

Processes evaluation of coverage and compliance to a round of mass drug administration with DEC and Albendazole for the control of lymphatic filariasis in Puducherry, India

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Received 12 June 2014; received in revised form 31 December 2014; accepted 14 May 2015

Abstract. Mass drug administration (MDA) with annual single dose of DEC and Albendazole is being carried out in India to achieve the National Health Policy goal of elimination of lymphatic filariasis by 2015. The study was conducted in the districts of the Union territory of Puducherry for processes evaluation of round of MDA conducted in 2012. We have conducted household surveys to assess the coverage of drug distribution and consumption, also to identify the reasons for non compliance and to make necessary recommendations for improving programme implementation. Cluster sampling method was followed for the household survey by circulating pre-tested questionnaire. Statistically sufficient numbers of samples were collected in all clusters of districts which are geographically separated. There was a significant variation between reported and assessed coverage. The coverage was comparable between the districts but significantly higher in rural areas compared to urban areas that may be due to acceptability of the drug by the rural people. Above 52% of target population have consumed the drug and consumption was significantly higher in the rural areas. Mahe region recorded a low consumption rate of between 19-42% in different wards, this may be due to misconception of people of Mahe that drugs which are given free of cost are of low quality. Selective intake of albendazole was noticed in Mahe.

INTRODUCTION

Filariasis has been a major public health problem in India and at least one-third of the people affected with the disease live in India. India alone accounts for 40% of the global burden of lymphatic Filariasis (Michael & Bandy, 1997). The people at risk of infection are increasing every year due to population growth and unplanned urbanization.

The international task force for disease eradication (Kumar *et al.*, 2008) identified filariasis as a potentially eradicable disease. The National Filaria Control Programme (NFCP) was launched in 1955 for the control of bancroftian filariasis and now the goal of the National Health Policy is to eliminate

lymphatic filariasis from India by the year 2015 (Babu 2004; Kumar 2008,). The Programme aims to achieve the goal by transmission control through annual single dose mass drug administration (MDA) by using Albendazole (fixed dose 400 mg), and diethyl carbamazine citrate (DEC 6mg/kg).

The present study was carried out to assess the effectiveness of the national programme in terms of actual coverage and compliance rates of the MDA in the different districts of UT of Puducherry. It will also endeavor to establish the reasons for non-compliance and how a positive direction can be initiated for appropriate policy change to address the issue.

MATERIALS AND METHODS

All the four districts were included for the assessment of coverage. A two stage cluster sampling protocol was followed with villages/wards as the primary sampling unit and the households as the secondary sampling unit. (Michael *et al.*, 2006).

Puducherry Union Territory with a population of about 1.24 million is divided into four districts viz., Puducherry (9,46,600), Karaikal (2 00 314), Mahe (41,934) and Yanam (55,616). Puducherry is the largest district and all the four districts are endemic for filariasis caused by *Wuchereria bancrofti* (NFCP Report, 1989). Two filarial control units have been established, aiming at vector control and case detection and treatment to protect the 1.24 million people.

Study design

The study was conducted as per the sampling design proposed in the National Guidelines for the Elimination of Lymphatic Filariasis, India. In India district is the evaluation unit (EU). Table 1 shows the study design followed for the assessment of MDA programme. In each EU, four clusters (three rural and one urban area) were selected on the basis of drug distribution coverage. For selection of rural sites, all Primary Health Centers (PHC's) were stratified into three groups on the basis of reported MDA coverage in the last round: (1) PHC with coverage below 50%, (2) PHC with coverage between 50-80% and (3) PHCs with coverage above 80%. Thereafter, one PHC from each stratum was selected for MDA evaluation. From each of the selected PHC a complete

Table 1. Study design followed for the assessment of MDA programme

Evaluation unit	Selection of PHC / urban wards	Selection of village / ward	No. of households (cluster)	No. of persons interviewed
Puducherry	3 PHCs, one each from low, medium and high MDA coverage and a Urban ward with medium coverage were randomly selected.	3 villages (clusters) one from each PHC and one ward (cluster) from Urban wards were randomly selected.	120 households (select 30 households per cluster following systematic sampling protocol)	600 persons (assuming a family size of five, 150 persons will be interviewed from 30 households in each cluster)
Karaikal	3 PHCs, one each from low, medium and high MDA coverage and a Urban ward with medium coverage were randomly selected.	3 villages (clusters) one from each PHC and one ward (cluster) from Urban wards were randomly selected.	120 households (select 30 households per cluster following systematic sampling protocol)	600 persons (assuming a family size of five, 150 persons will be interviewed from 30 households in each cluster)
Mahe	Urban wards	4 wards (clusters) were randomly selected	120 households (select 30 households per cluster following systematic sampling protocol)	600 persons (assuming a family size of five, 150 persons will be interviewed from 30 households in each cluster)
Yanam	Urban wards	4 wards (clusters) were randomly selected	120 households (select 30 households per cluster following systematic sampling protocol)	600 persons (assuming a family size of five, 150 persons will be interviewed from 30 households in each cluster)

