declined by more than 3 points from 2001 to 2010. Similar rate of decline is also marked in the API (12.35 in 2001 to 9.29 in 2010) of Odisha[20].

However, there is increase in the percentage of *Pf* cases (83.4% in 2001 and 88.6% in 2010), from 2001 to 2010. The total number of deaths reported in 2001 was 306 which were declined to 247 in 2010. But ***as per the provisional epidemiological data of 2011, a sharp decline has been observed by 60% in the malaria deaths (247 deaths in 2010 and 100 deaths in 2011) in comparison to other malaria indicators of the State.*** While there has been improvement in reducing malaria burden during last ten years, strategic program interventions adopted by the State need to be sustained to address menace of malaria in Odisha.

Chart 1. Malaria Epidemiological Data of Odisha, 2001-2011 (Source: Odisha-NVBDCP)

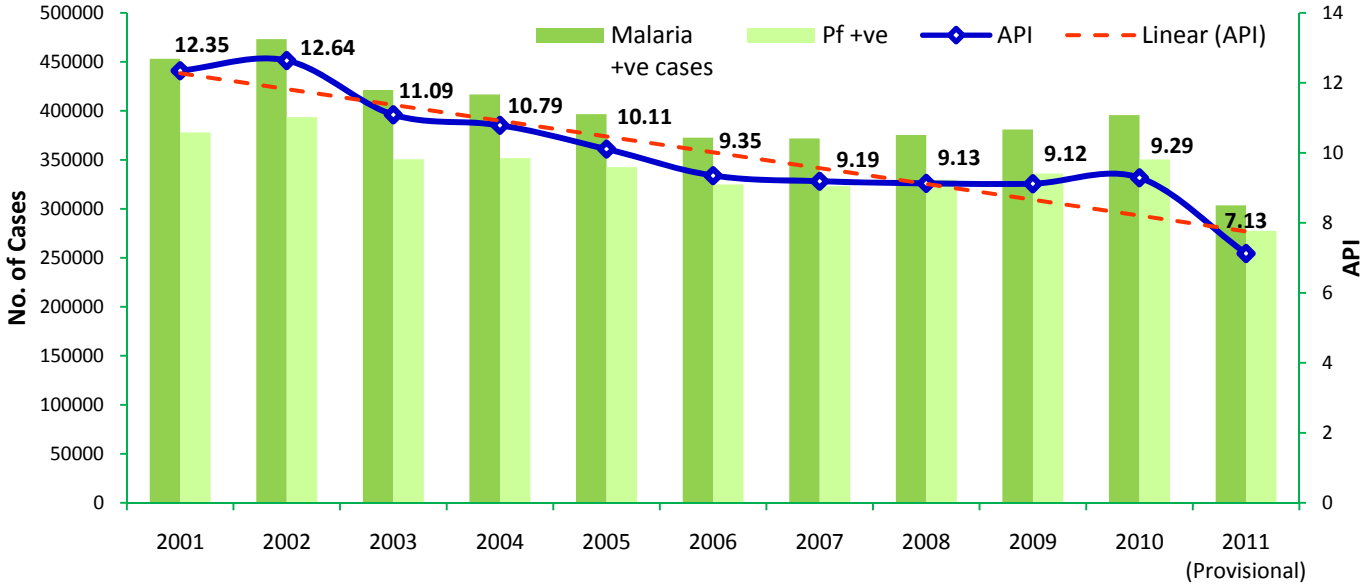


Table 2. Malaria Epidemiological Data, 2001-2011 (Source: Odisha-NVBDCP)

Year	Total Tested	+Ve	PF	Death	ABER	SPR	Pf%	API
2001	4131141	453155	378065	306	11.25	10.97	83.43	12.35
2002	4570466	473223	393523	465	12.21	10.35	83.16	12.64
2003	4430957	421323	350619	333	11.66	9.51	83.22	11.09
2004	4369409	416771	351737	283	11.32	9.54	84.40	10.79
2005	4848624	396573	342658	255	12.36	8.18	86.40	10.11
2006	4912657	372710	324893	257	12.33	7.59	87.17	9.35
2007	4945551	371879	323150	221	12.22	7.52	86.90	9.19
2008	5029677	375430	329631	239	12.23	7.46	87.80	9.13
2009	5015489	380904	336047	198	12.00	7.59	88.22	9.12
2010	5240458	395651	350428	247	12.30	7.55	88.57	9.29
2011 (Provisional)	4703259	303555	277529	100	11.04	6.45	91.43	7.13

[20] Odisha-NVBDCP epidemiological data, 2001 to 2010

1.4 Malaria Control Strategies and Interventions in Odisha

The National Vector Borne Disease Control Program (NVBDCP) under the Department of Health & Family Welfare (DoH&FW), Government of Odisha has adopted the following key strategies for prevention and control of malaria and other vector borne diseases in the State:

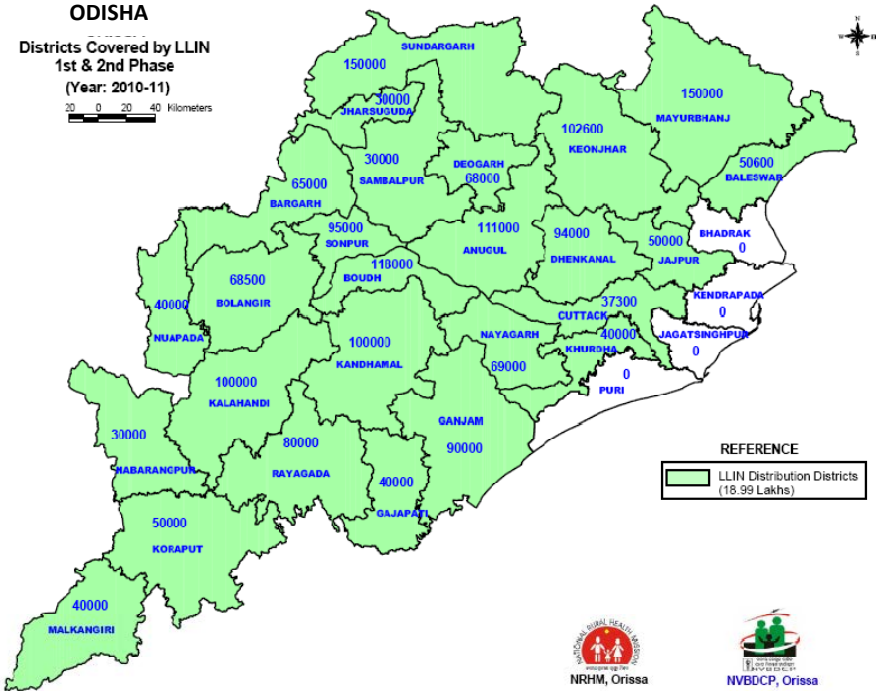
A. Surveillance and Case Management
   i) Case detection(active and passive)
   ii) Early Diagnosis and Complete Treatment (EDCT) by establishment of Fever Treatment Depots (FTD) Sentinel surveillance
   iii) Strengthening of Referral services & Management of severe & complicated cases
B. Integrated Vector Control
   i) Indoor Residual Spray (IRS)
   ii) Use of Insecticide Treated Mosquito Nets (ITMNs) / Long Lasting Insecticidal Nets (LLINs)
   iii) Anti-larval measures which includes source reduction
   iv) Epidemic preparedness and rapid response
C. Supportive Interventions
D. IEC/BCC
   i) Awareness Generation / Information to people
   ii) Demonstration and Social Mobilization campaign
E. Concurrent Monitoring & Supervision
F. Training and Capacity Building and Strengthening Human Resource
G. Inter-sectoral collaboration
H. Operational research

1.5 LLIN Intervention: A Tool to Control Malaria

Long Lasting Insecticide Treated Nets (LLIN) is a recent addition to the interventional tools for malaria control in Odisha. LLIN are mosquito nets made from insecticide impregnated fibers during the manufacturing process which enables them to retain the insecticide potency for three to five years and over about 20 washes. LLIN avoids the prior method of six-monthly impregnation of mosquito nets with insecticides, which is difficult to monitor and supervise in large scale programs.

1.5.1 LLIN distribution

The NVBDCP distributed about 19 Lakh (1.9 million) LLINs in the first phase during 2009-10 in 26 high malaria burden districts as shown in the map. This was based on a strategy to saturate the households in 17 clusters that having the highest incidence of malaria with an aim to reduce malaria transmission.



All households in the clusters were supplied with LLIN based on need[21] including provision of an additional LLIN to all pregnant women. The major source of supply for LLIN for the cluster approach was through the World Bank and Global Fund assisted National Vector Borne Disease Control Progamme (NVBDCP). LLINs have also been supplied by GOI for implementation at state level under the State NVBDCP as part of NRHM.

1.5.2 LLIN for Pregnant Women

Pregnant women are especially vulnerable to malaria due to their lowered immune status therefore they have been additionally targeted for distribution of LLIN in five malaria high burden districts, over and above the 17 identified cluster areas. Also the widespread resistance of Chloroquine and non-administration of any chemoprophylaxis to pregnant women recommended by the current National Drug Policy on Malaria-2010 are the other factors behind distribution and up-scaling use of LLIN by pregnant women.

This is a new specific initiative of the Department of H&FW, GoO supported by DFID funds provided under OHSP, named as 'Mo Moshari Scheme'. Under the scheme, 1.03 lakh LLINs were procured and distributed to the pregnant women in five districts. The distribution was started in March 2010 and continued approximately for a period of one year.

Hence, all pregnant women of these five districts in Odisha received LLIN through one of two routes:

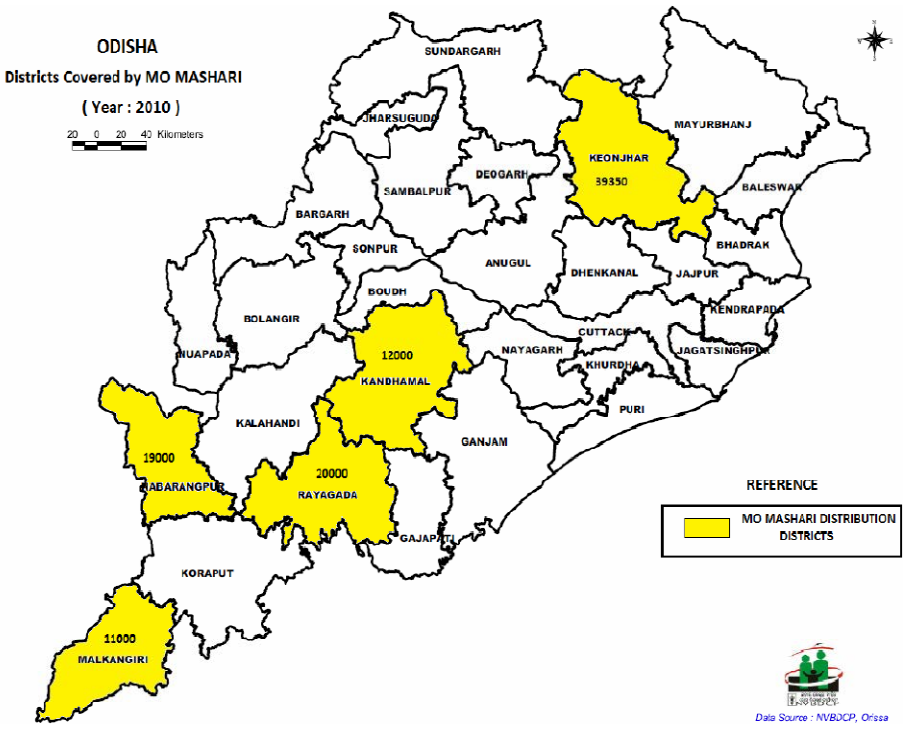
a) Cluster Distribution (GOI supplied LLIN) in 26 high malaria burden districts.

b) 'Mo Mashari' Distribution (DoH&FW, GoO supplied through OHSP) in five high malaria districts

The Cluster distribution was made through the Gaon Kalyan Samiti (GKS) or Village Health and Sanitation Committee. Mo-Mashari was provided to pregnant women during their registration for Antenatal care (ANC) at the Sub-centre. If a pregnant woman received an LLIN under Cluster Distribution, she did not receive a Mo-Mashari LLIN and vice versa as per state guidelines.

Based on the above, the entire LLIN distribution areas in the State can be categorized into three types, viz.

e) 'Mo-Mashari Only' Areas: Distribution of LLIN was made for a period of one year to all the eligible Pregnant Women in Non-Cluster areas of Mo-Mashari districts.



