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Information framework adopted for evaluation:

Objectives	Variables	Source	Methods
<p>(1) To test an intervention strategy that addresses the challenges for MDA in urban areas, building on an inclusive partnership framework developed on the basis of the research findings on the above objective, and involving in particular the private practitioners and active CBOs.</p>	<p>Coverage Compliance Reasons for low/high coverage and compliance Feasibility (willingness to repeat)</p>	<ul style="list-style-type: none"> ❖ Community members ❖ Government and municipality staff ❖ Other stakeholders 	<ul style="list-style-type: none"> ❖ Quantitative household surveys ❖ Process evaluation ❖ In-depth interviews
<p>(2) To evaluate the impact of this intervention strategy on perceived need of, and in enhancing support for, MDA amongst all stakeholders including the community, health workers, municipal officials</p>	<p>Perceived need of MDA</p> <p>Community, Health personnel/ Municipal officials:</p> <ul style="list-style-type: none"> ▪ Possible increase in knowledge level ▪ Risk perception will increase across strata ▪ Fewer conflicts ▪ Attitude towards MDA may change ▪ More involvement of people ▪ More demand for MDA, information ▪ Drug distribution and treatment coverage rates <p>Enhancing support for MDA</p> <p>Community:</p> <ul style="list-style-type: none"> ❖ Mobilization of resources – manpower, material, logistics 	<ol style="list-style-type: none"> 1. Community members 2. Key-informants in the community 3. Stakeholders including health/municipality personnel, NGOs, CBOs, etc. 	<ol style="list-style-type: none"> 4. Focus groups discussions 5. In-depth interviews 6. Quantitative household surveys

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	<ul style="list-style-type: none"> ❖ Demonstrate through proactive action (CBOs/NGOs) ❖ Liaison with other sectors for infrastructure support <p>Health workers/municipal officials:</p> <ul style="list-style-type: none"> ❖ Allocation of more time and resources (physical and human, IEC) ❖ Inclusion of LF in the priority list of diseases ❖ Initiating involvement of local political leaders for creating political will ❖ Disseminating information to media ❖ Maintaining liaison with concerned professional associations ❖ Creating/supporting a system for surveillance and management of issues related to MDA 		
<p>(3) To describe the preparatory and mobilization process as developed by the stakeholders, and to assess its strengths and weaknesses</p>	<ul style="list-style-type: none"> ❖ List of preparatory and mobilization processes and suggested strategies for the completion of those processes ❖ Stock of the suggested preparatory and mobilization processes at different levels (such as strata, sub-group, ward and municipality levels) ❖ Scope of involvement of various local talents and resources in the draft plan for mass mobilization ❖ Peoples' responses and their suggestions for mass mobilization ❖ Assessment of the draft preparatory and mobilization processes on the basis of the responses of the stakeholders and the general mass ❖ Passing on the feedbacks to the coordinating committee for required alterations or modifications in the strategies and arriving consensus by nominal groups technique (NGT)/ modified Delphi 	<ul style="list-style-type: none"> ❖ Different stakeholders ❖ Documentation of the preparatory process using audio-video equipments ❖ Documentation of the mobilization process ❖ Concurrent evaluation and passing of the feedbacks to different groups of stakeholder 	<ul style="list-style-type: none"> ❖ Formal and informal discussions ❖ Process documentation ❖ Process evaluation ❖ In-depth interviews
<p>(4) To describe the drug distribution process as developed by the government in consultation</p>	<ul style="list-style-type: none"> ❖ Stages of drug distribution ❖ Possible inclusion of other potential partners in DDP (e.g. like private practitioners) 	<ul style="list-style-type: none"> ❖ Recording drug distribution process ❖ Cross-checking of 	<ul style="list-style-type: none"> ❖ Process recording ❖ Process evaluation ❖ In-depth interview with



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<p>with the stakeholders, and to assess its strengths and weaknesses</p>	<ul style="list-style-type: none"> ❖ Assessment of the nature of participation of different categories of the stakeholders in developing DDP ❖ Critical assessment of the variation (possible positive and adverse impacts) ❖ Cultural constraints by different categories of stakeholders ❖ Time and place of drug distribution ❖ Selection of drug distributors ❖ Training of drug distributors ❖ Importance of strata and sub-groups in the process of drug distribution (to be ascertained by the coordination committee with the help of the researchers) ❖ Recording of regional peculiarities and possible cultural constraints (to be done by the members of the concerned groups) and incorporating sub-strategies for countering such constraints (to be done by the coordination committee in consultation with the concerned groups) ❖ Meetings with private practitioners/ and at the associational level and involving them as partners in evolving new strategies ❖ Suggestions of the private practitioners on possible constraints on the medical and socio-cultural dimensions ❖ Assessment of the participation of the marginalized/vulnerable groups in drug distribution process 	<p>inclusion of suggestions on the basis of research findings</p> <ul style="list-style-type: none"> ❖ Views of the stakeholders on the weakness of the suggested DDP ❖ Argument of the stakeholders in favour of adaptation of a new sub-strategy/minor modification of the suggested strategies of DDP (Nominal group technique) 	<p>stakeholders</p>	<ul style="list-style-type: none"> ❖ Quantitative household surveys ❖ Process evaluation ❖ In-depth interviews ❖ Focus group discussions with sub-groups
<p>(5) To evaluate the treatment coverage (consumption rate) achieved with the new strategy, and to assess whether after three years of intervention it reaches the desired level of treatment coverage with DEC/Alb that is required for elimination of LF</p>	<ul style="list-style-type: none"> ❖ Quantitative assessment of the drug coverage and compliance strata, sub-group and ward wise ❖ Analysis of coverage and compliance across the strata ❖ Reasons for low/high coverage and compliance ❖ Cross examining the effectiveness of the suggested sub-strategies for different sub-strata ❖ Critical assessment of the strength and weakness <ul style="list-style-type: none"> (i) Why a few sub-strategies did not yield the expected results? (ii) Why some of the strategies worked well? 	<p>Community members, including sub-groups</p> <ul style="list-style-type: none"> ❖ Government and municipality staff ❖ Other stakeholders 	<p>Quantitative household surveys</p> <ul style="list-style-type: none"> ❖ Process evaluation ❖ In-depth interviews ❖ Focus group discussions with sub-groups 	

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<p>(6) To determine the feasibility of implementation of the new strategy using existing human resources (health and other sectors) at the municipal and community level</p>	<ul style="list-style-type: none"> ❖ How leaders / CBOs in the community were identified, selection criteria used, meetings held, training / sensitisation sessions of CBOs, agenda discussed ❖ Number of committees formed at different levels? ❖ Number of leaders, CBOs per ward who participated in the MDA ❖ Number of meetings held for planning, and implementing MDA ❖ Role of health worker / non-health worker in the above ❖ How was the above different across strata/sub-groups ? ❖ IEC campaign details, IEC materials used, involvement of CBOs in IEC campaign ❖ Number of drug distributors, from health services, from community, from CBOs etc. ❖ How were side effects managed, systems for surveillance of side effects ❖ Number of private practitioners, professional associations who participated in planning and implementation of MDA ❖ Number of patients with side effects managed by private practitioners ❖ Role of private practitioners in implementing MDA – advising people, dispensing DEC – across strata ❖ Difficulties in the above processes 	<ul style="list-style-type: none"> ❖ Municipality and health personnel ❖ private practitioners ❖ All other stakeholders including CBOs 	<ul style="list-style-type: none"> ❖ In-depth interviews ❖ Focus group discussions
<p>(7) To document the contributions made by various stakeholders and to determine the cost of the new strategy</p>	<ul style="list-style-type: none"> ❖ costing per ward (additional costs incurred for involving partners) – direct costs + additional costs for human resources ❖ costs for meetings ❖ opportunity costs for volunteerism ❖ costs for training, IEC material distributed ❖ # of hours spent ❖ costs for CME for doctors ❖ incentives for drug distributors etc. 	<ul style="list-style-type: none"> ❖ Municipality and health personnel ❖ All Stakeholders at all levels 	<ul style="list-style-type: none"> ❖ Structured questionnaire survey



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Sampling:

The intervention and MDA are implemented in entire municipal area of Choudwar. For evaluation of intervention, following sampling frame is employed.

Strata: For sampling purpose, the urban wards are divided into four strata, i.e., high-income group (HIG), middle-income group (MIG), low-income group (LIG-1) and slums (designated as LIG-2). HIG wards are those having more than 60% of HIG houses. The same principle is applied for the identification of MIG and LIG-1 wards. The list of slums is obtained from the municipality authorities, to identify LIG-2 areas.

Selection of households from HIG, MIG and LIG-1 strata: After categorizing all the wards into HIG, MIG and LIG-1, two wards are selected from each stratum on a random basis. Having listed all colonies/streets in a ward, five colonies/streets are selected on a random basis. In each colony/street, a random point is selected and from there ten consecutive households are selected for various surveys.