list of the names of villages (clusters) was prepared. One village was selected randomly, using random number generated by Microsoft Excel program. In each selected village, 30 households were selected following a systematic sampling protocol. For the urban areas, from the list of all the wards (clusters) one ward was selected randomly using random number generated by Microsoft Excel program. In the next step, from the selected ward in the urban area, 30 households were covered. Information related to MDA was collected from all inmates of the household. On an average, 30 households may contain 150 or more inmates. The four clusters survey would indicate information for 600 or more household members. However, in the districts where the urban population is more than the rural population, the distribution of the four clusters was modified according to the proportion of urban to rural population. The Union Territory is comprised of four districts (EUs): Puducherry, Karaikal, Mahe and Yanam. In Puducherry and Karaikal EUs three rural clusters and one urban cluster was selected. For Mahe and Yanam EUs, as the urban population is 100% urban all the four clusters in each EU were selected from urban wards. Selection process of sub units, clusters and households is given in flow chart.

The 16 clusters selected for the survey is shown in Table 2. A semi-prettested questionnaire (Appendix 1) was used to gather information. All the individuals in the selected houses constituted the sample. Information was collected directly from the individuals who were available at the time of visit. Information for the absentees and children below 15 years were collected from the head of the family or any other elderly person in the selected household. In the place of locked houses, adjoining household was selected for the survey.

From each of the primary sampling unit (village/ward), secondary sampling units (households) were selected by systematic sampling procedure. The surveys were undertaken within 30 days following MDA (WHO 2011). A total of 12 households were selected so as to obtain a sample of minimum 50 individuals from each village/ward. All the

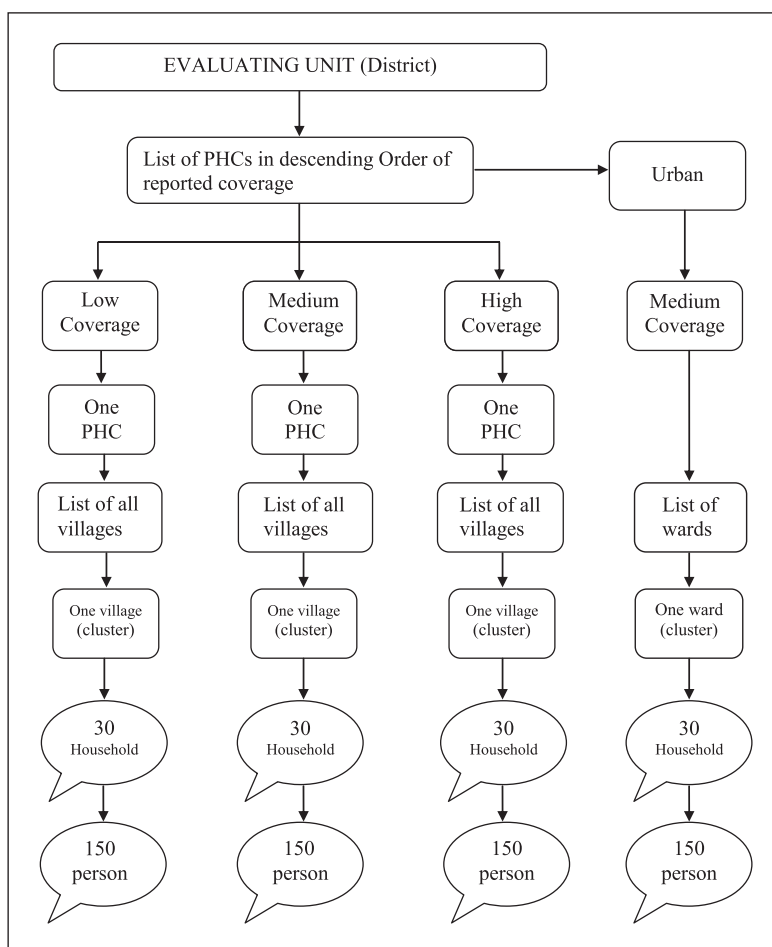
individuals in the selected houses constituted the samples. In case of children below 10 years their parents or responsible persons in the house were interviewed. The pretested questionnaire was designed to elicit information on coverage of drug distribution, consumption, the number of tablets received/ consumed, supervised consumption, consumption before/after food, reasons for non-compliance, instance and types of side reactions if any (Ramaiah *et al.*, 2011). The surveys were carried out in all the four areas during the months of February and March 2012.