[21] LLIN Distribution Strategy of DoH&FW GoO 2010

f) 'Mo-Mashari + Cluster' Areas: One time distribution of LLIN was made to households based on need with an extra LLIN to Pregnant Women. Then, subsequent distribution to Pregnant Women for one year in Cluster areas of Mo-Mashari districts.

g) 'Cluster Only' Areas: One time distribution of LLIN to households was made based on need with an extra LLIN to Pregnant Women (no subsequent distribution to pregnant women).

1.5.3 Behavior Change Communication (BCC) for LLIN use

Alongside with the distribution of LLIN, the State adopted a specific behavior change strategy to encourage the use of LLIN. Different BCC strategies were used in the above mentioned LLIN distribution areas.

a) BCC in Mo-Mashari only areas: The focus was on pregnant women, the BCC messages on usage and maintenance of LLIN was provided through Inter Personal Communications (IPC) by the frontline workers namely MPW (M&F), AWW and ASHA.

b) BCC in Mo-Mashari + Cluster areas and Cluster only areas: In the areas where entire family members were covered with LLIN, BCC messages was provided through a campaign mode – the "Nidhi Ratha" campaign, Interpersonal Communication (IPC) by the front line workers (MPW(M&F), AWW &ASHA) and pre-publicity activities. Three prong BCC Strategy was adopted, a brief outline of the same is mentioned below:

i) *Pre publicity activities to inform about LLIN distribution*: The pre-publicity campaign was focused on creating a demand for LLIN at the community level. The key information given during these activities were date, venue and time of distribution along with the benefits of the new type of nets given. ASHAs and GKS members were oriented to take up publicity activities such as updating *'Swasthya Kantha'* (the health wall at the village), use of platforms such as Village Health Nutrition Day, Immunization days, local village market, and stalls in local fairs/festivals. Innovative mechanisms such as wall writings by ASHA, drum beating by Dakua (informer at village level) reminding the date, venue and time of distribution were adopted by GKS members.

ii) *Demonstrations during distribution*: The block level Health Team under the leadership of Medical Officers (MO) organized demonstration at village level during distribution. Demonstration included hanging and drying of nets under shade. Handmade posters and pamphlets were used to explain the community to promote the usage of LLIN.

iii) BCC campaign *'Nidhi Mousa to Masari Ne'*: The first two interventions of BCC generated demand amongst community for LLIN and gave hands on information on the first wash and hanging of net. The last segment of BCC concentrated on bringing in behavioral change amongst the users by reiteration of messages on malaria control and prevention and usage and maintenance of LLIN. This segment included van campaign (Chariot named as Nidhi Ratha) and Jatra performance (folk theatre). The Nidhi Ratha was used to inform the villagers on performance of Jatra while messages on malaria prevention and control and usage of LLIN adopting popular Oriya songs were played and leaflets distributed throughout its journey. Jatra troupe followed Nidhi Ratha reiterating the messages in a humorous and appealing story format. Where ever organizing Jatra was not possible video shows were given as an alternative. Adaptation of the script to local dialects to suit the audience was allowed without changing the key messages. The plan was developed till the last mile suggesting on the process of selection of venue of performance at village level making GKS responsible.

Source: Odisha Reaches-Treated Bed Nets to Vulnerable Populations, DoH&FW, GoO, 2010

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CHAPTER II
EVALUATION SCOPE & METHODOLOGY

- Background & Purpose of Evaluation
- Objectives of Evaluation
- Outcome and Impact level changes measured under the Evaluation
- Evaluation Methodology

2.1 Purpose of Evaluation

The LLIN distribution to pregnant women and BCC messages on use and maintenance of LLIN (under Mo-Mashari and Cluster schemes) were initiated by the DoH&FW, GoO during February-March 2010. The distribution process continued for a period of one year with district wise variation of one to two months. In September 2011, the State Technical Team of Odisha-VBDCP under DoH&FW decided to evaluate the Scheme having completed about one and half years of operation. A study was conducted to estimate the usage of LLIN among the pregnant women and assess the impact of BCC activities among users. The Study was commissioned by the Odisha Technical and Management Support Team (TMST) on behalf of Odisha-VBDCP with the purpose to measure the short term outputs and outcome level changes brought in by Mo-Mashari scheme and BCC activities on the beneficiaries and recommend further possible measures for improvement.

2.2 Objectives

i) To estimate the coverage & usage of LLIN by women during pregnancy (recall)

ii) To estimate the coverage & usage of LLIN by mother after delivery (observed)

iii) To estimate the coverage & use of LLIN by mothers to protect their young children (observed)

iv) To assess the effectiveness of the BCC campaign on use of LLIN by households in the Cluster and Mo-Mashari areas

v) To assess the mechanisms for distribution for Pregnant Women

2.3 Assessment of output and outcome level Changes

Output level Changes

i) % of pregnant women who received an LLIN (through Cluster or Mo-Mashari scheme)

ii) % of pregnant women who reported use of LLIN during pregnancy (recall)

iii) % of eligible women who possess LLIN currently

iv) % of current post-natal women who use LLIN (slept last night)

v) % of children 0-23 months who slept under LLIN

vi) % of pregnant women who were exposed to BCC messages (in terms of importance given to use of LLIN for mothers and young children)

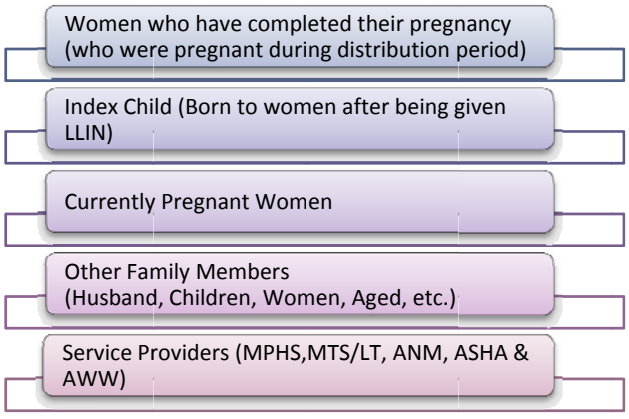
vii) Percentage of pregnant women who were exposed to BCC messages (in terms of improvement in Knowledge, Attitude and Practices)

Outcome level Changes

i) Incidence of Malaria and change in the BMI and Hemoglobin level amongst mothers

ii) Incidence of Malaria , Change in the Birth Weight, Nutritional Status and Hemoglobin level amongst young children

2.4 Study Participants



2.5 Methodology

2.4.1 Study Design

A combination of both exploratory and comparative study designs was adopted for undertaking the study. Based on the secondary data analysis of the State VBDCP database and the geographical areas of Mo-Mashari and Cluster distribution, a comparative study was conducted between LLIN possessed households and Non-LLIN possessed households to assess the output and outcome level changes. Both quantitative and qualitative research techniques were used for collection of data at primary level and analysis.

2.4.2 Sampling

Multi-stage sampling technique was used for selection of sample units viz. Districts, Blocks, Sub-centers, villages and households. The step by step processes adopted for sampling are as follows:

Selection of Districts: The cluster sampling method was adopted for selection of sample districts

i) The districts of Odisha were grouped under two arms, viz. 'Mo-Mashari' and 'Non-Mo-Mashari' districts
ii) Two districts having highest API were chosen from each arm
iii) The four districts selected are:
Mo-Mashari Arm: Rayagada & Kandhamal
Non Mo-Mashari Arm: Kalahandhi & Nuapada

(Though Koraput district has the highest API under 'Non Mo-Mashari' arm, it was replaced with Nuapada, since major parts of Koraput has been covered with LLIN interventions by Government and some Non-Government agencies)

Selection of Blocks: Cluster sampling method was also adopted for selection of Blocks. Blocks were selected from different parts of the district matched with API, socio-economic, geographic

environment e.g. ST/SC population, forests and inaccessible areas to make the sample blocks more representative.

i) Blocks in the 'Mo-Mashari' districts were divided as 'Mo-Mashari only' Block and 'Mo-Mashari + Cluster' Block
ii) Blocks in Non-Mo-Mashari districts were divided as 'Cluster only' Block and 'Non-LLIN' Block.
iii) Since there are only few Blocks under 'Mo-Mashari + Cluster' and 'Cluster only' groups, one Block having highest API was selected from each group.
iv) From Blocks of 'Mo-Mashari only' and 'Non-LLIN' groups, two Blocks each were selected (except Nuapada district where one Block was selected from the 'Non-LLIN' Blocks due to fewer number of Blocks in the district).

In total, 11 sample Blocks were selected for the evaluation.

Selection of Sub-centers: One Sub center was randomly identified in the Block and the villages were visited for surveying the sample households. In case of non-availability of required number of sample households, the team moved to the nearby sub-centers for achieving the sample size. In total, 32 Sub-centers were covered under the evaluation (10 each in Mo-Mashari only Blocks and Mo-Mashari + Cluster Blocks, and 6 each in Cluster only and Non-LLIN Blocks).

Selection of Villages: The evaluation covered 109 villages in 32 sample sub-centers.

Selection of Households/Primary Sampling Units: Against the estimated sample size of 778 households (389 each from those who received LLIN and not received LLIN)[22], a total of 1329 households were covered (801 received LLIN and 528 not received LLIN) in 4 districts having women who had completed their pregnancy but were pregnant during the distribution of LLIN under Mo-Mashari or Cluster Scheme or having women currently pregnant (at the time of study).

Table 3. Pregnant Women Covered in the Survey

LLIN Received under Mo-Mashari Only	LLIN Received under Mo-Mashari + Cluster	LLIN Received under Cluster Only	No. of PW who Received LLIN	No. of PW who did not Received LLIN
216	209	376	801	528

Amongst the 810 households who received LLIN, the evaluation covered 611 having women who had completed pregnancy and 198 having currently pregnant women.

Out of the 528 households who did not receive LLIN, the evaluation covered 259 having women who had completed pregnancy and 270 who were currently pregnant. (Table 3 & 4)

Table 4. Category of Pregnant Women covered in the Evaluation

	Received LLIN	Not Received LLIN
Women who completed their pregnancy	611	259
Currently Pregnant Women	198	270
Total	**801**	**528**

The evaluation also assessed impact of LLIN use on young children born to women after being given LLIN (index child). In total 865 index children were covered out of them 593 were born to women who received LLIN and 272 were born to women not received LLIN.

Table 5. Households with Index Children Covered in the Survey

LLIN Received under Mo-Mashari Only	LLIN Received under Mo-Mashari + Cluster	LLIN Received under Cluster Only	Total of LLIN Received	LLIN not Received
193	174	226	593	272

[22] Calculated using Power Sampling Technique

The following methods were adopted for selection of LLIN received sample households in Mo-Mashari and/or Cluster Areas:

i) To start with, the study team collected village wise list of women who were given an LLIN from the ANM of the sample sub-centers.
ii) In addition to the same, all the left out eligible pregnant women (who could not be given an LLIN during the distribution period) were identified during the visit to the villages. This was done in consultation with the AWW and ASHA and other key informants / households residing in different hamlets of the village.
iii) So all those pregnant women who were given and not given LLIN during the distribution period were interviewed in the study. This identification exercise was done in both Mo-Mashari Only and Mo-Mashari + Cluster areas.
iv) In Cluster Only and Non-LLIN areas, the same period during which LLINs were distributed to pregnant women in Mo-Mashari Only areas was taken to identify and interview them in the study.
v) As mentioned earlier, these eligible pregnant women covered in the study include women who completed their pregnancies and who were currently pregnant at the time of survey.
vi) Over and above covering the eligible pregnant women, the study team also interviewed current pregnant women who were not given an LLIN for a comparison.

Coverage of Service Providers: Service providers associated with the LLIN distribution at the Block, Sub-centre and Village level were interviewed to know their responses on distribution and use of LLIN and BCC activities (Table 6).

Table 6. Category of Service Providers Interviewed during the Survey

MTS/LT	ANM	AWW	ASHA
10	16	40	30

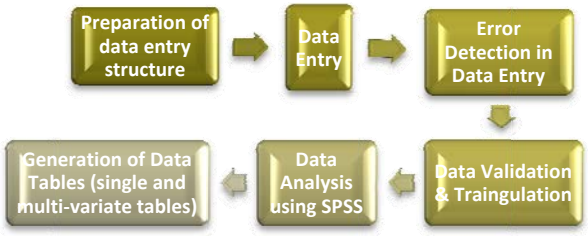
2.4.3 Tools & Techniques used for Data Collection

Table 7. Tools & techniques used for data collection

Study Respondents	Techniques of Data Collection	Tools for Data Collection
Pregnant Women & Household members	Interview Method	Structured Interview Schedule
Service Providers (MPHS, MTS/LT, ANM, ASHA & AWW)	Interview Method	In-depth Interview (IDI) Schedule
Community Level Informants	Focused Group Discussion (FGD)	FGD Checklist

2.4.4 Data, analysis and reporting

The study used various quantitative and qualitative data analysis methods. The quantitative data was cleaned, entered and analyzed by software packages like SPSS and Excel. Single and



multivariate tables were generated from the data analysis, which are presented in the report with frequencies, percentages and averages. Statistical significance tests were also conducted using SPSS. The qualitative data tables / matrixes were analyzed for reporting the open-ended responses, focused group discussions and interview with service providers.