Selection of households from slums: The lists of wards containing slums are prepared on the basis of information obtained from the municipality. From the compiled list, 10 slums/ hutments are selected on random basis. From each area, 10 households are selected consecutively.

Quantitative and qualitative approaches:

Both quantitative and qualitative data collection techniques are used during the evaluation as shown in the above table. The quantitative data on coverage, compliance and related issues are obtained through household questionnaire survey. All the sample households from four strata are included for household questionnaire survey. For comparison purpose, the household coverage survey has been undertaken in a neighbouring urban area, namely Dhenkanal, where no intervention has taken place. This town is comparable in population and other physical and demographic features and MDA has been undertaken as usually by the government. Similarly another rural area has been selected for this survey. The coverage and compliance are compared across these areas, i.e. intervened urban area, non-intervened urban area and non-intervened rural area. The qualitative techniques used are focus group discussions (FGDs), in-depth interviews and free listing. All these surveys are taken equally from all strata. FGDs are conducted among members of youth club, members of women group, general community and sub-groups in the community. In-depth interviews with various respondents including the partners of intervention (like councillors, community leaders, private practitioners, paramedical professionals, media persons, representatives of CBOs and NGOs, etc.) are conducted. Key-informants from each stratum, who specifically represent the stratum are sampled and interviewed. In addition, some key-informants who represent the entire town are selected. Few case studies are recorded in order to narrate high level of people's participation and high coverage of MDA. Free-listing has been done to assess the change in the people's priority, with regard to LF.

Details of surveys

Particulars of survey	Sample
Household coverage survey	
From Intervened urban area	4835
From non-intervened urban area	1218
From non-intervened rural area	1145
Post intervention KAP survey	402
Key-informant interviews	36
In-depth interviews with partners	19
In-depth interviews with drug distributors	40
In-depth interviews with supervisors of distribution	4
Focus group discussions with community members	15
Free-listing	122
Case studies	2

Data processing and analysis

Quantitative data: The quantitative data collected through household coverage survey were processed and analysed through SPSS. V.10. For open-ended questions, particularly on reasons for non-reception and non-compliance of drugs, adverse reactions, etc., equivalent narrations were pooled in to different categories during analysis. The significance of differences in their indicators is assessed by Z-test.

Qualitative data: All the FGDs and in-depth interviews were undertaken in Oriya, the local language of Orissa. The entire discussion/interview was recorded on audiocassettes. At the end of the discussion/interview, the audiocassettes were played back and transcribed in to Oriya with the help of field notes. The scripts were translated to English. These scripts were entered in to personal computer in MS Word as text files. The analysis is being done by using ATLAS/ti for Windows V.4.1. Three indicators namely coverage (percentage of eligible people who received tablets), compliance (percentage of eligible people who swallowed tablets) and household coverage (percentage of households visited by CDDs or health workers (in non-intervention area) during MDA were used to evaluate the outcome of intervention. The free-listing data will be analysed by using Anthropac.

Results of Intervention:

The quantitative data obtained through household coverage survey and post KAP survey are analysed and the results are given. The results of coverage survey indicated that the intervened urban area recorded significantly high coverage ($p < 0.001$) and compliance ($p < 0.001$) and household coverage ($p < 0.001$) than that of non-intervened urban area, but nearer to that of the non-intervened rural area (Table 1 and Fig. 1). The household coverage data indicate the efforts of drug distributors in reaching the households. In intervened urban area it is similar to rural areas, where there is network of health workers and health workers cover all corners of the village. In intervened urban area, the CDDs could reach



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to maximum number of households. The difference between coverage and compliance, i.e. the group of individuals who have not consumed the tablets, though they received is

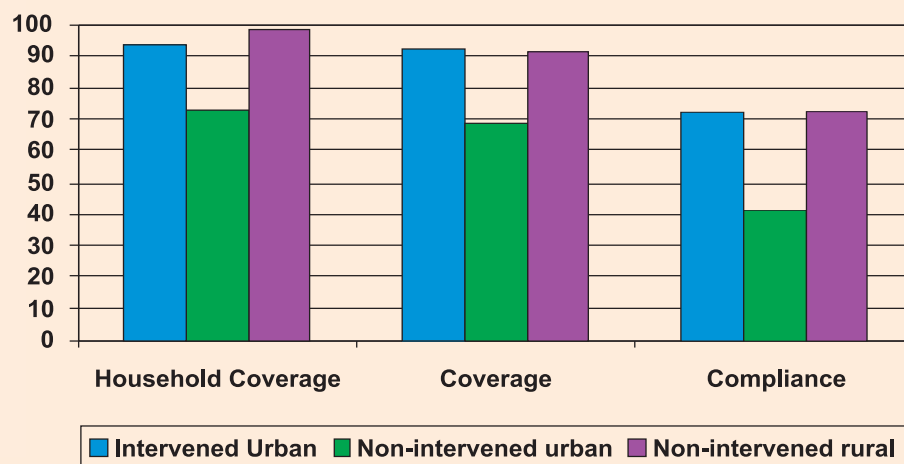
Table 1. Coverage and compliance in intervened and non-intervened area

Area	Group	Sample size	Coverage	Compliance
Intervened urban area	Male	2540	92.3	71.3
	Female	2295	91.9	73.2
	Total	4835	92.1	72.2
Non-intervened urban area	Male	612	69.3	38.9
	Female	606	68.2	43.4
	Total	1218	68.7	41.1
Non intervened rural area	Male	596	91.6	70.8
	Female	549	91.6	73.0
	Total	1145	91.6	71.9

still high in all groups. However, this number is more in non-intervened urban area (27.6%), than intervened urban area (19.9%) and non-intervened rural area (19.7). The reasons for both compliance and non-compliance are collected through coverage survey as well as through some ethnographic methods. The analysis of these data gives clue for existence of high numbers.

The age-wise rates of coverage and compliance in study area are given herewith (Fig. 2). There are no significant variation either in coverage and compliance among individuals of above 4 years old. But there are significantly low levels of coverage and compliance reported among children below 5 years. This is due to perception of parents that the age of the children is too young to receive drugs and also the fear of adverse reactions.

Fig. 1. Coverage, compliance and household coverage rates among intervened urban, non-intervened urban and rural areas

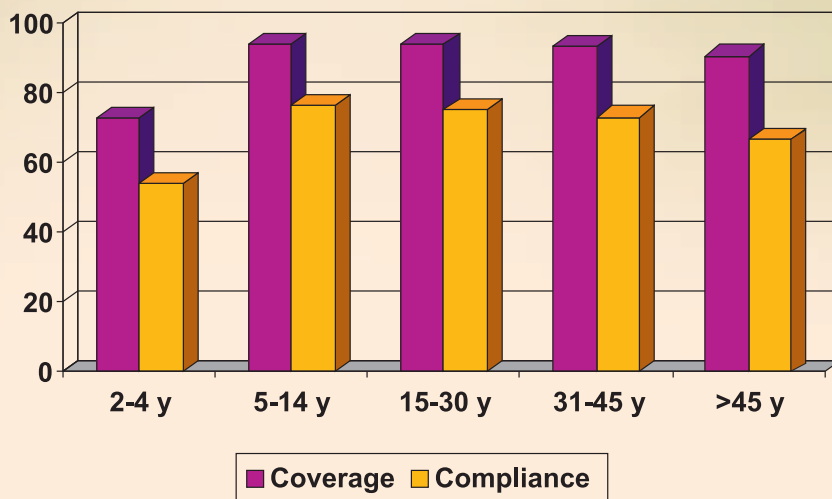


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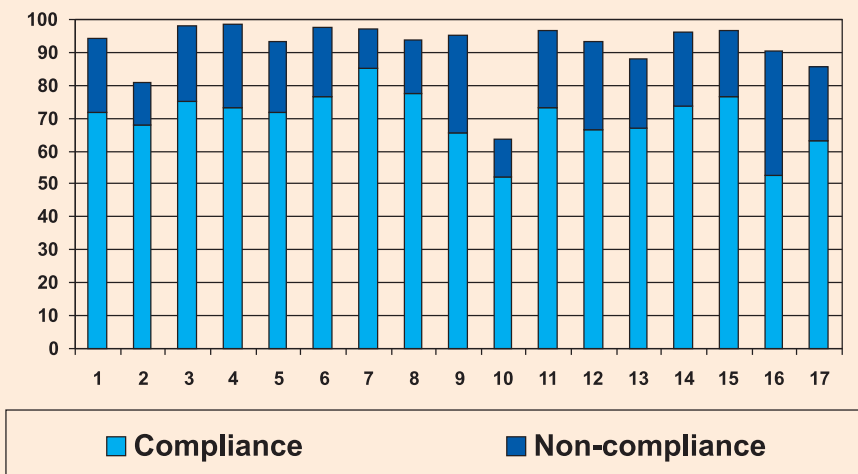
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Fig. 2. Coverage and compliance among individuals of different age groups in intervened urban area



The variations in coverage and compliance across various wards of study area are noticed and shown (Fig. 3). Of all the wards, 10th ward reported the lowest coverage and compliance. The gap between coverage and compliance also varied across these wards. The reasons are to be obtained carefully from qualitative data. It is attempted to correlate the features of wards as well as the performance of ward level activities with coverage and compliance rates.