RESULTS

The details of the sites and number of respondents interviewed are given in Table 3. From all the four districts a total of 16 clusters were covered under the assessment survey.

Households visited were 301 in the urban area and 180 in the rural area. As many as 2193 individuals were covered. Information was gathered directly from the individuals. Samples from urban area constituted about 64% of the total samples. Data related to individuals above 2 years of age was analyzed for assessing coverage of drug distribution, consumption of drugs, compliance, side reactions and reasons for not consuming the drugs.

The overall coverage of drug distribution (the proportion of individuals who received the drug) was 82.0%, ranging between 74.6% (Mahe) and 91.30% (Puducherry) (Table 7). Only a small variation (0.1%) was observed between DEC and Albendazole distribution. A minimum 75% coverage was achieved in all the districts. The increased coverage of drug distribution compared to the first round of MDA (83%) was maintained during this round also, though the overall coverage was 4% lesser than the previous round (2010). The overall coverage of drug distribution was lower in females (80.9%) compared to males (83.3%) which was not significantly different ($\chi^2=2.05$; $p=0.15$). High level coverage was achieved in rural areas (86.3%) and it was significant ($\chi^2+14.9$; $p<0.05$)



Flow Chart: Selection of Areas, Clusters, Households and Individuals in Evaluation Unit (Districts)

Table 2. Sites selected for assessing MDA programme during 2012

District	PHC/Municipality	Village	Ward
	Ariyur	Anandapuram	-
	Kalapet	Peria kalapet	-
	Ramanathapuram	Thondamanatham	-
	Mudaliarpet	-	Ward 34
Karaikal	Niravi	Niravi	-
	T.R. Pattinam	Vanjur	-
	Thirunallar	Pettai	-
	Karaikal	-	Ward VI
Mahe	Mahe	-	Ward V
	Mahe	-	Ward VII
	Mahe	-	Ward X
	Mahe	-	Ward XIV
Yanam	Yanam	-	Ward II
	Yanam	-	Ward III
	Yanam	-	Ward VI
	Yanam	-	Ward X

compared to urban areas (79.7%). District wise comparison showed that highest coverage was achieved in Puducherry. Village/ward wise analysis ranged from 67 to 96.69% in different sites (Table 5). Children in the age class 2-5 years showed significantly ($p<0.05$) lower coverage compared to other age classes (Table 4). The coverage was comparable between the genders (Table 6).

Overall, 51.8% of the sampled population reported to have consumed DEC (Table 7). The consumption rate (the proportion of individuals who consumed the drug) was highest (74.1%) in Puducherry (rural) district and the lowest (29.4%) was recorded in Mahe (urban). There was an improvement in Puducherry district during this round of MDA. Consumption was 67.6% in rural areas which was significantly ($p<0.05$) higher when compared to 43% in urban areas. High level of compliance particularly in rural areas reflects the impact of continued efforts towards social mobilization. Overall compliance (proportion of individuals who consumed out of those who received) was 63.2%, about 3% higher when compared to last round (59.8%). Both drugs were consumed together in all the areas except Mahe where the consumption of Albendazole was significantly higher (41.6%) compared to DEC (29.4%), suggestion selective intake of Albendazole.

The gap between coverage of drug distribution and consumption ranged between 17.80% (Puducherry district) and 45.43% (Mahe) in different districts (Fig. 1). In the rural area the proportion of the people consumed the drug was significantly (<0.05)

higher. Though there was an improvement, this trend was similar to earlier rounds indicating that social mobilization efforts need to be strengthened to bridge the gap, particularly in urban areas. Supervised administration was rare (0.3%) and in some areas none of the individuals consumed the drug in presence of drug distributors. Perceived side reaction varied between 0.7 and 6.0% of those who consumed the drug in different districts, with an overall rate as low as 2.0. Mahe recorded high incidence of side reactions. Almost all the respondents (99.3%) reported to have consumed the drug after food. Percentage of locked houses was minimal ($<1\%$), adjacent houses were selected, hence no deviation of results.

Spatial analysis of coverage, consumption and compliance in Puducherry district showed that the coverage was not significantly different between the districts ($p>0.05$) and high level of coverage ($>80\%$) was observed in 10 (62%) out of 16 clusters surveyed. Consumption was highly variable between the sites (19.1–81.4%) and the difference is significantly different ($p<0.05$). Analysis of data (Table 5) from different sites within a given district showed that the gap in consumption rates between clusters was narrow in Puducherry district (13.0%:68/4 to 81.4%) while in Mahe it was wide (23.8%:19.1 to 42.9%). More than required minimum level of consumption of 65% was observed only in five sites. Both coverage and consumptions are significantly lower in younger age class (2-5 years). Between the age classes of 6-14 and above 14, all the parameters were comparable (Table 4).