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CHAPTER III
EVALUATION FINDINGS

- Evaluation Findings of Mo-Mashari Scheme
  - Profile of pregnant women & their household characteristics
  - Distribution Process of LLIN among pregnant women
  - LLIN coverage among pregnant women
  - LLIN retention among pregnant women
  - LLIN/Nets possessed by households
  - LLIN/Net use among pregnant women
  - LLIN/Net use among household members
  - Possible Factors Influencing the LLIN/Net use
- Evaluation Findings of BCC
  - BCC activities in Cluster areas
  - BCC activities under Mo-Mashari Scheme
- Assessment of short term Outcomes of LLIN use on pregnant women and young children
  - Incidence of Malaria
  - Change in Haemoglobin (Anaemia) status
  - Change in Nutritional Status

3.1 Evaluation Findings of Mo-Mashari Scheme

3.1.1 Profile of Pregnant Women & their Household Characteristics

This sub-section highlights the socio-economic and demographic characteristics of pregnant women and their households covered and it provides a context for assessing the short term outcomes of Mo-Mashari scheme and BCC activities undertaken by the Government during the year 2010-11.

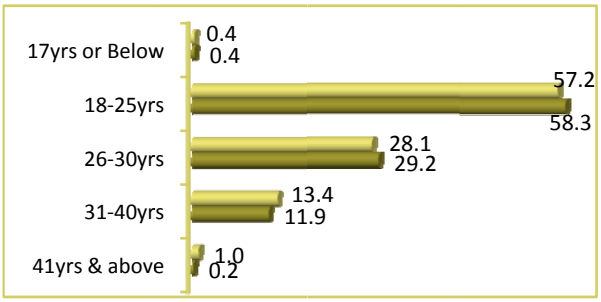
Characteristics of households, pregnant women and index children covered in the evaluation: The evaluation covered 1329 sample households of them 801 are LLIN received households and 528 are Non-LLIN households. The LLIN received households include 611 women who had completed pregnancy, 198 currently pregnant women (at the time of survey) and 593 young children (98% of them are index child born to women after receiving LLIN). The Non-LLIN households have 259 women completed pregnancy, 270 currently pregnant women and 272 young children (94% of them are index child born to women who were pregnant during LLIN distribution period) (Table 8).

Table 8. Characteristics of Households, Pregnant Women and Index Child covered in the study					
Indicators	**LLIN received under Mo-Mashari Only**	**LLIN received under Mo-Mashari + Cluster**	**LLIN received under Cluster Only**	**LLIN received under any scheme**	**Did not receive LLIN under any scheme**
Households covered in the study	216	209	376	801	528
Total Household Members	1125	1036	1889	4050	2364
Average Household Size	5	5	5	5	4
No. of Pregnant Women covered in the study	216	209	376	801	528
No. of women who completed their pregnancy	201	180	230	611	259
No. of currently pregnant women	21	30	147	198	270
No. of women who completed pregnancy as well as currently pregnant	6	1	1	8	1
Total children covered in the study	193	174	226	593	272
Index child	189	169	223	581	256
Other child (in case of no index child)	4	5	3	12	16

Herewith, the women who completed pregnancy and currently pregnant are aggregated into one group and termed as pregnant women in the report. Wherever it is necessary, the evaluation segregated them into two categories and presented the findings separately.

Age: The age distribution among pregnant women of LLIN-received and Non-LLIN households is found to be similar. However majority of pregnant women age ranged from 18-25 years (Chart 2).

Chart 2. Distribution of Pregnant Women by age (in %)



Caste: ***Majority*** (***76%) of pregnant women in LLIN-Households and 67% in Non-LLIN households belonged to the vulnerable communities, viz. Scheduled Tribes and Scheduled Castes*** and the percentage of Scheduled Tribes is highest in both groups (Chart 3).

Religion of pregnant women: Majority of them are Hindus while the percentage of Hindu among LLIN Households found less than non LLIN Households Also the percentage of Christians amongst LLIN-received (18%) households found more than the Non-LLIN households (5%).

Educational: ***Highest percentage of pregnant women in both LLIN-received (60%) and Non-LLIN households (55%) were found to be illiterate.*** Overall, the educational attainment of pregnant women does not differ much between LLIN-received and Non-LLIN households (Chart 4).

Chart 3. Composition of caste among Pregnant Women (in %)

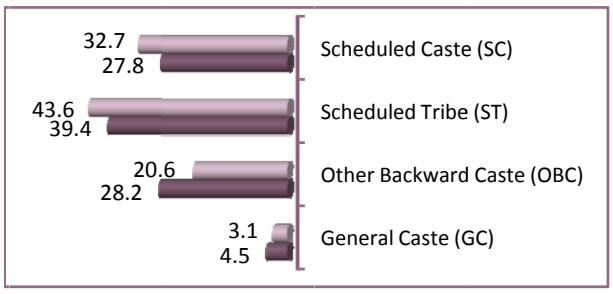
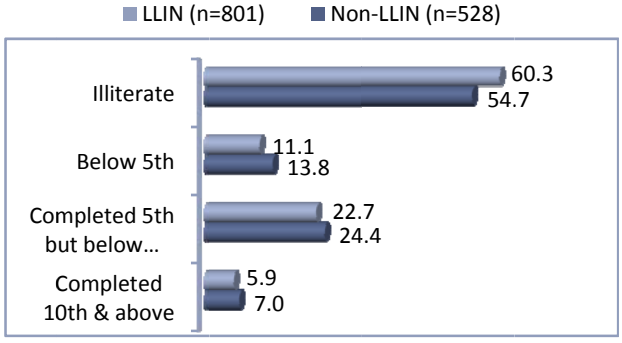


Chart 4. Level of Education of Pregnant Women (in %)



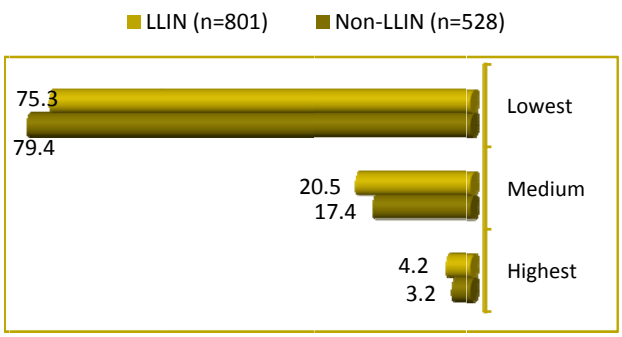
Household demographic characteristics:

i) A total of 4050 and 2364 individuals were enumerated in 801 LLIN households and 528 Non-LLIN households respectively (Table 8).

ii) The mean household size of pregnant women in LLIN-received households (5 individuals per household) is more than the Non-LLIN households (4 individuals per household).

Standard of Living Index (SLI): The SLI has been developed by indexing 29 household assets and variables to understand the economic background of pregnant women. Majority of **pregnant women in LLIN-received (75%) and Non-LLIN households (79%) were found to be having low SLI**.

Chart 5. Standard of Living Index (SLI) of Pregnant Women (in %)



In brief, the key socio-economic characteristics of pregnant women interviewed are more or less similar. The study findings also reveals that majority of pregnant women in both the sample groups are backward in terms of their education, castes and standard of living (Chart 5).

3.1.2 Distribution Process of LLIN among Pregnant Women

The findings of the assessment of distribution process under Mo-Mashari to Pregnant Women made at the district level are mentioned below:

Guidelines for LLIN distribution: In January 2010, Odisha-VBDCP issued a Mo-Mashari guideline prior to distribution of LLIN in the districts. The key points included were:

a) In Cluster Sub-centers where the entire population is protected by LLIN, one extra LLIN will be given to the households having Pregnant Women for her use (in 'Mo-Mashari + Cluster' Areas)
b) In Mo-Mashari areas, LLIN will be provided to the pregnant woman during her registration for ANC with other ANC Packages
c) Left out Pregnant Women will be provided one LLIN during Village Health Nutrition Day in presence of LHV/ASHA/AWW/ LS and GKS Member

Supply of LIN from the District to Block: Out of four sample districts, both the Mo-Mashari study districts had supplied LLINs to the 'Mo-Mashari only' Blocks in two phases, while in the Rayagada district the LLINs were supplied to the Blocks two months earlier than the Kandhmal district. The supply to the blocks was made as per the requirements given by the Blocks (Table 9).

Table 9. Phase wise Supply of LLINs to Mo-Mashari Blocks

Districts	Block	Month of Supply	Quantity of LLINs supplied(#)
Rayagada	Ramanaguda	Mar'10 (1st Ph)	1000
		Mar'11 (2nd Ph)	300
	Bissamcuttack	Mar'10 (1st Ph)	1500
		Aug'10 (2nd Ph)	500
Kandhamal	Baliguda	May'10 (1st Ph)	1842
		Mar'11 (2nd Ph)	250
	Tikabali	May'10 (1st Ph)	823
		Mar'11 (2nd Ph)	200

Unlike Mo-Mashari only Blocks, the districts adopted different strategies for supplying LLINs to pregnant women in 'Mo-Mashari + Cluster' Blocks (namely Kashipur in Rayagada and Daringbadi in Kandhmal districts). In Kashipur Block, the MTS was instructed by the District-VBDCP to distribute an extra LLIN to pregnant women during Cluster distribution but no such instruction or guideline was given to the MTS of Daringbadi Block. Also no LLINs were provided to the Daringbadi Block of Kandhamal district during the 1st phase of Mo-

Mashari while it was supplied to the other Blocks. As a result, the pregnant women did not receive individually an LLIN for their use during the Mo-Mashari period. The block was supplied with LLIN of the Mo-Mashari scheme in April 2011 only. ***Therefore the supply of LLINs to five study Blocks was made as per the Mo-Mashari guideline except Daringbadi Block.***

Supply of LLIN from Block to Sub-centre (ANM): All the Sub-Centers under the study Blocks received LLIN within one month of receiving the stock at district level. Any of the three modes were followed across all the study Blocks for supply of LLIN to ANM.

i) LLINs were handed over to ANM during sector meeting.

ii) LLINs were provided at the Sub-centre itself.

iii) The ANMs were asked to collect LLINs from the Block.

The ANMs, who were provided LLINs at the sector meeting or asked to collect from the Block, expressed the difficulties faced by them for carrying LLINs to their respective sub-centers.

The quantum of LLINs supplied to the ANMs was decided using different criteria by different Blocks.

i) The ANMs in Ramanaguda Block were equally supplied 50 LLINs each by the Block.

ii) In Bissamcuttack, the number of LLINs supplied to ANMs was calculated on the basis of 25 LLINs per 1000 population in the Block.

iii) In Baliguda & Tikabali Blocks, the LLINs were provided as per the request made by ANMs.

iv) In Daringbadi, the LLINs were supplied on the basis of population of the sub-centers (50 LLINs each to sub-centers with higher population and 25 LLINs each to lower population).

Process of LLIN Distribution to pregnant women: The processes and strategies adopted for distributing LLIN to pregnant women differed from Block to Block. Detailed Block wise processes adopted are presented in the matrix given in the next page (Table 10). Some key highlights of the same are as follows:

i) ***None of the Blocks had taken into consideration the number of pregnant women normally registered at a sub-center before supplying the LLINs to ANM.***

ii) ***Uniform pattern was not followed by Blocks for distribution of LLIN to pregnant women though Odisha-VBDCP Guideline was made available to the districts***

iii) ***Across all the study Blocks, the ANMs combined the LLIN distribution with TT or ANC check-ups or both during VHND and immunization day. The left out pregnant women were given LLIN on other days at the Sub-centre or AWC or at their homes.***

Period of pregnancy with regard to LLIN distribution are presented below:

i) Majority (i.e. 92%) of women received LLIN during pregnancy. The remaining 8% received it during post delivery.

ii) ***Only 9% of pregnant women were given LLIN during 1st Trimester while 43% and 42% received during the 2nd and 3rd trimester of pregnancy respectively*** (Chart 6).