Fig. 3. Coverage, compliance and household coverage rates among intervened urban area



The qualitative data are to be analysed. The qualitative data will be analysed with the background of low and high rates of coverage and compliance, to unveil the motives to achieve high compliance and reasons for low compliance. Also the data is being critically examined to improve and implement the strategy in coming round of MDA. The key findings based on the preliminary data analysis are shown in Box-2.



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Sidebars

Box-1 SPECIAL STRATEGIES	Box-2 KEY FINDINGS
<ul style="list-style-type: none">• Sub-group approach: While dealing the following sub-groups during community mobilization and drug delivery, special strategies were adopted for their acceptance in order to achieve more compliance.<ul style="list-style-type: none">• Religious minorities• Linguistic minorities• Prisoners• School/college students• Use of local practitioners: The services of local practitioners including private practitioners and physicians from industry hospitals were utilized during management of adverse side reactions, and ward level community mobilization activity.• Sensitisation of media personnel: Through a process of mobilization, media personnel were requested to highlight the positive aspects of the program ignoring the bare instances of some adverse reactions at the time of reporting. For achieving their support, some of them were made members of the steering committee.• Communication and community mobilization activities: Intensive community mobilization activities (e.g., rallies by school children and house-to-house visits) were organized by involving different partners during the period of environment building. Various IEC materials also were used.	<ul style="list-style-type: none">• Partnership approach involving various stakeholders is an innovative alternative method for addressing the problem of low MDA coverage and compliance in urban India.• The MDA with local decision-making and local leadership is quite effective in urban communities.• This innovative approach has potentiality to achieve desired levels of results in different strata of urban communities.• It takes into account the specificity of the situation and thereby tries to address the socio-cultural peculiarities of different sub-groups.• Seems to be suitable for implementation in other urban areas.

1.7 Malariogenic stratification of Anugul district of Orissa using sibling species prevalence of malaria vectors

Objectives:

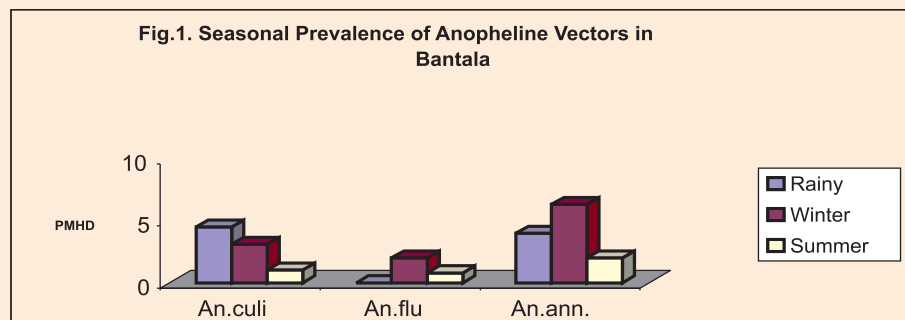
1. To study the prevalence of different sibling species complex of malaria vectors and their susceptibility status to insecticides in Anugul district of Orissa.
2. To study the bionomics of the complex like resting, feeding and biting behaviour, anthropophilic indices, gonotrophic cycle, and preferential breeding habit.
3. Malariogenic stratification of the district basing on the above parameters

Results:

The distribution of vectors, their species complex and its biological adaptation and residence in particular environment is the determining factor in establishing malaria endemicity. Anugul district has eight PHCs having a total population of 11,39,341 (Census of India, 2001). The district possesses forest, riverine and plain ecotype and it has also developmental dam project area as well as mining area. Three out of eight PHCs, viz. Bantala, Godibandh and Kaniha, representing each ecotype, were selected for entomological studies. From each PHC, 6 representative villages were selected based on different ecotypes (Hilly forest-2, Plain-2 and riverine-2). Each PHC was visited once in all the three seasons i.e rainy, winter and summer. Each village possesses about 100 houses on an average. Mosquitoes were collected from 10% of the households (HD) and 10% of the cattle-sheds (CS) from each village. The sampling for all the entomological studies were done as per the WHO procedure (WHO, 1975). After collection, the mosquitoes were identified. Blood meals were collected on Whatmans filter paper for processing by gel diffusion technique. The ovaries were dissected from semigravid females and were placed in modified Cornoy's fixative. Ovaries were processed in 50% propionic acid and stained in 2% lacto- aceto-orcein according to the method of Green and Hunt (1980) for making polytene chromosome preparation. The chromosomal preparations were studied under phase contrast microscope.

The entomological study reveals the presence of 13 species of mosquitoes belonging to four genera, i.e. *Anopheles*, *Culex*, *Aedes* and *Armigeres*. *Anopheles* species collected were *An. aconitus*, *An. annularis*, *An. culicifacies*, *An. fluviatilis*, *An. hyrcanus*, *An. maculatus*, *An. pallidus*, *An. pseudojamsei*, *An. Subpictus*, *An. splendidus*, *An. tessellatus*, *An. vagus* and *An. Varuna*.

The prevalence of the three main vectors in different PHCs during winter, summer and rainy seasons are depicted in Fig.1-3. The density of *An. culicifacies* was highest during rainy followed by winter and summer while *An. fluviatilis* was collected more in winter in all the PHCs. *An. annularis* was predominant during winter followed by rainy season.



Status :

Intramural

Investigators :

Dr. N. Mahapatra,
Dr. R.K. Hazra,
Dr. S.K. Parida;
Mr. N.S. Marai,
Mr. H.K. Triparthy.

Starting date :

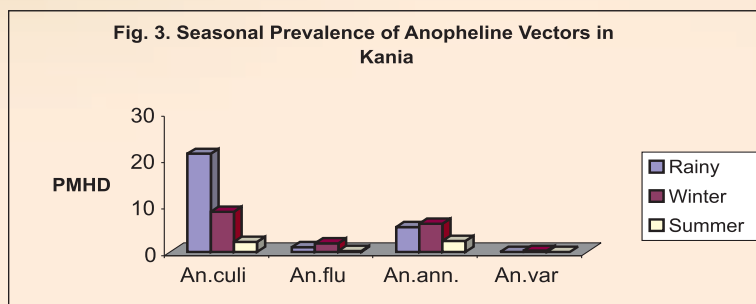
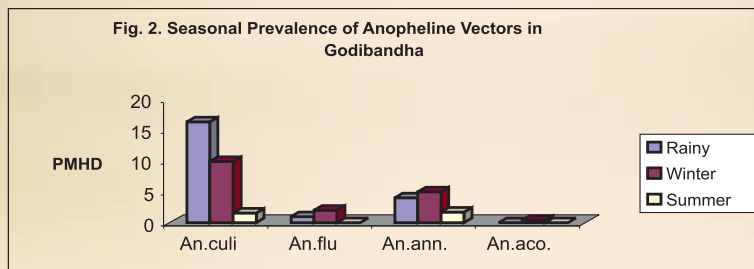
October 2003

Closing date :

September 2005



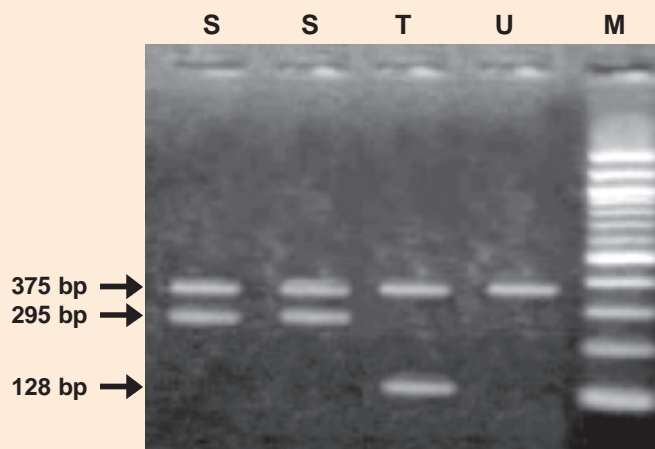
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An. culicifacies, *An.fluviatilis* and *An. annualis* are found to be the main vectors in Anugul district. Out of five sibling species of *An.culicifacies* (A,B,C,D, & E), species B and C and from three sibling species of *An. Fluviatilis* (S,T &U) only S and T were collected from the district. *An. culicifacies* B and C and *An. fluviatilis* T were found in all the PHCs. The percentage of *An. culicifacies* C were 80 %, 55% and 70% in Bantala, 85%, 68%, and 75% in Godibandh and 78%, 65% and 72% in Kaniha PHC during rainy, winter and summer seasons respectively(fig 5-7).