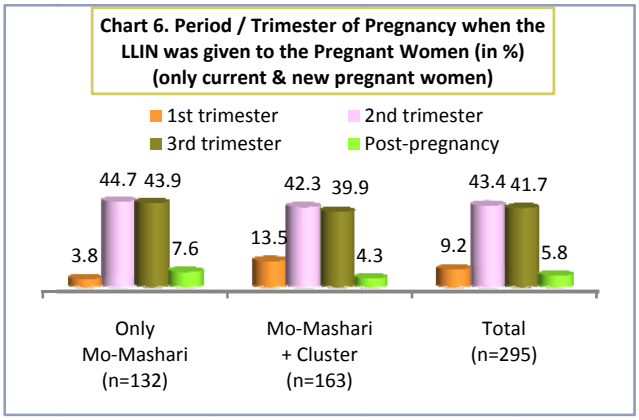


Table 10. Distribution process of LLIN to pregnant women

Process indicators	Mo-Mashari Blocks				Mo-Mashari + Cluster Blocks	
	Ramanaguda	Bissamcuttack	Baliguda	Tikabali	Kashipur	Daringbadi
a) **Period of distribution**	• From Mar'10 to Mar'11	• From Mar'10 to Dec'10	• From June'10 to May'11	• From June'10 to Apr'11	• From Mar'10 to Mar'11	• After May'11
b) **Place / occasion of distribution**	• Distributed during 1st ANC Check-up/VHND • Left outs given at home	• 1st distributed at CHC to the nearest 2 SCs • Distributed during VHND and immunization days	• Mostly distributed on fixed day at SC other than Immunization and VHND day	• Mostly distributed on VHND and immunization days	• Mostly distributed on VHND and other days after cluster distribution	• Mostly distributed on VHND and other days
c) **Target Beneficiaries**	• Only targeted the Current & New Pregnant Women • Only few of the rest(Specify) was given, if resisted	• Targeted all Pregnant Women (Current + New + Others) • There were more left outs due to absence & less LLIN with ANM	• Targeted to those who were given TT in April and then in subsequent months (rest were also given) • Mother of newborn was also given LLIN	• Targeted to those who already Received TT and recently given TT • Left outs not given LLIN although there was sufficient LLIN	• Targeted all Pregnant Women (Recent + New + Others)	• Only targeted the Recent & New pregnant women • The rest were not given, hence ANM faced strong resistance
d) **Adequacy of LLIN**	• Less numbers • No LLIN stock at higher level(pregnant women Complaining) during survey	• Less numbers • No LLIN stock at higher level after Dec'10	• More LLINs but less pregnant women (One ANM got 250 LLINs)	• Sufficient • No LLIN stock during survey	• Highly Insufficient • Extra LLIN was not given in some villages • No LLIN stock during survey	• Highly Insufficient • Some ANMs had stock as the distribution only started after May'11
e) **Fees charged to pregnant women**	• Given free of cost	• Rs. 15/- to 20/-taken by ANM per pregnant women for LLIN	• Given free of cost	• Given free of cost	• Given free of cost	• Given free of cost

Late registration, non-availing of ANC services, staying in mother's house during pregnancy, etc. were reported by the frontline workers viz. ANM, ASHA and AWW as the reasons for majority not being given LLIN during 1st Trimester. Across all the study Blocks, the ANMs were against the distribution of LLIN to the pregnant women in the 1st trimester of pregnancy as there are more chances of abortion during the same period. None of them knew that malaria could be a cause for early abortion hence the use of LLIN by pregnant women from the 1st trimester onwards needs to be encouraged.

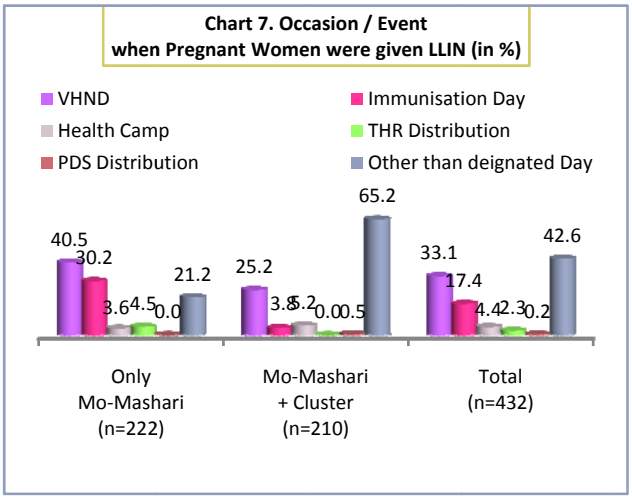
Deliver Points and Service Providers:

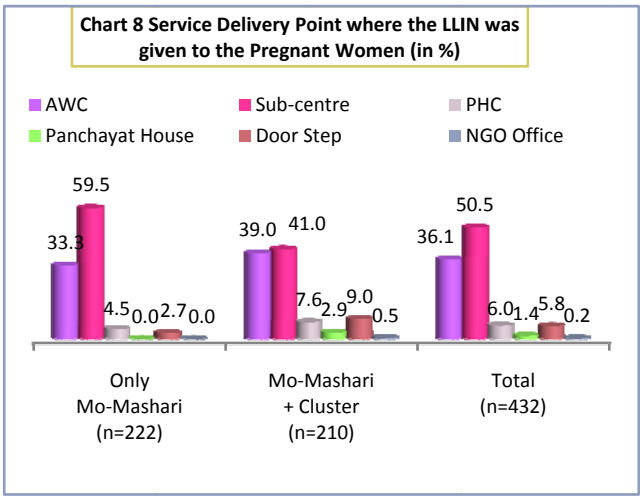
i) Highest i.e. 51% of pregnant women were given LLIN at the sub-centre followed by 36% at AWC.

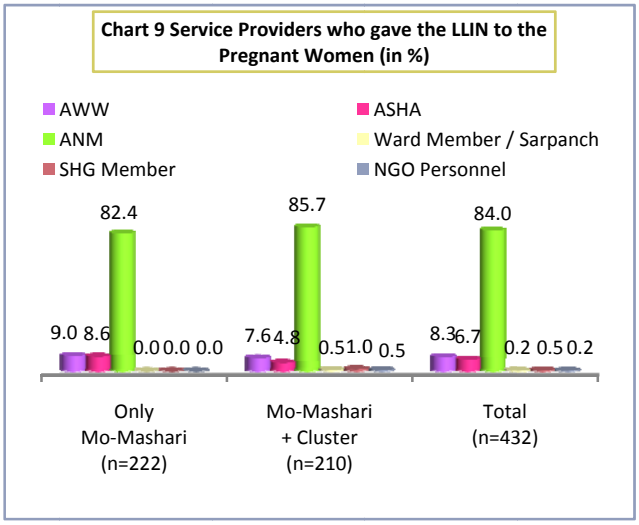
ii) Majority i.e. 84% were provided LLIN by ANMs.

iii) ***Only 33% and 17% of pregnant women were given LLIN during VHND and immunization day respectively. But maximum i.e. 43% of***

pregnant women were given LLIN on days other than any health events or occasions due to absence from receiving services (Chart 7, 8 & 9).







3.1.3 LLIN Coverage among Pregnant Women

The evaluation team enumerated all the eligible women (who were pregnant during the distribution period and have completed pregnancy and women who were currently pregnant) in 9 sample villages of six study Blocks.

The details presented in the Table 11 show that ***84% of eligible pregnant women were provided LLIN under the Mo-Mashari scheme.*** The remaining 16% could not be given because of insufficient LLINs with ANM; leaving out pregnant women who already received 1st ANC or TT;

Table 11 No of Pregnant Women in the village given an LLIN during the Mo-Mashari distribution period

Area Type	Block	Distribution Period of LLIN	No. of Pregnant Women	No. of Pregnant Women Received LLIN	% of Coverage
Mo-Mashari Only Area	Baliguda	May'10 - May'11	21	18	85.7
	Tikabali	June'10 - April'11	37	29	78.4
	Ramanaguda	Mar'10 - Mar'11	17	15	88.2
	Bissam Cuttack	Mar'10 - Dec'10	15	7	46.7
Sub Total (Mo-Mashari Only Area)			**90**	**69**	**76.7**
Mo-Mashari + Cluster Area	Daringbadi	May'11.....	29	27	93.1
	Kashipur	Mar'10 - May'11	39	37	94.9
Sub Total (Mo-Mashari + Cluster Area)			**68**	**64**	**94.1**
Total (in 9 villages)			**158**	**133**	**84.2**

absence of pregnant women in the village at the time of LLIN distribution; etc.

The study findings also revealed that ***the LLIN coverage of pregnant women in 'Mo-Mashari + Cluster' areas (94%) is better than the 'Mo-Mashari only' areas (77%).***

3.1.4 LLIN Retention by Pregnant Women

The LLINs were visually verified by the survey team to know the retention of LLIN by pregnant women in Mo-Mashari only and Mo-Mashari + Cluster areas. ***Out of the 425 pregnant women interviewed, the LLIN of almost all i.e. 423 (99.5%) was visually verified by the evaluation team which indicated complete retention of LLIN by pregnant women.***

3.1.5 LLIN/Nets Possessed by Households

The evaluation team also enumerated a total of 1234 LLINs with the 801 households and visually verified it in LLIN distributed areas. ***Out of 1234 LLINs enumerated, 1180 (96%) LLINs were found to be possessed by the household.*** This indicates an up-scaled awareness of the community, even after one and half year of Cluster distribution majority of households could show the LLINs kept in their houses.

The Table 12 presents the average number of LLINs possessed by households in different distribution areas. ***On an average the households in Mo-Mashari + Cluster areas possessed highest i.e. 1.9 LLINs per household followed by 1.6 LLINs in Cluster only areas and 1 LLIN in Mo-Mashari only areas.*** Since one additional LLIN was given to the pregnant women, the average number of LLINs possessed per household in Mo-Mashari + Cluster areas is more than the Cluster only areas.

However ***as compared to the mean family size of households (i.e. an average of 5 individuals per household in both the areas), the average numbers of LLINs possessed per household were found to be lesser in both Mo-Mashari + Cluster areas and Cluster only areas*** even though an additional LLIN was given to the pregnant women in Mo-Mashari + Cluster areas. This may be due to distribution of 1 LLIN per every 2.5 persons (2 adults and 1 child) as per Odisha-VBDCP guidelines in Cluster scheme. Therefore, the household with average family size of 5 individuals need to have at least 2 LLINs while the evaluation findings revealed that the households had less than 2 LLINs in the general / cluster distributed areas. Therefore, ***higher number of LLINs needs to be distributed in the Cluster areas for complete coverage of individuals in the households.***

Table 12 also shows that ***due to LLINs distributed by the government, the average no. of any nets possessed by LLIN-received households (1.5 nets in Mo-Mashari only, 2.1 in Mo-Mashari + Cluster and 1.7 in Cluster only areas per household) was found***

Table 12. Average number of LLIN and Any Net possessed by households

Indicators	Mo-Mashari Only	Mo-Mashari + Cluster	Cluster Only	Total of LLIN received under any scheme	LLIN not received under any scheme
No. of Households Covered	216	209	376	801	528
Average Household Size	5	5	5	5	4
Total No. of LLINs possessed by households	217	404	613	1234	--
Total No. of Any Nets possessed by households	314	431	658	1402	370
Average no. of LLINs per Household	1.0	1.9	1.6	1.5	--
Average no. of Any Nets per Household	1.5	2.1	1.7	1.8	0.7

Note: To match with the size of LLIN given to households, all other nets owned by households have been converted into an uniform double size nets

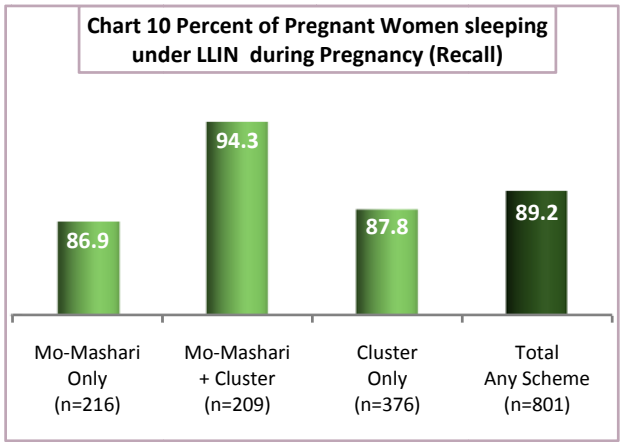
to be much higher than the nets possessed by Non-LLIN households (0.7 nets per Non-LLIN household). So the net possession of households has improved due to LLIN distribution by the government.