Molecular identification of *An.fluviatilis* was also done. In the molecular analysis the D3 region of the ribosomal DNA were analyzed using primers developed by MRC (Singh *et al.*, 2004)(Fig -4). The result of the molecular study revealed the composition of *An. fluviatilis* S were 78 % , 88%and 50% in Bantala PHC and 75%, 98% and 66% in Kaniha PHC during rainy, winter and summer seasons respectively. In Godibandh PHC, all the *An. fluviatilis* collected were found to be only *An. Fluviatilis* S (fig 8-9). One specimen of *An. fluviatilis* U was collected from Bantala PHC.

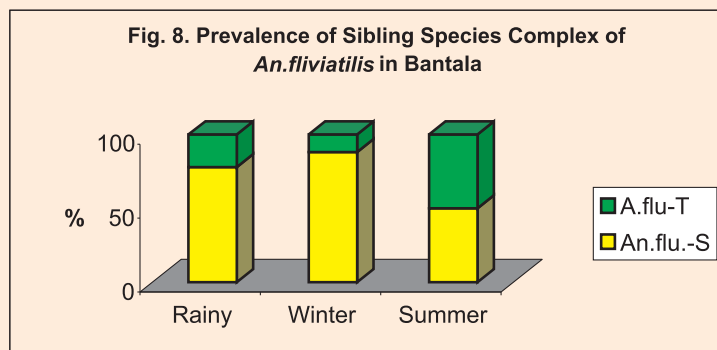
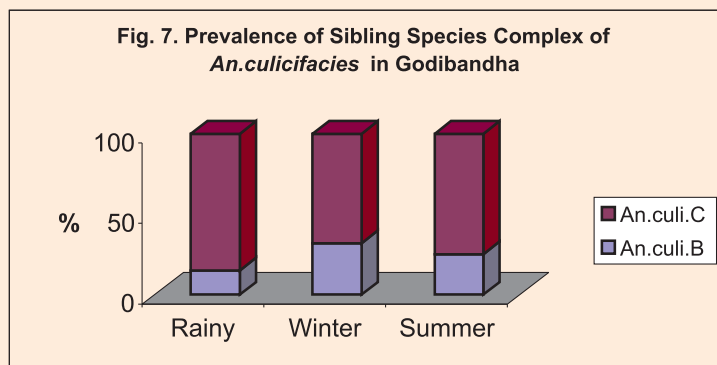
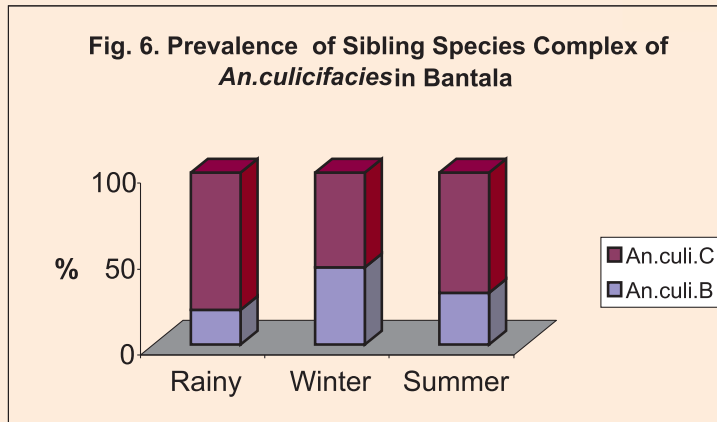
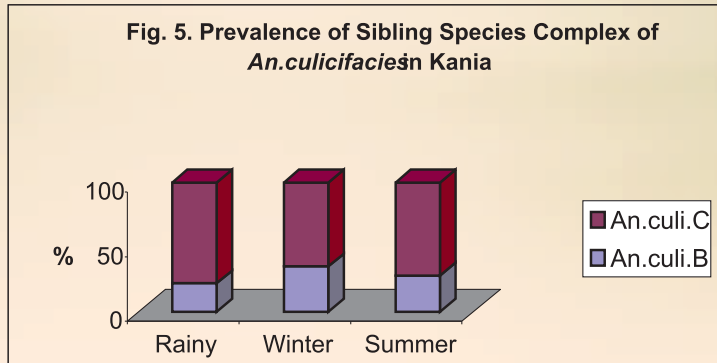
Fig. 4. Molecular analysis of *An. fluviatilis*



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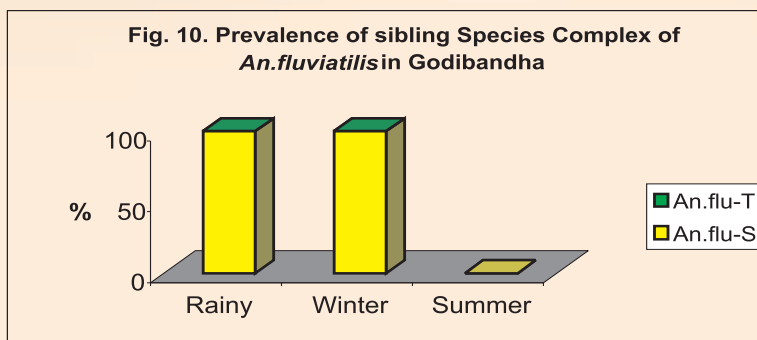
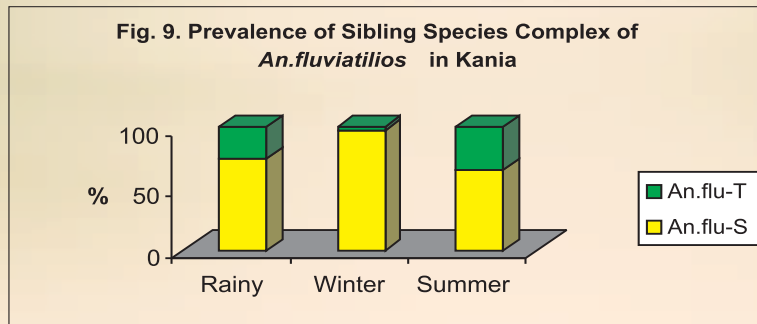


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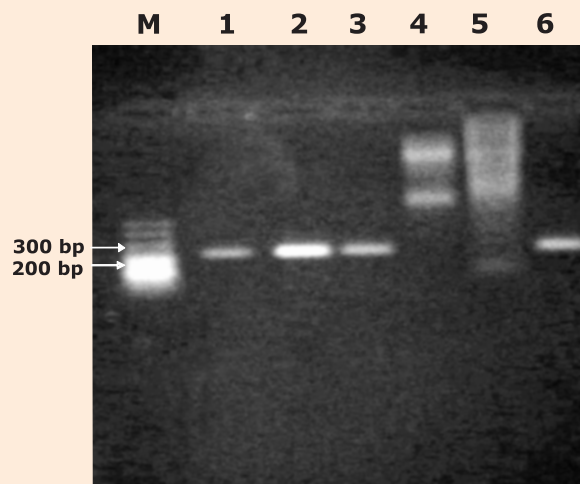
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Detection of sporozoite:

Detection of sporozoite was done in 256 anopheline mosquitoes by dissection and in 327 anophelines by PCR method (Snounou *et al.*, 1993). Two specimen of *An. Culicifacies* (one from Kaniha and one from Godibandh) and one species of *An.annularis* (Kania) were found positive for *P.falciparum* sporozoite by PCR method (Fig-11). The sporozoite rate by PCR method was found to be 0.9 % and the sporozoite rate by both the methods is 0.5%. (Tab-1)The work is in progress.

Fig.11. Detection of sporozoite by PCR method in Anopheline



Lane M: 100 bp ladder, Lane 1&2 test samples *An. culicifacies* and 3 to 5 test samples of *An.annularis* Lane 6 : Positive Pf sample

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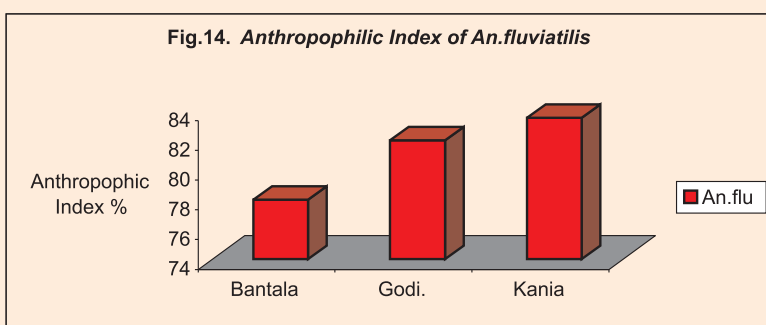
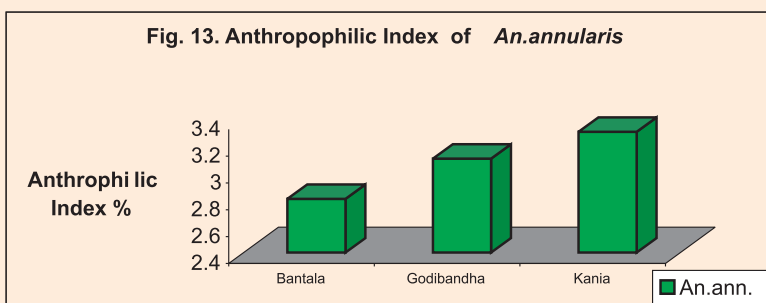
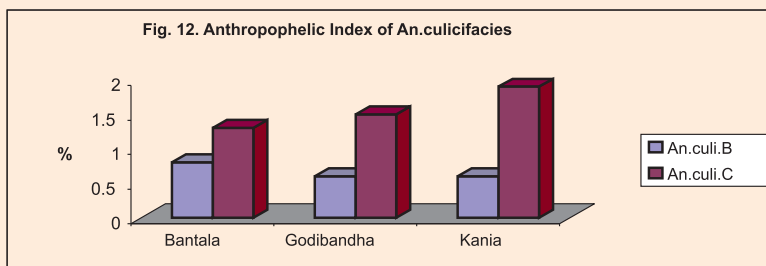
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Table 1. Sporozoites detection

SL. No.	Anopheline Species	Number dissected	Number positive for sporozoites	PCR detection	
				Number tested	Number positive
1	<i>An.culicifacies</i>	118	0	160	2
2	<i>An.annularis</i>	123	0	154	1
3	<i>An.fluviatilis</i>	4	0	5	0
4	<i>An.varuna</i>	8	0	4	0
5	<i>An.aconitus</i>	3	0	4	0
Total		256	0	327	3

Precipitin test:

Precipitin test was conducted for the identification of source of blood meals of anopheline vectors by using gel-diffusion technique. *An. fluviatilis* was found to be highly anthropophilic (>75%) where as *An. culicifacies*(>97%) and *An. annularis* (>96%) were highly zoophilic (Fig12-14).





Susceptibility Test:

The susceptibility status of *An.culicifacies* B and C was done and it was observed that both B and C are resistant to DDT but they are susceptible to Deltamethrine 0.5%.

Though two sibling species reported in *Anopheles annualris*, the presence of species complex in Orissa is unknown. We have started the detection and identification of sibling species of *An. annualris*, which also plays an important role in malaria transmission. Molecular methods for identification of sibling species work initiated with standardization of D3 and ITS2 region.

Status : 1.8 Development of potent mosquitocidal agents from natural sources

Extramural (ICMR)

Investigators :

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Dr. R.K. Hazra,

Dr. S.K. Parida

Collaborator :

Dr. U.V. Mallavadhani (P.I.)

Regional Research Laboratory (CSIR),

Bhubaneswar

Starting date : March 2005

Closing date : February 2007

Objectives:

1. Identification, collection and extraction of potent natural sources (terrestrial plants, mushrooms, high altitude taxa like lichens, orchids and ferns.
2. Generation of abundantly available natural products and analogues.
3. Mosquitocidal screening of the natural sources and natural products/analogues against mosquito vectors, *An. stephensi* (malaria), *Cx. Quinquefasciatus* (filariasis), *Ae.aegypti* (dengue).
4. Development of potent natural mosquitocides

Work Progress:

Preliminary work was done before funds released in the month of July.

Procedure for collection and extraction of natural sources (carried out by RRL):

Natural sources such as plants, Lichen, mushrooms, etc. were collected from outlocation and wild sources. Species were identified. The collected plant products were washed with fresh water, shed dried and powdered in pulverizer. The powder sources material were packed in soxhlet extractor and extracted with various polar and nonpolar solvent such as n-Hexane, Ethylacetate and Methanol. Concentrations of these extracts under reduced pressure yielded the respective residues. These residues are then screened for mosquitocidal activity. Initially methanol, chloroform, ethylacetate and water soluble extract of Cinnamon species and methanol and ethylacetate extract of Euphorbia and Dispirus species were supplied by RRL for screening for mosquitocidal activity.

Bioassay test:

The bioassay test of the plant extracts were carried out in the laboratory condition against the 3 species of mosquitoes viz., *An.stephensi* (vector of malaria), *Ae.aegypti* (vector of dengue) and *Cx.quinquefasciatus* (vetor of filariasis) following standard WHO procedure (WHO, 1981). A known amount of the extract were dissolved with a known volume of solvent to give the stock solution, appropriate amounts of which were added separately to 100 ml of water in 500 ml beakers to give different test concentration (0.01 to 1ppm). Each concentration was replicated five times. After addition of the test material, the water were stirred vigorously and left for about 30 minutes for evaporation of the solvent. Around 15 healthy laboratory bred late 3rd instar larvae were released into each beaker for assay. The mortality and behaviour of the larvae were observed. A pinch of yeast tablet were given into each beaker or tray for feeding the larvae. The observations were made till all the larvae in the control beaker emerge to adult.

To start with 0.01 ppm to 0.1 ppm of methanol, chloroform, ethylacetate and water soluble extract of Cinnamon species and methanol and ethylacetate extract of Euphorbia and Dispirus species were tested against *An.stephensi*, *Cx.quinquefasciatus* and *Ae.aegypti*. No mortality was observed in any of these concentrations. The test concentration was increased (0.1 to 1 ppm). Ethylacetate extract of Euphorbia did not show any mortality upto 1 ppm against all the three species tested. (Table 1). Water soluble extract of Cinnamon showed 73.3% mortality at 0.4 ppm against *Cx. quinquefasciatus*. (Table 1-2). The study is in progress.

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Table 1. Bioassay test result of Methanol extract of Euphorbia

Species	Concentration	No.of larvae tested	Mortality after 24 hrs	Mortality after 48 hrs.
<i>Cx. quinquefasciatus</i>	0.1ppm	75	Nil	Nil
	0.2ppm	75	Nil	Nil
	0.4ppm	75	Nil	Nil
	0.6ppm	75	Nil	Nil
	0.8ppm	75	Nil	Nil
	1 ppm	75	Nil	Nil
<i>An.stephensi</i>	Control	75	Nil	Nil
	0.1ppm	75	Nil	Nil
	0.2ppm	75	Nil	Nil
	0.4ppm	75	Nil	Nil
	0.6ppm	75	Nil	Nil
	0.8ppm	75	Nil	Nil
	1 ppm	75	Nil	Nil
<i>Ae.aegypti</i>	Control	75	Nil	Nil
	0.1ppm	75	Nil	Nil
	0.2ppm	75	Nil	Nil
	0.4ppm	75	Nil	Nil
	0.6ppm	75	Nil	Nil
	0.8ppm	75	Nil	Nil
	1 ppm	75	Nil	Nil
	Control	75	Nil	Nil

Table 2 : Bioassay Test Result of Plant Extract against *Cx. quinquefasciatus*

Species	Concentration	No.of larvae tested	Mortality after 24 hrs	Mortality after 48 hrs.
Water extract of Cinnamon	0.1 ppm	75	10	1
	0.2ppm	75	12	2
	0.3ppm	75	18	4
	0.4ppm	75	55	5
	control	75	Nil	Nil

1.9 Studies on prevalence of 76Tcrt / 86Ymdr1 Plasmodium falciparum isolates in severe malaria cases of Orissa and its biological advantage.

Objective:

- To investigate the prevalence of 76Tcrt / 86Ymdr1 Plasmodium falciparum isolates in severe malaria cases of different geographical regions of Orissa.
- To test the drug sensitivity pattern of these isolates by in-vitro assay.

Status :

Intramural

Investigators :

Dr. M.R. Ranjit, Dr. G.P. Chhotray

Starting date : April 2005

Closing date : January 2005



On Going Studies

3. To study the multiplication pattern of these isolates in different blood groups

Progress:

Since the PI was on study leave upto January 2005, the project has been initiated from February 2005 after the Ethical committee approval. During this period total 55 blood samples (23 severe and 31 uncomplicated) has been collected from SCB Medical College & Hospital, Cuttack for genomic analysis. The genomic DNA has been isolated by phenol extraction and ethanol precipitation. The PfCRT (K76T) and PfMDR1 (N86Y) point mutations were analyzed by PCR-RFLP. The initial result reveals that a significantly higher ($P < 0.005$) number of severe cases ($n=11$, 47.8%) harbours the CQ resistance markers than the uncomplicated cases ($n=4$, 12.9%). This indicates that the maximum number of severe malaria in the state may be associated with treatment failure.

Status :1.10 Study on nutritional status of Dongria Kondh primitive tribe and Domb scheduled caste populations of Orissa.