Further to mention that amongst Non-LLIN households, 57% (i.e. 301 out of 528) possessed a net. Out of a total of 425 nets owned by Non-LLIN households, 47% were impregnated with insecticidal and of them 42% had been impregnated over more than six months impregnation.

3.1.6 LLIN/Net Use by Pregnant Women and Young Children

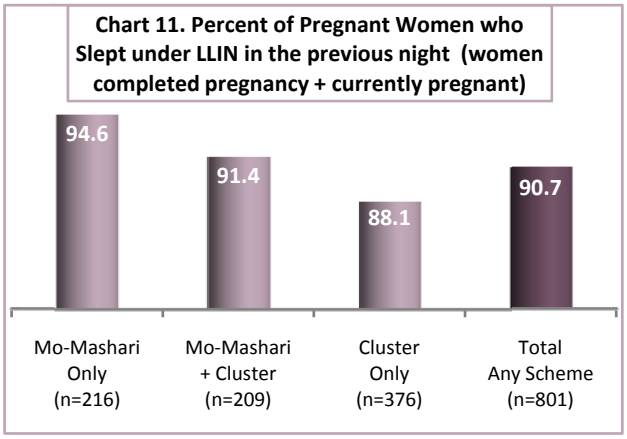
Use of LLIN by women during pregnancy: ***In Mo-Mashari + Cluster areas 89% of women reported sleeping under LLIN during pregnancy and*** 96% of them were regular users.

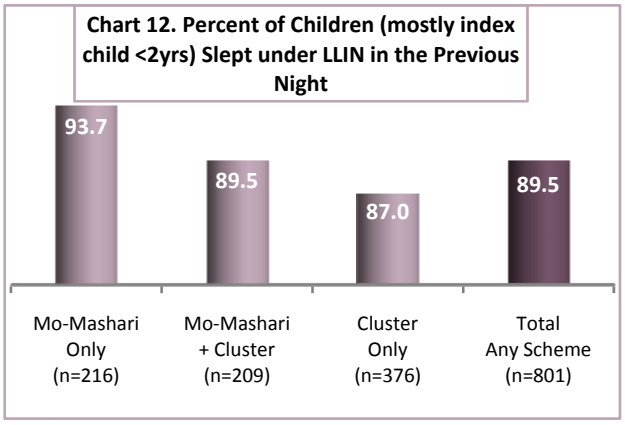
The percentage of women reported sleeping under LLIN was found to be higher in Mo-Mashari + Cluster areas (94%) than other areas. The reason may be lack of supply of LLIN to about 11% of women in Mo-Mashari only areas during their Pregnancy.

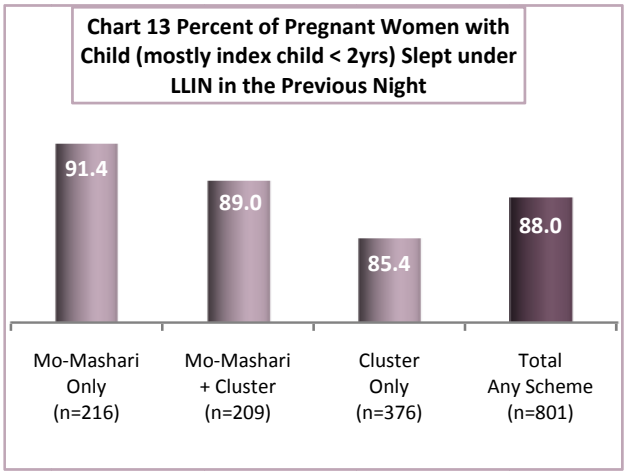


Pregnant women and / or children reported having slept under LLIN in the previous night: People sleeping under net in the previous night before the day of survey is an indicator to judge the net use behavior of people.

Study findings revealed that ***91% of pregnant women in LLIN-received households slept under LLIN in the previous night.*** Higher percentage of (i.e. 95%) pregnant women slept under LLIN in Mo-Mashari only areas in comparison to other areas (Chart 11).





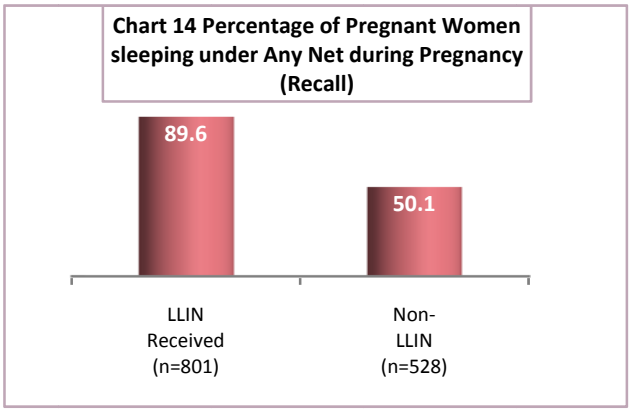


The ***percentage of Pregnant Women with their young children sleeping under LLIN in the previous night and Children who slept under LLIN the night before is found to be 90% and 88% respectively.*** Of them, higher percentages of children as well as pregnant women with child slept under LLIN in Mo-Mashari only areas in comparison to other areas.

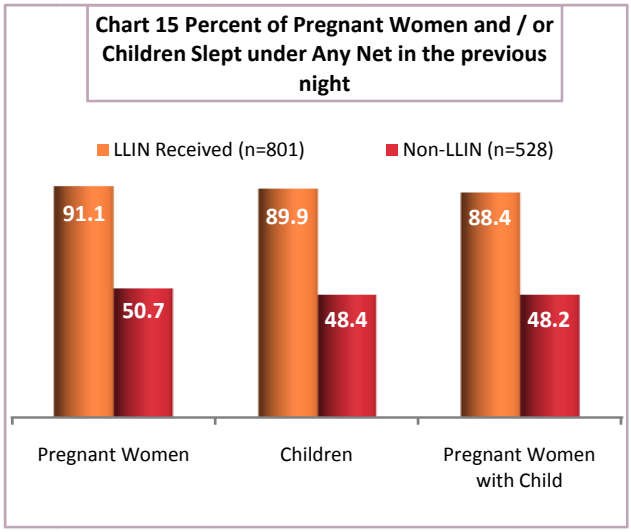
Irrespective of LLIN distributed areas, ***92% of households surveyed stated that the pregnant women and their young child should sleep under the LLIN.*** During the survey, it was observed that the husbands of pregnant women were found giving priority to their pregnant wife and young children across all study Blocks. It was more evident in one of the Mo-Mashari + Cluster Blocks namely Daringbadi where white color LLINs were given to household members and blue color LLIN was given to the pregnant women. Field findings showed colour nets were being more preferred and need less maintenance than other LLINs.

Photograph showing how husband purchased an ordinary net to sleep in the Mo-Mashari distributed areas

Use of any Net by women during pregnancy (Comparison between LLIN and Non-LLIN households): During the survey, ***90% of women in the LLIN-received households reported sleeping under any net during their pregnancy (i.e. only 1% more than those sleeping under LLIN) in comparison to 50% in Non-LLIN households.***



Out of the total pregnant women interviewed in LLIN-received areas, only 3 reported sleeping under ordinary nets during their pregnancy even though they had LLIN (Chart 14).



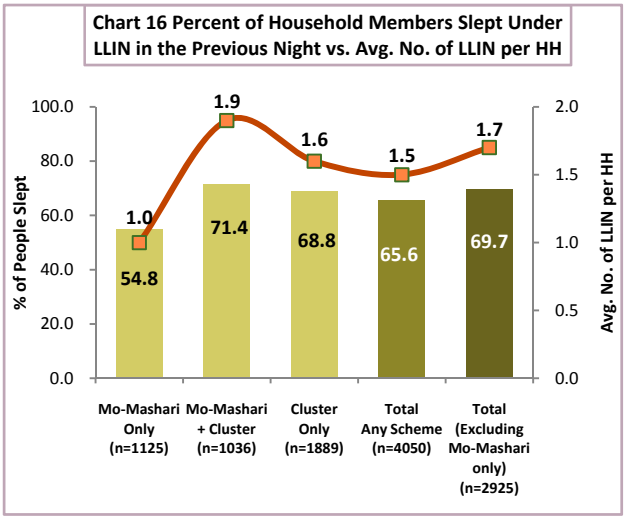
Pregnant women and / or Children slept under any Net in the previous night (comparison between LLIN and Non-LLIN households): The study reported that ***91% of pregnant women, 90% of children and 88% of pregnant women with their young child in LLIN-received households slept under any net in the night before the day of survey. As compared to them, only 50% or lesser slept under any net in Non-LLIN households.***

However out of those who had nets in the Non-LLIN households, majority (i.e. 90%) of pregnant women slept under it in the previous night. So there is no real difference found in the net use

behavior of pregnant women between net possessed households in LLIN and Non-LLIN areas. However it is revealed the pregnant women have raised awareness to protect themselves and their young children from Malaria (Chart 15).

3.1.7 LLIN/Net Use by Household Members

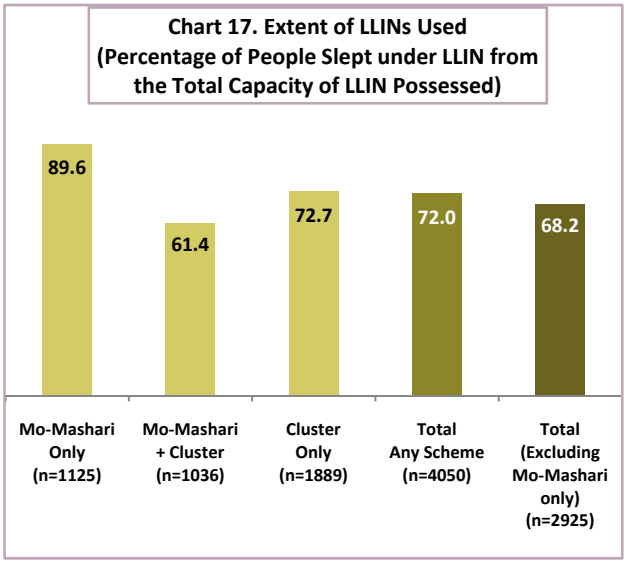
In general / cluster distributed areas, 70% of household members slept under LLIN in the night prior the day of survey. But as compared to the average number of LLINs possessed by households (i.e. 1.7 LLIN per household) lower proportion of household members slept under LLIN in the night before.



Particularly, the gap between the percentage of people slept under LLIN and the average number of LLINs possessed by households is more in Mo-Mashari + Cluster areas (71% of people slept against 1.9 LLINs possessed per household) and Cluster only areas (69% of people slept against 1.6 LLINs possessed per household). Interestingly in the Mo-Mashari only areas where only 1 LLIN was given, no gap is observed in the same (Chart 16). This indicates that ***the household members in Mo-Mashari + Cluster areas and Cluster only areas did not use LLIN to the optimum level.***

The study also reveals that ***the percentages of pregnant women (91%) and young children (90%) slept under LLIN were much higher than all the household members (70%) slept under the same. Thus, it is evident from the same that the household members, excluding the pregnant women and young children, less used the LLIN.***

Extent of use of LLIN by household members: The evaluation also made an attempt to approximately know the extent of LLINs used by household members. This was done by calculating the total net capacity of LLINs possessed (@ 2.5 persons per LLIN[23]) and then taking the percentage of actual number of people slept under LLIN from the same (each child below 5 years of age is given the weight of 0.5 as done for calculating LLIN capacity).

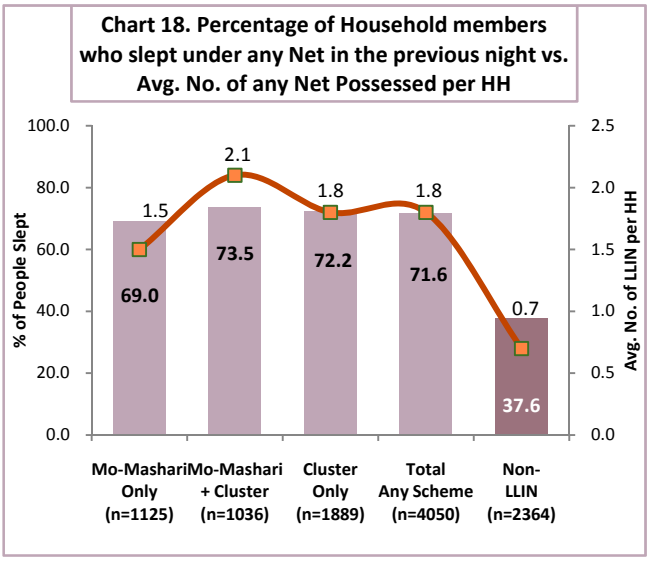


As shown in Chart 17, the LLINs possessed by households were used to the maximum extent in Mo-Mashari only areas (90%; target beneficiary – pregnant women) in comparison to other areas (73% target beneficiary – all household members). In brief, ***while 70% of household members slept under LLIN in the general / cluster distributed areas, the extent of LLINs used by households was not up to the optimal level (approximately 32% of***

[23] Odisha-VBDCP LLIN distribution guideline

the total capacity of LLINs possessed by households was not used).