Extramural (ICMR-Taskforce)

Investigators :

Dr. G. Bulliyya,
Dr. B. Dwibedi, Mrs. G. Mallick

Starting date : July 2003

Closing date : June 2005

Objectives:

1. To study demography, socio-economy and morbidity status;
2. To assess the nutritional status of all age groups;
3. To study the household food and nutrient consumption patterns and seasonal variation;
4. To evaluate the availability and utilization of health care and nutritional programmes;

Work progress:

Field works have been conducted in three revenue blocks namely Muniguda, Kalyansighpur and Bissam Cuttack in Rayagada district. Household on demography, socio-economy, utilization of healthcare services, knowledge-attitude practices on health and nutrition were collected from 210 households (165 Dongria PTG and 45 Domb SC). Diet survey was carried out among 155 households and nutritive values were calculated using nutritive values of Indian foods.

Nutritional status of preschool children was assessed according to weight-for-age (underweight), height-for-age (stunting) and weight-for-height (wasting) using SD classification and NCHS standards (Fig 1). The prevalence of underweight (weight-for-age $<$ median-2SD), stunting and wasting was 69%, 62% and 38% respectively among Dongria, while it was relatively lower among Domb children. The proportion of severe grades of underweight and stunting is observed to be marginally higher for girls. The proportions of children by weight-for-height are in the order of grades of normal (62.2% and 71.7%), wasting (27.0 and 20.8%) and severe grade of wasting (10.8 and 7.5%) in both the population groups.

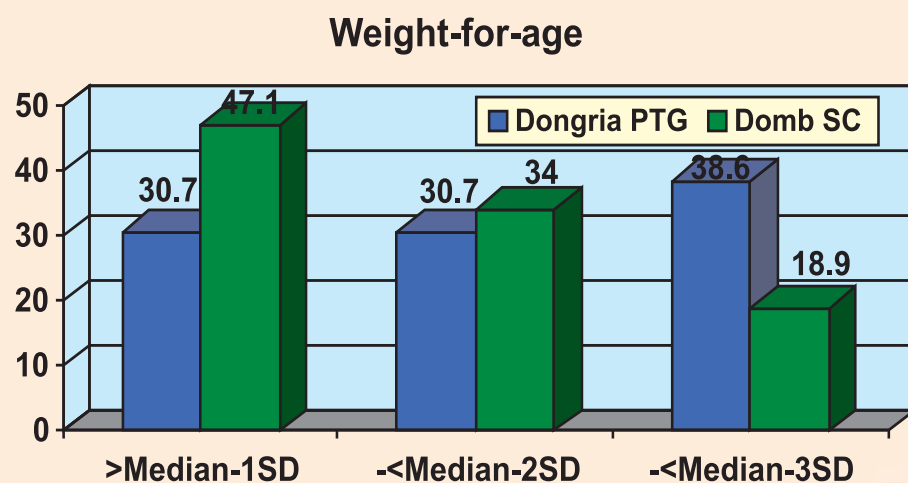
The nutritional status of adults aged over 20 years assessed according to body-mass index (BMI). The prevalence of chronic energy deficiency ($\text{CED-BMI} < 18.5 \text{ kg/m}^2$) was about 60% for both Dongria Kondh and Domb populations, while about 30% and 10% were having

below normal and normal BMI. Less than one percent of these populations were overweight or obese ($BMI > 25 \text{ kg/m}^2$). The prevalence of grade III CED ($BMI < 16 \text{ kg/m}^2$) was greater in Domb SC (17.6%) than in Dongria (13%) populations. About 10% of adults were normal in both the study groups. The prevalence of CED among males was relatively higher for both the groups (Fig 2).

Anaemia status of study populations was assessed using the WHO cut-off values of age and sex specific groups using haemoglobin levels (Fig 3). The prevalence of anaemia was 86.4% and 76.9% among Dongria Kondh and Domb populations respectively. The proportion of mild, moderate and severe grades of anaemia was 42.2%, 28.5% and 15.7% respectively for Dongria Kondhs, while it was 36.9%, 28.2% and 11.8% for Domb scheduled caste population. The extent of mild and moderate degrees of anaemia was higher in Dongria Kondh tribal group as compared to Domb scheduled caste population.

Salt samples were collected from a total of 242 households on the day of survey and tested for iodine content using iodometric titration method in the laboratory (Table 1). The proportion of household salt samples having less than the recommended levels of iodine ($< 15 \text{ ppm}$) was 97% in the Dongria Kondh in comparison to 74.3% in the Dombs. The percent of household samples had adequate iodine ($> 15 \text{ ppm}$) was lower for the Dongria Kondh than for the Domb. School age children (6-12 years) examined for their goitre status by palpation method and graded according to WHO classification (Table 2). Prevalence of total goiter rate ranged from 23.1% for Dongria Kondh and 25.2% for Domb children indicating the problem of iodine deficiency disorders (IDD). Urinary iodine excretion levels were estimated from 345 samples by wet-digestion method. The proportion of children having mild, moderate grades of IDD were lower among the Dongria Kondh children than their counterpart Domb children, while severe grade was higher than the latter, which reflect poor iodine nurture of study populations.

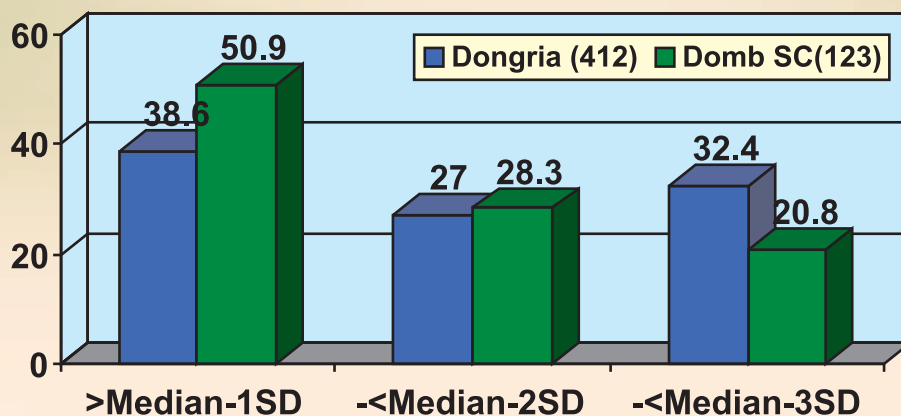
Fig 1. Nutritional status of preschool children (0-5years) by SD classification





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Height-for-age



Weight-for-height

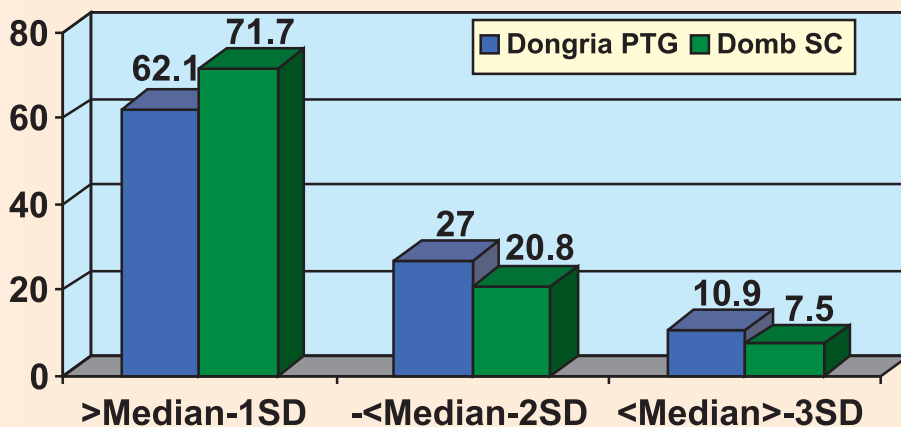


Table 1. Iodine content of households salt samples by titration

Salt iodine content (ppm)	Dongria Kondh(168)	Domb SC(74)
0.0-7.0	51.2	18.9
7.1-15.0	45.8	55.4
15.1-30.0	2.4	14.9
>30.1	0.6	10.8

Table 2. Prevalence of goiter and urinary iodine excretion levels among school-age children.