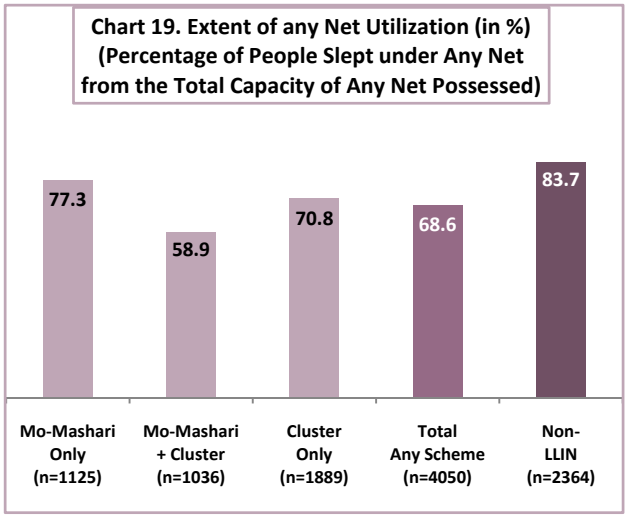
Household members slept under Any Net in the previous night: About 72% of household members in LLIN-received households slept under any net in the previous night as compared to only 38% in Non-LLIN households.



Like people slept under LLIN, the gap between the percentage of household members slept under any net and the average number of any nets possessed by households is more prominent in Mo-Mashari + Cluster (74% of people slept against 2.1 nets possessed per household) and Cluster only areas (72% of people slept against 1.8 nets possessed per household). No gap is found between the two in Mo-Mashari only areas and Non-LLIN areas (Chart 18).

Extent of use of any Net by Household Members: Chart 19 shows that the Non-LLIN households who had nets used the same to a greater extent (84%) than LLIN-received households (69%).

The study findings revealed that the nets possessed by LLIN-received households were least used in Mo-Mashari + Cluster areas (59%) and Cluster only areas (71%) and relatively more used in Mo-Mashari only areas (77%). Interestingly, the average number of nets possessed in Mo-Mashari only areas (1.5 nets per household) is lesser than the nets possessed in Mo-Mashari + Cluster areas (2.1 nets per household) and Cluster only areas (1.8 nets per household). So, ***the extent of net utilization is relatively lower in areas where households possessed more nets and vice versa.***



3.1.8 Possible Factors Influencing the LLIN/Net Use Behavior

The factors influencing the net use behavior of people differ by beneficiaries and geographical areas. Some of the key influencing factors identified based on Focused Group Discussion and interview with service providers during the household survey mentioned below:

Factors influencing the LLIN/Net use behavior in LLIN areas:

Pregnant Women: Higher percentage of pregnant women used net across different LLIN distributed areas which may be due to factors such as:

i) Individual attention given to the pregnant women through Inter Personal Communication (IPC) both during and after the distribution of

LLIN by the frontline workers viz. ANM, ASHA and AWW.

ii) Higher priority given to the pregnant women and young children by their family members for using LLIN/Net (92% of Household members stated that the pregnant women and young children should sleep under LLIN).

Household Members: The study findings revealed that the net use by other household members was suboptimal, which may be due to factors like:

i) Inadequate LLIN/Net found in 37% of the households. Since LLINs/Nets were not available for entire household members, some households took the decision of not using the same.

ii) The room sizes of the houses of beneficiaries (particularly in the tribal areas) are smaller therefore the LLIN provided to them cannot be hung inside the room.

iii) Gender, age and relationship of household members were not taken into consideration while distributing LLIN which was a limiting factor in the net use behavior of people.

iv) The BCC campaign undertaken in the general / cluster distributed areas focused on community as a whole and there was no individual attention given to the household members to encourage for using LLIN while pregnant women in Mo Mashari areas were addressed by IPC. Therefore higher percentage of pregnant women slept under LLIN/Net than other household members.

Pregnant Women and Household members in Non-LLIN areas: Overall, percentage of pregnant women and household members in Non-LLIN households who slept under net was found to be lower in comparison to LLIN-received households. The reason may be non-availability of net with 43% of households.

However out of those households who possessed nets, higher percentages of household members and pregnant women slept under the same. The factors likely to be influencing for greater net use are:

i) Majority of the people were aware about the need of net use and purchased nets from the market (73%).

ii) Nets were impregnated with insecticidal which has added value to the ordinary nets purchased from the market (47% of the nets were impregnated with insecticidal).

iii) The frontline workers also encouraged the use of net by pregnant women in Non-LLIN areas.

3.2 Evaluation Findings of Behavior Change Communication (BCC)

The Odisha-VBDCP developed a locally appropriate Behavior Change Communication (BCC) strategy for promoting the use of LLIN across the LLIN distributed areas. Health messages were designed and communicated through multiple channels at different steps of LLIN distribution process.

Specific BCC strategies were adopted for Mo-Mashari scheme and Cluster distribution.

a) In the cluster areas, the BCC messages were provided in a campaign mode involving different community level stakeholders e.g. MTS, PHIO, MPHS, GKS, AWW and ASHA.

b) The BCC messages under Mo-Mashari scheme were delivered to pregnant women through Inter-Personal Communication (IPC).

The evaluation assessed both the BCC strategies separately through Focus Group Discussion and

household interview and presented the short term outcome and output findings here. The evaluation did not include the process assessment of the BCC activities undertaken.

3.2.1 BCC in Cluster Areas

The BCC strategy in the cluster areas adopted:

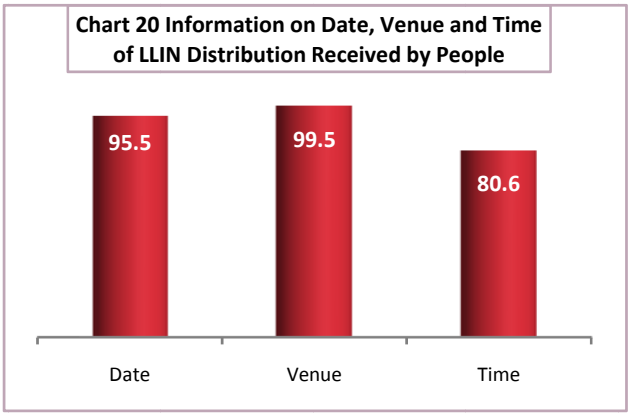
i) Pre-distribution publicity

ii) Demonstration during distribution

iii) Social Mobilization Campaign through "*Nidhi Ratha"* that played Oriya Songs & distributed leaflets which was followed by Street/Folk Theater/Video Show named 'Nidhi Mausa to Mashari Ne' by locally hired folk art groups.

The outputs of each of these three strategies were assessed and presented here. The readers need to keep in mind that the evaluation was done after one & half year of the campaign which is a long recall time for the people interviewed in the evaluation.

Pre-distribution publicity: The household responses show that ***more than 96% of people received prior information about date and venue of distribution of the LLIN in comparison to 81% of households who received information on the time of LLIN distribution*** (Chart 20).



Amongst those who received prior information, a major percentage of them were informed by the frontline workers viz. AWW (54%), ASHA (52%) and ANM (32%). The involvement of Ward Member, Sarpanch and SHG members was found to be inadequate about informing people about the LLIN distribution.

Table 13. Sources of Information on LLIN Distribution

Source of Information	% of Households
ASHA	51.9%
AWW	53.8%
ANM	32.1%
Ward Member	2.7%
Sarpanch	1.6%
SHG Member	0.5%

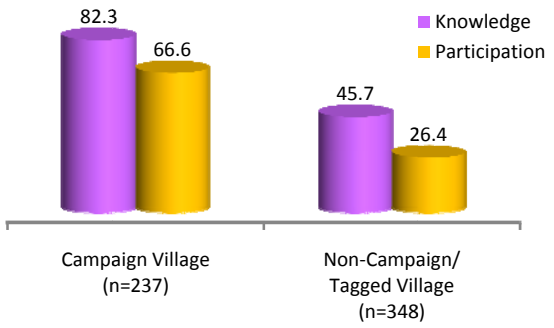
Demonstration during distribution: This strategy adopted under BCC informed people on the use and maintenance of LLIN through demonstration on hanging of nets, drying nets under shade, washing and tucking of sides, etc. and also by distribution of handmade posters and pamphlets at the time of distribution.

The evaluation revealed, only 59% of households were informed on the use and maintenance of LLIN during distribution. But during FGD, people in almost all villages (except two villages) said that they were informed on the use and maintenance of LLIN during distribution.

The evaluation team also observed that majority people gathered during the first one to two hours in the first session of LLIN distribution. Also during that period, the AWW and ASHA communicated the messages on LLIN use and demonstrated the same to the people present at the venue. But, people coming afterwards missed out the demonstration and the important messages communicated on LLIN use. Likewise huge gathering of crowd hampered proper demonstration of LLIN by the providers.

Social Mobilization through Nidhi Ratha Campaign: The Odisha-VBDCP launched intensified BCC campaign across the LLIN distributed areas for encouraging the use of LLIN by people following LLIN distribution. The campaign was organized in two separate events viz. van campaign (chariot named as *Nidhi Ratha*) and folk theater/video show ('Nidhi Mausa To Mashari Ne') which were undertaken one after the other. Nidhi Ratha moved around the villages, playing popular songs (with BCC messages) and distributing leaflets, followed by folk theater/video show organized at venues proposed under the micro plan (the venues for the campaign were identified in the centre places of areas covering few surrounding villages).

Chart 21. Knowledge and Participation in Nidhi Ratha campaign held in the village (in %)



Keeping this in view, the evaluation decided to disaggregate the BCC findings by campaign villages (where Nidhi Ratha and folk theater/video show was organized) and non-campaign / tagged villages (where the campaign was not organized but they were informed to attend the campaign in the identified venue near to their village) for comparing the outputs of BCC between the two sets of population.

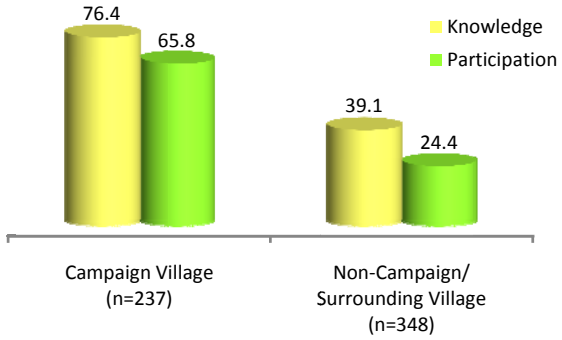
i) The knowledge of people regarding the Nidhi Ratha campaign held in the village shows a higher percentage of people know the same in the campaign villages (82%) as compared to people in the tagged villages (46%).

ii) ***The percentages of people attended the Nidhi Ratha campaign in tagged villages (26%) was found to be lesser than half of those who attended the same in the campaign villages (67%)*** (Chart 21).

iii) Similar variance is also marked with regard to people who knew and attended the folk theater/video show between the campaign and tagged villages. Chart 22 shows, about three fourth (i.e. 76%) in campaign villages knew the folk theater/video show held as compared to only one third (i.e. 39%) in tagged villages.

iv) Notably, ***only one fourth (i.e. 24%) of people attended the folk theater/video show in tagged villages as compared to two third (i.e. 66%) attended in campaign villages.***

Chart 22. Knowledge and Participation in Jatra / Folk Theater / Video Show Organized (in %)