Goitre grade	Dongria (n=234)	Domb SC (n=111)	Urinary iodine Excretion (ug/L)	Dongria PTG (n=234)	Domb SC (n=111)
Grade 0	76.9	74.8	Normal (≥ 100.0)	38.9	36.9
Grade I	12.0	13.5	Mild (50-99.9)	21.4	37.0
Grade II	11.1	11.7	Moderate (20-49.9)	25.8	26.1
Total goiter	23.1	25.2	Severe (<20)	13.9	9.0

Fig 2. Nutritional status of adults by BMI (kg/m²)

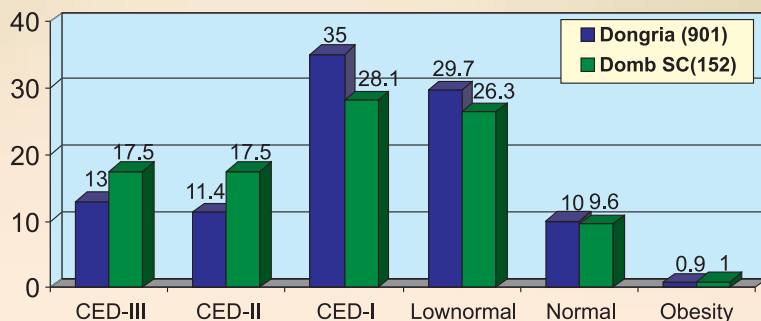
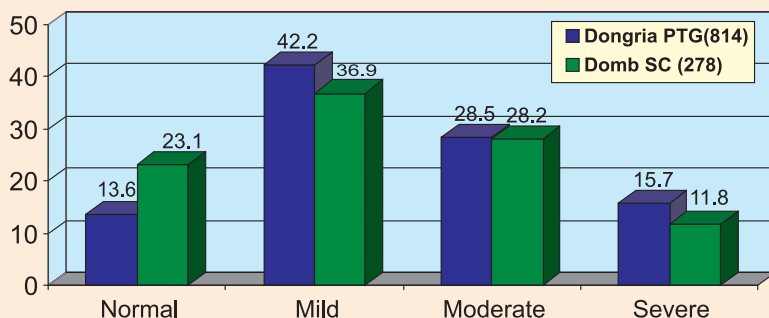


Fig 3. Prevalence of anaemia by haemoglobin levels (g/dl)



1.11 Epidemiology of Viral hepatitis in primitive tribal population of Orissa

Objectives:

1. To estimate the prevalence of hepatitis virus infection (A, B, C, D & E) in primitive tribal population of Orissa and distribution of genotype markers among HBV and HCV infected cases.
2. Identification of risk factors of hepatitis virus infection.

Progress:

The study envisages clinical examination and history recording, risk factor assessment and serological screening of hepatitis virus infection of sample study population, followed by genotyping of HBV and HCV positive cases with estimation of viral load.

Mayurbhanj district has been selected as the study area. The primitive tribes identified in this district are Lodha/Saora Lodha, Kharia / Hill kharia, Mankidi and Mankidia. These primitive tribes are distributed in seven community development blocks of the district and their population is as follows; Kharia/Hill Kharia-1733, Mankidi and Mankidia-723 and Lodha/Saora Lodha-3400.

The total of 2500 individuals from these primitive tribes are enrolled into the study as ascertained by PPS sampling technique. Fieldworks have been initiated. Funds for the extramural study waited from Council.

Status :

Extramural multicentric
(ICMR tribal Task force)

Investigator :

Dr. S.K. Kar,
Dr. B. Dwibedi,
Dr. B.V. Babu,
Dr. A. Mohapatra,
Dr. A.S. Acharya,

Starting date : March 2005

Closing date : September 2008



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Status : 1.12
Extramural (University of Toronto)

Investigator :
Dr. A.S. Kerketta

Starting date : August 2004

Closing date : July 2007

A 6-year's Prospective study of the risks of death by cause from tobacco and alcohol use among 2 million Indian men and women: a multicentric study.

The study is being implemented with the collaboration of the office of Registrar General of India (RGI) and Centre for Global Health and Research (CGHR) over the last three years to improve the overall cause of death reporting and to add analytic epidemiological questions to Sample Registration System (SRS), which is India's flagship mortality measurement system.

The study envisages the following activities:

1. Training and retraining of the SRS supervisors on verbal autopsy methodology:

So far the training of 700 RGI supervisors (including other centers), who conduct the semi-annual survey on deaths and births in SRS units has been completed. Training duration is 5 days and uses a "sandwich" approach combining practical fieldwork with training in Epidemiology, 10th International Classification of diseases and injuries. The training is repeated every six months so as to ensure skill levels remain high.

Orissa SRS covers 36.7 million people; spread over 405 units and having 51 supervisors to carry out survey on vital statistics for every half year. The training of the supervisors of DCO Orissa was conducted on verbal autopsy methodology after which for first time the VA was implemented in SRS, during 2nd HYS of 2002 and 1st HYS of 2003.

2. Resampling of 10% of VA of SRS supervisors

A total of 2780 deaths were recorded from all age groups during these surveys. All the VA forms reviewed by the PI for completeness and accuracy and have been transferred to the Regional data entry centre i.e. Epidemiological Research Centre, Chennai. Refresher training was imparted to the SRS supervisors especially on the use of newer modified manual, use of single page VA form and symptoms list. In the Special Survey of death (SSD) covering period of 2001-2003 (except the HYS mentioned earlier) VA have been undertaken on a total of 7000 deaths.

These forms have been sent for scanning at office of RGI, Delhi. Resampling of 10% death event was conducted for both the 2nd HYS and 2003 1st HYS as a quality control measure.

3. Assigning of cause of death as per ICD-10.

The physicians from SCB Medical college, Cuttack were trained in on assigning cause of death (coding) in October 2004 and refresher training was conducted by RMRC in June 2005. The probable underlying cause of death assignment and coding as per ICD -10 has been initiated on web-based. So far 290 forms has been coded. The VA has ben initiated by SRS supervisors in the new SRS frame of 2004.

Status: 1.13 Extramural Investigators : Dr. R. S. Balgir Collaborators:

Dr. Sarita Agarwal (SGP Institute of medical Sciences, Lucknow, Dr. R.K. Jena (SCB Medical College, Cuttack), Dr. D.K. Patel (VSS Medical College, Burla), Dr. L.K. Meher (MKCG Medical College, Berhampur)

Consultant :
Prof. B.C. Kar, Ex-Prof. of Medicine, VSS Medical College, Burla

Coordinator :
Director, RMRC, Bhubaneswar

Objectives:

1. To study the pattern of haplotypes and mutations of b-thalasseмииs and other structural hemoglobinopathies like Hb S, Hb E prevalent in the state of Orissa.
2. To find out the correlation, if any, of these mutations with the clinical manifestations such as degree of splenomegaly, level of fetal hemoglobin and severity of anemia.

Progress:

The project was approved by the SAC of the Centre in September 2003 and ethical committee also cleared the project. The project has been submitted to the Council for funding on 15th October 2004. Funds are not yet received. Preliminary work is to be initiated with intramural funds.

1.14 Study of health consequences of domestic violence with special reference to reproductive health

The role of socio-economic and cultural factors influencing women's status including health is well documented by various studies. Since gender imbalances influence women's health and well being to a large extent throughout their life cycle, it is important to understand the reproductive health consequences with a gender perspective in different settings. Irrespective of racial, social, religious, ethnic, and economic backgrounds, the problems of gender related health consequences are present in Indian society and could be more damaging at individual level where culture of silence helps it to persist. Fear and insecurity have taken over the self-esteem and confidence of women despite their capacity and willingness to meet the challenge.

One of the major epitomes of unequal power relationships between women and men is domestic violence. According to WHO, violence is the intentional use of physical force or power, threatened or actual, against oneself, another person, or against a group or community, that either results in or has a high likelihood of resulting in injury, death, psychological harm, mal-development or deprivation. Domestic Violence in the family or at home is increasingly recognized as a major health problem with serious health and economic consequences.

Domestic violence takes place when an adult misuses his/her power to control another and it is the establishment of control and fear in a relationship through violence and other forms of abuse. The violence may involve physical/emotional abuse, sexual assault, threats, psychological torture and social isolation. Studies reveal that violence has an association with miscarriage, stillbirth, preterm labour and birth, foetal injury and death as well as birth of low birth-weight baby. Many women are coerced, pressurised, or battered to submit to unwanted abortions by men who are opposed to child birth. These abused women are less likely to seek pre-natal care and more likely to give birth to low-weight babies. Few studies mostly in high-income countries have shown that physical violence during pregnancy increases the risk of preterm labour or delivery, foetal distress or death and low birth-weight offspring. In rural India, almost one third of all babies are born with low birth weight. Maternal mortality in India is the second highest in the world, estimated to be between 385-487 per 100,000 live births and around 125,000 women die from pregnancy and pregnancy related causes each year. Antenatal services are poor with only 53.8 per cent receiving tetanus toxoid injections and 46.8 per cent having their blood pressure measured and 80 per cent of women are anaemic. As many as 58 per cent reduce their food intake during pregnancy instead of increasing it. Two-thirds of deliveries still take place at home, with only 43 per cent supervised by health professionals. Violence is another phenomenon that is reported during pregnancy, besides its occurrence before the pregnancy.

Women aged between 20 to 34 years of age suffer the highest rates of domestic violence compared to other age groups and pregnant women are more likely to develop pregnancy/obstetric related problems due to domestic violence. WHO (2000) noted that among women aged 15-44 years, gender violence accounts for more deaths and disability than cancer, malaria, traffic injuries and war put together. Women who are victims of domestic violence are 12 times more likely to attempt suicide than those who do not experience such violence. It is estimated by World Bank that rape and domestic violence account for five percent of the healthy years of life lost to women of reproductive age in developing countries. The largest discrepancies are due to deaths from violence. Homicide is a leading cause of death among pregnant women.