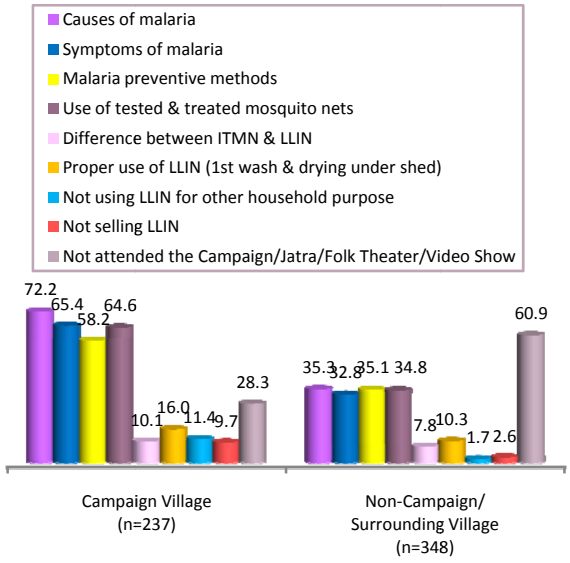
v) ***The dissemination of the Nidhi Ratha campaign was found lesser in the tagged villages in comparison to the campaign villages where reasonable percentages of people attended both the events.***

The factors that adversely influenced the attendance of people in the campaign are (responses of people during FGD with community):

- Inaccessible villages - lack of road communication and surrounded by forests (particularly the tagged villages)
- Absence of people in the village due to economic engagement of people such as wage earning, agriculture and forest produce collections
- Lesser participation of women in public functions
- Lack of information about the campaign in the tagged villages

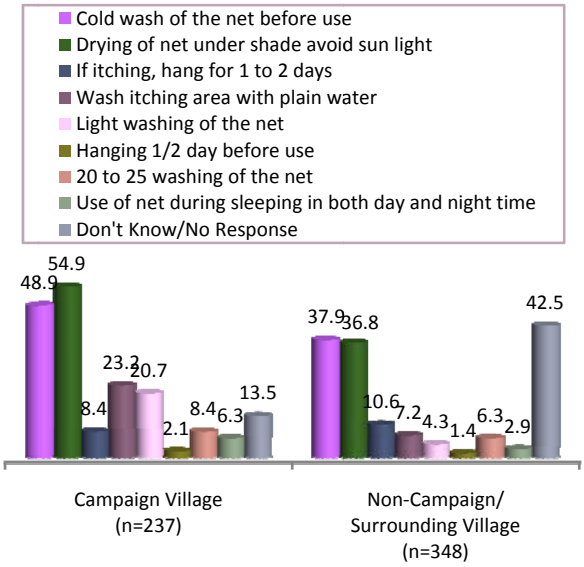
But, important to note that majority of people who attended the campaign could mention the story line of Nidhi Mausa program and relate the same with malaria. The household data also reveal that ***about 58% to 72% of people in campaign villages and 32% to 35% in non-campaign villages carried messages on causes, symptoms & methods of preventing malaria and the need of using mosquito nets from the campaign/folk theater attended by them. Messages relating to proper use, retention (not selling the LLIN) and maintenance of LLIN were carried by only 10% to 15% of people in the campaign villages and by negligible percentages of people in non-campaign villages.***

Chart 23. Health messages carried from the Campaign/Jatra/Folk Theater/Video Show (in %)



Overall outputs of BCC Strategy during LLIN distribution: The evaluation team assessed the knowledge and practices of people on the use and maintenance of LLIN. The assessment shows higher percentages of people aware of the 'cold wash of the net before use' and 'drying of net under shed' in campaign villages (i.e. 49% to 55%) than tagged villages (i.e. 37% to 38%).

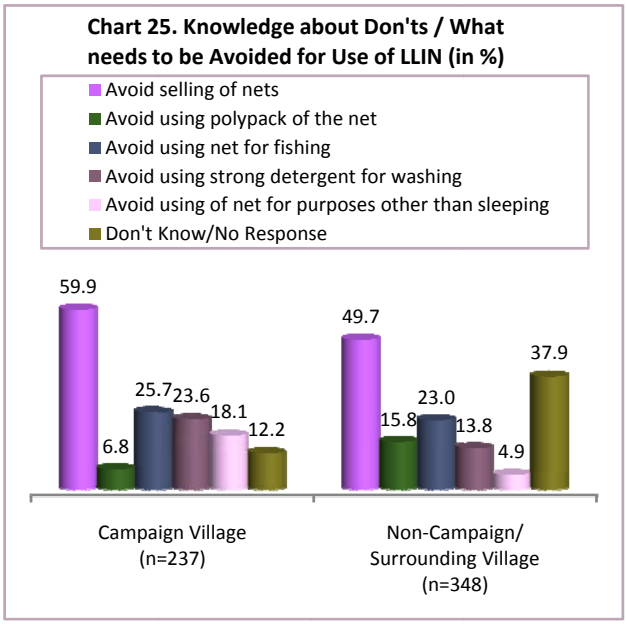
Chart 24. Knowledge about the Do's for proper use & Maintenance of LLIN (in %)



But, only 21% in campaign villages and 4% in tagged villages know about the 'light washing of LLIN' and 8% in campaign villages and 6% in tagged villages are aware of the 'number of washes that the insecticidal of LLIN would last'.

Message on the retention of LLIN or avoid selling of LLIN has reached to highest i.e. 60% of people in campaign and 50% in tagged villages. Most of the people at the time of LLIN distribution were categorically told by the workers for not selling the LLIN. But other important messages such as 'avoid using LLIN for fishing' and 'avoid using strong detergent for washing the LLIN' were reached to

only 24% to 26% in campaign villages and 14% to 23% in tagged villages.



The knowledge related outputs presented above were substantiated by the observations during household visit and discussion with people during FGD. Following are some observations with regard to good practices and bad practices of people on use and maintenance of LLIN:

- People in some households reported carrying LLIN with them to forest, agriculture field, etc. for sleeping in the night (people reported using sticks to hang the net).

- Majority of people reported proper tucking of the net (except very few instances who were hanging LLIN from the roof which leaves no scope for tucking).


Photograph showing the type of cot used by people for sleeping

- Few complained about mosquitoes getting inside the LLIN (some households have cots made-up of rope / tape / strip which allows mosquitoes enter inside the net from under the cot).

- Most of the tribal household have common kitchen and bed room because of which the LLINs hanged on the wall become dirty/black color/oily due to smoke in the kitchen.

- After use in the night, LLIN is hanged on the wall. Hardly anybody was observed folding the LLIN and keeping inside the box or any other proper places to avoid getting dirty.

- People across the study areas washing the LLIN more frequently (at least once in every month).
  - People are washing the LLIN with Soda and boiled water.
  - Before washing, people keep the LLIN in the boiled water with soda / detergent for long hours.
  - After washing, most of the people dry LLIN under bright sun light while some of them know that LLIN needs to be dried under shade.

- The evaluation team did not find any people using the LLIN cover or poly pack for domestic purpose.

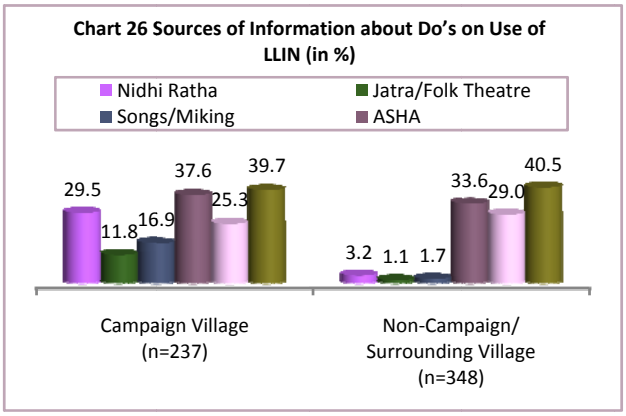
- Very few people complained about the problem of itching due to sleeping under LLIN.

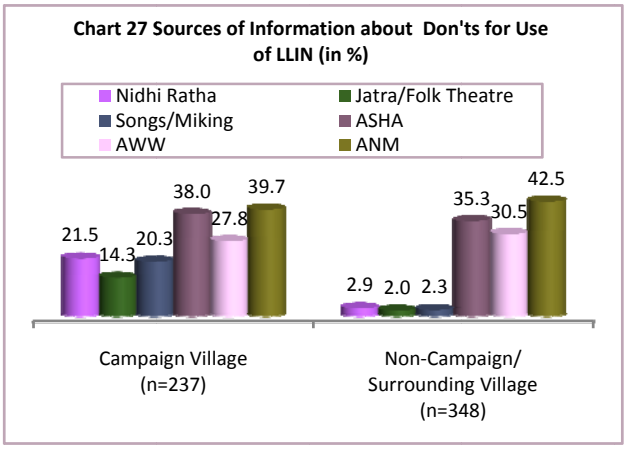
- In some parts of Kashipur, people were using LLIN for fishing.

From the above findings, ***it appears that the BCC messages on causes, symptoms, preventive methods, importance of using LLIN and retention***

of LLIN have reached to highest percentages of people in both campaign and tagged villages. But messages relating to maintenance of LLIN have reached to fewer number of people. Since huge investment was made by the Government on distribution of LLIN, poor maintenance of LLIN by beneficiaries warrants for more intensive and continuous BCC.

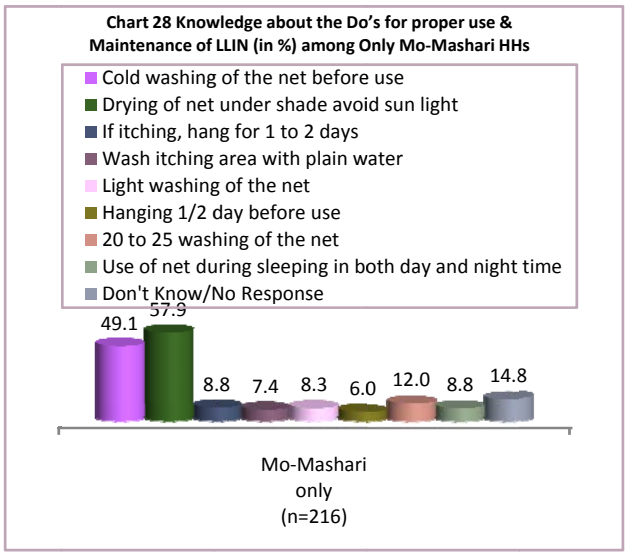
Sources of information received by people: Irrespective of type of messages received (Chart 26 & 27), the frontline workers (viz. such as ANM, ASHA and AWW) were the major sources of information to gather knowledge by the people on use and maintenance of LLIN. Nidhi Ratha, folk theater and songs/miking were the next important sources of information. Important to mention here that before the campaign was held, the messages on the use and maintenance of LLIN had been discussed with people at the time of distributing LLIN to people.

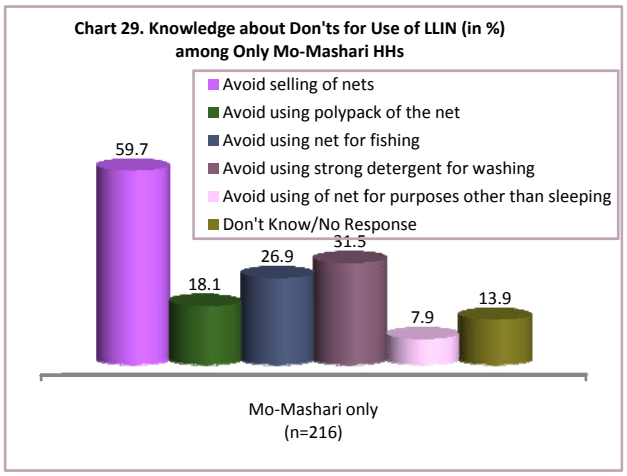




3.2.2 BCC under Mo-Mashari Scheme

Unlike to cluster areas, the messages on use and maintenance of LLIN were communicated to the pregnant women through IPC by the frontline workers such as ANM, ASHA and AWW. But similar





to the households in the cluster areas, higher ***percentages of pregnant women in the Mo-Mashari only areas had knowledge on 'cold wash of the LLIN before use', 'drying of LLIN under shade' and 'avoid selling of LLIN'. While lower percentages of pregnant women were aware about the 'light washing of LLIN', 'need to avoid using strong detergent', 'number of washes that the insecticidal of LLIN would last', etc.***

Among the frontline workers, ***almost two third of pregnant women reported ANM as the source of their knowledge on use and maintenance of LLIN followed by ASHA and AWW.***

Chart 30 Sources of Information about Do's on Use of LLIN (in %) among Only Mo-Mashari HHs (1st Three Sources)

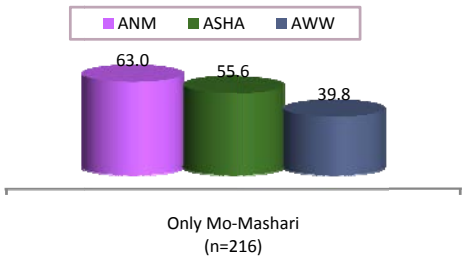
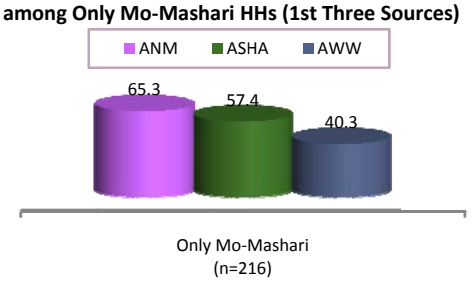


Chart 31 Sources of Information about Don'ts / What needs to be Avoided for Use of LLIN (in %) among Only Mo-Mashari HHs (1st Three Sources)



3.3 Assessment of Short term outcomes of LLIN use on pregnant women and young children

The main objective of the Mo-Mashari scheme was to protect women from malaria during pregnancy period. Research evidence from other studies report reduced incidence of malaria among pregnant women and young children following use of LLIN. Studies also report reduction in Anaemia status and improvement in nutritional status of pregnant women and young children.