The present study is an attempt to gather first hand information and analyse various pathways, outcomes and their relationships with domestic violence and related issues. It is initiated to study the relationship between the acts of violence, its reasons and health consequences.

Status :

Extramural (ICMR Taskforce)

Investigators :

Dr. S. K. Kar,

Dr. B. V. Babu,

Dr. A. Mohapatra

Starting date : March 2004

Closing date : October 2005



On Going Studies

Objectives:

1. To understand the people's perception of domestic violence.
2. To know the prevalence of domestic violence.
3. To find out the factors associated with domestic violence.
4. To identify gynaecological and obstetric outcomes of domestic violence.
5. To study its perceived health consequences with special reference to reproductive health.
6. To report how women cope with domestic violence.

Materials and methods:

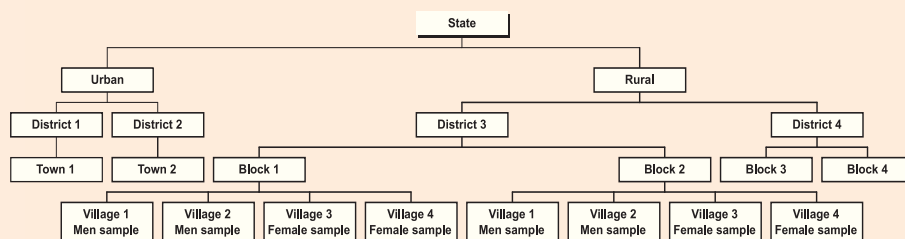
As it is a multi-centric study, it is initiated in all the six zones of India i.e. Northern, Southern, Eastern, Western, Central and North-East zones. Three states from each zone are selected to have a wider representation of the zone. Since the prevalence rate of domestic violence is different for each state, the sample also differs which is calculated using the following method.

According to NFHS-2, the bad obstetrics outcome of pregnancy is 8% and it is expected that the risk will be double with women subjected to abuse or violence. To detect this difference, a sample of about 282-300 married women meeting violence are considered for the study ($\text{Alpha}=0.05$ and $1-\text{Beta}=0.80$) in each zone. Therefore, 325 women meeting violence (which include a margin of 10% non-response) were enrolled. The women with no history of violence were also included. They acted as control group. Therefore, a total of 375 cases and 375 controls would be studied to achieve the required sample. The same number of male sample is also included in the study. To attain the above sample of women and men, adequate numbers of eligible couples are interviewed in each state depending on the prevalence of domestic violence as reported by NFHS-2. The state with high, medium and low prevalence rate of domestic violence are considered.

The RMRC, Bhubaneswar was given the responsibility of conducting the study in Eastern zone. The zone consists of Orissa, West Bengal, Bihar and Jharkhand states. However, the study has been conducted in the states of Orissa, West Bengal and Jharkhand. The prevalence of domestic violence is largest in Orissa (28.9%) followed by Jharkhand (26.6%), and it is lowest in West Bengal (17.6%). The Jharkhand being a newly created state is a part of Bihar and reported 26.6% violence rate, the sample for this state has been calculated considering this rate. Thus, the sample considered for the three states are: 432-450 for Orissa, 469-500 for Jharkhand and 710-750 for west Bengal. The total sample required from Eastern Zone would be 1700.

Both urban and rural areas were considered for sampling. From each state four districts were selected from different corners of the state. Keeping in view the 70:30 ratio of rural: urban population, the sample sizes were calculated. Pictorial representation (Fig.1) depicts the procedure of selecting the sample from both urban and rural areas.

Fig. 1. Pictorial presentation of the sampling



Indepth intervention on domestic violence

The study involved collecting both quantitative and qualitative data. The research team met village/community heads, elders, etc. before initiating the data collection. Rapport is

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established with the family members and specially the woman is taken into confidence to get data on violence particularly. All married women of each household in the age group between 15-49 were sampled. Corresponding to the women sample men of the neighbouring village were selected. The quantitative data from men and women were collected by using a structured questionnaire. The qualitative data were collected through focus group discussions and case studies. The case studies were aimed to explore the coping strategies of women who experienced domestic violence. Standard methodology is followed during collection of qualitative data. The details of samples collected are shown in Table 1 and 2.

Table 1. Districts covered under the study in Eastern zone of India

Name of the state	Rural-1	Rural-2	Urban-1	Urban-2
Orissa	Puri	Sambalpur	Dhenkanal	Nayagarh
Jharkhand	Saraikela-Kharsawan	Hazaribag	Jamshedpur	Bokaro
West Bengal	Medinipur	Jalpaiguri	Durgapur	Malda

Table 2. The details of the sample

Name of the State	Habitat	Quantitative data collected		FGDs conducted	Case studies collected
		Male	Female		
Orissa	Rural	320	320	4	2
	Urban	142	140	4	4
Jharkhand	Rural	352	352	4	4
	Urban	150	150	4	2
West Bengal	Rural	528	528	4	5
	Urban	224	224	4	1
Total Sample		1716	1714	24	18

The quantitative data are being computerized through Epi-Info. All the FGDs were recorded on audiocassettes. The cassettes were played back and transcribed into the local language, and thereafter translated to English. Shortly, these scripts will be computerized as text files. The analysis will be done by using Atlas/ti for Windows.

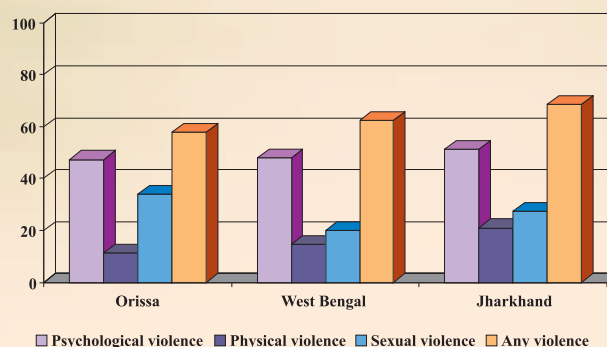
Results:

The data entry and analysis are being initiated. However, the data on few issues have been picked from the questionnaires and analyzed for preliminary reporting. The investigation created three principle measures for domestic violence against women: any psychological violence, any physical violence and any sexual violence. These behaviour-based outcomes measured both lifetime prevalence (occurred at least once in womens' married life) and during pregnancy. Overall, about 58% of women in Orissa, 62% of women in West Bengal and 68% of women in Jharkhand reported experiencing at least one form of violence. Up to 51% women reported psychological violence, 21% women reported physical violence and 34% reported sexual violence (Fig. 2). The prevalence of all forms of violence is highest in Jharkhand state, followed by West Bengal and Orissa. However, the sexual violence is more prevalent in Orissa than in the remaining states of the Eastern zone.



Fig. 2. Overall prevalence of domestic violence

Per cent



We attempted to assess the impact of occurrence of domestic violence on reproductive outcome. Of the ever-pregnant women surveyed, 29.8% of women reported at least one form of violence during pregnancy. The rates of pregnancy outcome among these women are compared with those women who have not reported any form of violence during pregnancy (Table 3). A few women who are presently pregnant are excluded from the analysis. It is clear that violence has a serious impact on pregnancy outcome. The percentage of full term live births is significantly lower among women who experienced violence during pregnancy than their counterparts. Violence has been linked significantly with increased risk of pre-term births, still births and spontaneous abortions/miscarriages. Thus, violence operated through multiple pathways to affects women's sexual and reproductive health.

Table 3. Various indicators of reproductive outcome among women who reported violence during pregnancy and women with no experience of violence

Reproductive outcome	Women reported no violence (n=955)	Women reported violence (n=416)	Significance
Full term live births	832 (87.1%)	301 (72.4%)	0.000
Pre term live births	87 (9.1%)	55 (13.2%)	0.021
Still births	11 (1.2%)	19 (4.6%)	0.000
Spontaneous abortions and miscarriages	22 (2.3%)	38 (9.1%)	0.000
Induced abortions	3 (0.3%)	3 (0.7%)	0.545

Status :

Extramural (DBT)

Investigators :

Dr. B.B. Pal, Dr. G.P. Chhotray

Collaborator :

Dr. D.V. Vijai Singh,
Institute of Life Sciences, Bhubaneswar

Starting date : July 2005

Closing date : June 2008

1.15 Molecular monitoring of *Vibrio cholerae* in hospitalized diarrhoeal patients and aquatic environment in Puri district of Orissa"

The above research project has been submitted to Department of Biotechnology July 2005. Funds awaited.

Progress of work:

A total of eight strains of *Vibrio cholerae* were provided by RMRC to ILS . These strains were further tested by septaplex PCR for specific sero-group, presence of virulence and regulatory genes and SXT constin. Further work is in progress and more number of strains will be tested by Septaplex, Hexaplex PCR and will be characterized by ribotyping, ctx typing etc. after receiving fund.