The evaluation also measured the short term outcomes of LLIN use in terms of assessing the incidence of malaria, anaemia and nutritional status of pregnant women and their young children. Since there is not enough baseline data available, the evaluation compared the above outcome indicators between the LLIN-received and Non-LLIN households to know the changes brought in by the LLIN distribution program under Mo-Mashari and Cluster schemes. Also it is important to mention that except LLIN distribution, all other malaria control interventions e.g. EDCT by using RDT, Insecticide Residual Spray (IRS), impregnation of ordinary nets with insecticidal, IEC/BCC activities for encouraging use of net, etc. are being undertaken by the State in both the LLIN distributed and Non-LLIN areas.

3.3.1 Incidence of Malaria Parasitemia

The survey team conducted a rapid one step malaria diagnosis by using a Rapid Diagnostic Test(RDT) (pLDH/HRP2 Combo test antigen based) of all the pregnant women and their young children (0 day-36 months). The RDT was used to diagnose the Plasmodium falciparum and Plasmodium vivax species in the human blood.

The percentage of pregnant women diagnosed having malaria is only 2% in LLIN-received households in comparison to 4% in Non-LLIN households. Similarly malaria was detected in 3.8% of young children in Non-LLIN households as compared to only 2.3% in the LLIN-received households. This shows ***a difference of 50% and 39% of lesser malaria cases amongst the pregnant women and young children respectively in LLIN-received households.***

Table 14. Incidence of malaria amongst pregnant women and young children

Study Participants	LLIN Households	Non-LLIN Households
Amongst Pregnant Women	**2%** (N=800)	**4%** (N=528)
Amongst Children (mostly index child below 2 years of age)	**2.3%** (N=554)	**3.8%** (N=238)

The malaria incidence by type shows higher percentage of Plasmodium falciparum cases amongst the pregnant women as well as young children in Non-LLIN households in comparison to the LLIN-received households.

Table 15. Type of malaria parasite found amongst pregnant women and young children

Study Participants	LLIN Households	Non-LLIN Households
A. Pregnant Women	(N=800)	(N=528)
Pf+ only	1.0%	2.8%
Pv+ only	0.4%	0.2%
Both Pf+ and Pv+	0.6%	0.9%
B. Young Children	(N=554)	(N=238)
Pf+ only	0.9%	2.1%
Pv+ only	0.5%	0.8%
Both Pf+ and Pv+	0.9%	0.8%

3.3.2 Status of Anaemia

The haemoglobin levels of all women currently pregnant, women who competed pregnancies and all young children were directly measured (mostly the index child below 2 years of age) using HemoCue Hb 301+ Analyzer[24].

Table 16. Status of Anaemia amongst pregnant women and young children

Study Participants	LLIN Households	Non-LLIN Households
Amongst Current Pregnant Women (<11g/dl)	**48.5%** (N=198)	**68.5%** (N=270)
Amongst Women Completed Pregnancy (<12g/dl)	**56.6%** (N=602)	**70.5%** (N=258)
Amongst Young Children (mostly index child <2 years (<11g/dl)	**77.7%** (N=551)	**88.2%** (N=238)

The haemoglobin test results revealed that ***the percentage of any anaemia amongst currently pregnant women was at least 20% lower in LLIN-received households than Non-LLIN households. Similar percentages of change in any anaemia were also found amongst women completed pregnancy and young children*** (Chart 16)***.***

[24] The HemoCue has been found to give accurate results, comparable to estimates from more sophisticated laboratory instruments (Gehring et al., 2002; Von Schenk et al., 1986; McNulty et al., 1995; Krenzischeck and Tanseco, 1996; Medina et al., 2005; Rosenblit et al., 1999; Lardi et al., 1998; Gupta et al., 2007)

3.3.3 Nutritional Status

Nutritional Status of Women: Body Mass Index (BMI) is used as an indicator to assess the nutritional status of women covered in the evaluation (excludes pregnant women and women with a birth in the preceding 2 months). The evaluation measured the height and weight of women for calculating their BMI.

Table 17. Body Mass Index (BMI) of women

Study Participants	LLIN Households (N=547)	Non-LLIN Households (N=233)
Underweight (BMI <18.5)	33.8%	42.9%
Severely / Moderately Thin (BMI <17.0)	10.1%	20.2%

The BMI status of women presented in Table 17 reveals that ***the percentages of underweight and severely/moderately thin women were at least 9% and 10% lower in LLIN-received households as compared to Non-LLIN households respectively.***

Birth Weight of Children: The birth weight of all index children as recorded in the register of ANM was documented by the study team.

The percentage of children with normal birth weight was found to be more in Non-LLIN households than LLIN-received households.

Table 18 Birth weight of Index child

Study Participants	LLIN Households (N=575)	Non-LLIN Households (N=269)
Children Below 2.5kg	19.5%	16.0%
Children 2.5kg or above	80.5%	84.0%

Nutritional Status of Children: Like women, the evaluation also measured the height and weight of the children to know their nutritional status. The date of birth of each child was collected from the birth records maintained by ANM. The WHO - Anthro software was used to analyze the nutritional status of children.

Table 19. Nutritional status of Index children		
Study Participants	**LLIN Households**	**Non-LLIN Households**
Underweight (Weight for Age)	**39.8%** (N=561)	**41.5%** (N=248)
Wasting (Weight for Height)	**28.8%** (N=556)	**31.7%** (N=246)
Stunting (Height for Age)	**41.4%** (N=561)	**44.4%** (N=248)
Severely Underweight (Weight for Age)	**17.6%** (N=561)	**21.8%** (N=556)
Severely Wasting (Weight for Height)	**14.2%** (N=556)	**17.9%** (N=556)
Severely Stunting (Height for Age)	**21.2%** (N=556)	**17.7%** (N=556)

Table 19 shows that ***the percentages of underweight, wasting and stunting children were marginally lesser in LLIN-received households than the Non-LLIN households (only 2% lesser cases of underweight and 3% lesser cases of stunted and wasted children each in the LLIN-received households).***

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CHAPTER IV

Conclusions and Recommendations

The study findings presented in the foregoing chapter brings out some key challenges in the execution of Mo-Mashari scheme and BCC campaign which needs to be addressed at different levels for further strengthening of the LLIN distribution and protection of pregnant women and young children. Thus the desired short term and long term outcomes in terms of reduced incidence and deaths achieved will lead to protection of the vulnerable community from Malaria and other vector borne diseases. An attempt has been made by conducting community survey to identify the key issues & challenges and recommend further measures to address those challenges.

4.1 Conclusions and Recommendations

The study clearly indicates positive outcomes in terms of reduction in cases among Pregnant Women and Young Children in LLIN received households (50%), retention of LLIN (99%) and usage of LLIN among the pregnant women (89%) and by post natal mothers for their young children, reduction in anaemia status among pregnant women (20%) and young children (10%). Similarly improvement in nutritional status is observed both in pregnant women and young children however it needs further evaluation.

Following are some key recommendations made by the study to further improve the program:

Issues/Challenges	Suggestions / Recommendations
i) Sustainability of LLIN distribution to pregnant women under State initiative Mo-Mashari Scheme after March 2011	• Keeping into account the positive impact of the LLIN use found in the study, the State may decide to continue the scheme and resume distribution of LLIN to protect the vulnerable community. • The State may also expand the program to all the Malaria high burden districts in Odisha (21). • Supply of LLIN from the State to District and from District to below needs to be made consistent and regular to match the demand for concurrent distribution of LLIN to pregnant women.
ii) Lack of micro-plan at district/CHC level to address the requirement of LLIN distribution from Block to Sub-centers	• The MTS/LT, PHIO, MPHS (M/F) in the Block need to prepare an annual micro-plan to address the actual requirement of LLIN by a sub-centre taking into consideration the past records of pregnant women registered in the sub-centre and the birth rate of SC.
iii) Lack of storage and transportation facility for LLIN at Sub-centre and to the distribution point in the village	• Proper storage and transportation facility may be provided at the CHC / sub-centre or at village level for distribution of the LLIN to the target beneficiary at appropriate time. In other case, the Block CHC may supply LLIN periodically (quarterly) to sub-centre to avoid storing problem. • Effort should be made to deliver LLINs at the sub-centre rather asking ANM to collect

Issues/Challenges	Suggestions / Recommendations
	the same from the Block CHC or in the sector meeting. • Periodic (quarterly) tracking and replenishment of LLIN should be made at the sub-centre. • The MPHW (M) may be engaged to carry LLINs from the sub-centre to village for distribution to pregnant women.
iv) Delay in distribution of LLIN to women during antenatal period (mostly distributed in the 2nd and 3rd trimester)	• The ANMs need to be educated for distributing LLIN in the 1st trimester of pregnancy during antenatal registration in order to avoid early abortion that may be caused by malaria. • There is a need for early detection of pregnancy through ASHA using NISCHAYA kit which would help giving LLIN in the 1st trimester of pregnancy after detection of pregnancy at AWC or Home delivered. • ANM needs to establish coordination with ASHA and AWW, PRI member for distribution of the same at the village. • The platforms like VHND and Immunization day may be utilized for communicating the IEC/BCC messages on regular use of LLIN during pregnancy. • The State may keep a provision in the Maternal Health Card/JSY Card for knowing the receipt of LLIN by the pregnant women.
v) Non-coverage of all the pregnant women with LLIN	• The state may need to explicitly mention in the Mo-Mashari guideline for coverage of all the pregnant women (including all the current and new pregnant women). • The State may consider covering the floating population under Mo-Mashari scheme (Pregnant women coming from non-endemic area to high-endemic area to stay with parents during pregnancy. Since they are not registered with Sub-Centre, LLIN is not provided to them. A buffer stock of LLIN may be kept for them. • In cluster areas, concurrent household survey for assessment of the beneficiaries needs to be done village wise to meet additional requirement of LLIN based on age, sex, relationship, chronically diseases, PH, newly married brides, young mothers with newborn etc. • Assessment of LLIN requirement of a family in cluster areas (This would help to avoid the inadequate or over supply of LLIN to families. The AWC Survey Register may be referred to assess the LLIN requirements of the family).
vi) Improper storage of LLIN (becoming dirty due to smoke in the kitchen)	• The State may provide coloured LLIN to pregnant women and households to avoid frequent washing of the same. • The beneficiaries need to be educated on proper use, storage and maintenance of LLIN at home • GKS members may follow up this activity with the target

Issues/Challenges	Suggestions / Recommendations
	beneficiary from time to time
vii) Lesser use of LLIN by household members viii) Lack of proper maintenance of LLIN by pregnant women and households	• The State may continue the *Nidhi Ratha campaign* which helps in mass mobilization of people for using LLIN and making them aware about vector borne disease. • Extra emphasis needs to be made on maintenance of LLIN in the health messages communicated to the community during Nidhi Ratha campaign. • Nidhi Ratha campaign and LLIN distribution may be clubbed together which may lead to enhanced participation of the people (male/female) with appropriate communication of BCC messages on use and maintenance of LLIN and may result in enhanced awareness of the community. • Greater emphasis needs to be given on Inter Personal Communication (IPC) in addition to Nidhi Ratha Campaign by frontline workers (ASHA, AWW) during pre distribution, during distribution and post distribution (during home visit, VHND, Pustikar Diwas, Antenatal checkups, Immunization Day, etc.).

Issues/Challenges	Suggestions / Recommendations
	• A checklist of messages need to be provided (in printed form) to FLWs for communication (preparing a flip chart on use & maintenance of LLIN). • Counseling on use and Maintenance of LLIN may be added to the training of all the frontline workers. • The State may conduct training or orientation program for capacity building of the frontline workers to develop their understanding on LLIN distribution, use, maintenance, IPC and follow up.

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