Table 4. Assessed coverage of drug distribution, consumption and side reaction in relation to age classes in 2012

Age class	Sample	Received		Consumed		Compliance	Side reaction	
	No.	No.	%	No.	%	%	No.	%
<2	10	0	0.0	0	0.0	0	0	0.0
2-5	112	71	63.4	45	40.2	63.4	2	4.4
6-14	287	249	86.8	153	53.3	61.4	0	0.0
>14	1784	1479	82.9	939	52.6	63.5	21	2.2
Overall	2193	1799	82.0	1137	51.8	63.2	23	2.0

Table 5. Coverage and consumption of drug (DEC) in different sites during 2012

District	PHC/Municipality	Village/Ward	Cluster Sample	Coverage (%)	Consumption (%)
Puducherry	Ariyur	Anandapuram	149	87.25	68.46
	Kalapet	Peria kalapet	121	96.69	72.73
	Mudaliarpet	Ward 34	140	86.43	70.71
	Ramanathapuram	Thondamanatham	135	94.81	81.48
Karaikal	Karaikal	Pachur	131	87.79	45.80
	Niravi	Niravi	143	86.01	72.73
	Thirunallar	Pettai	121	67.77	47.11
	TR. Pattinam	Vanjur	118	83.90	60.17
Mahe	Mahe	Ward V	121	78.51	42.98
	Pallur	Ward VII	152	67.11	19.08
	Pandakkal	Ward X	196	79.59	34.18
	Pandakkal	Ward XIV	154	73.38	22.73
Yanam	Yanam	Ward II	127	81.10	55.91
	Yanam	Ward III	122	87.70	29.51
	Yanam	Ward VII	125	72.80	56.00
	Yanam	Ward X	138	84.78	62.32
Total			2193	82.03	51.85

Table 6. Assessed coverage of drug distribution, consumption and side reaction in relation to gender in 2012

Gender	Sample	Received		Consumed		Compliance	Side reaction	
	No.	No.	%	No.	%	%	No.	%
Female	1153	933	80.9	578	50.1	62.0	13	2.2
Male	1040	866	83.3	559	53.8	64.5	10	1.8
Overall	2193	1799	82.0	1137	51.8	63.2	23	2.0

(Table 6) summarizes the results of gender specific analysis which showed marginally higher values of coverage and consumption among males over females were observed but were not significantly ($p>0.05$) different. Instances of over or under dosing of drug was assessed based on the number of tablets reported to have received and consumed by the respondents against the recommended doses. To minimize over/under dosing correct age need to be recorded. Social mobilization and training have to be strengthened to overcome issues related to dosing (WHO 2011).

DISCUSSION

The drug was distributed to over 82% of the target population, during the current round in all the districts. The coverage was comparable between the districts but significantly higher in rural areas compared to urban areas. There was no difference in the distribution of DEC and Albendazole. With regard to under dosing and over dosing it was observed that nearly 5% of the respondents reported that information was not clear. To minimize over/under dosing correct age need to be recorded. Social

Table 7. Assessed coverage, consumption and side effects in different districts in Puducherry UT in 2012

District	Urban/ Rural	Sample (≥2 years)	Received (DEC)		Received (Alben- dazole)		Consumed (DEC)		Consumed (Alben- dazole)		Com- pliance	Side reaction	
			No.	%	No.	%	No.	%	No.	%	%	No.	%
Puducherry	Rural	405	375	92.6	377	93.1	300	74.1	302	74.6	80.0	5	1.7
	Urban	140	121	86.4	121	86.4	99	70.7	99	70.7	81.8	1	1.0
	Total	545	496	91.01	498	91.4	399	73.2	401	73.6	80.4	6	1.5
Karaikal	Rural	382	304	79.6	304	79.6	232	60.7	232	60.7	76.3	2	0.9
	Urban	131	115	87.8	115	87.8	60	45.8	60	45.8	52.2	NA	0.0
	Total	513	419	81.68	419	81.7	292	56.9	292	56.9	69.7	2	0.7
Mahe	Rural	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Urban	623	466	74.8	466	74.8	183	29.4	259	41.6	39.3	11	6.0
	Total	623	466	74.8	466	74.8	183	29.4	259	41.6	39.3	11	6.0
Yanam	Rural	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Urban	512	418	81.6	414	80.9	263	51.4	261	51.0	62.9	4	1.5
	Total	512	418	81.6	414	80.9	263	51.4	261	51.0	62.9	4	1.5
Total	Rural	787	679	86.3	681	86.5	532	67.6	534	67.9	78.4	7	1.3
	Urban	1406	1120	79.7	1116	79.4	605	43.0	679	48.3	54.0	16	2.6
	Total	2193	1799	82.0	1797	81.9	1137	51.8	1213	55.3	63.2	23	2.0

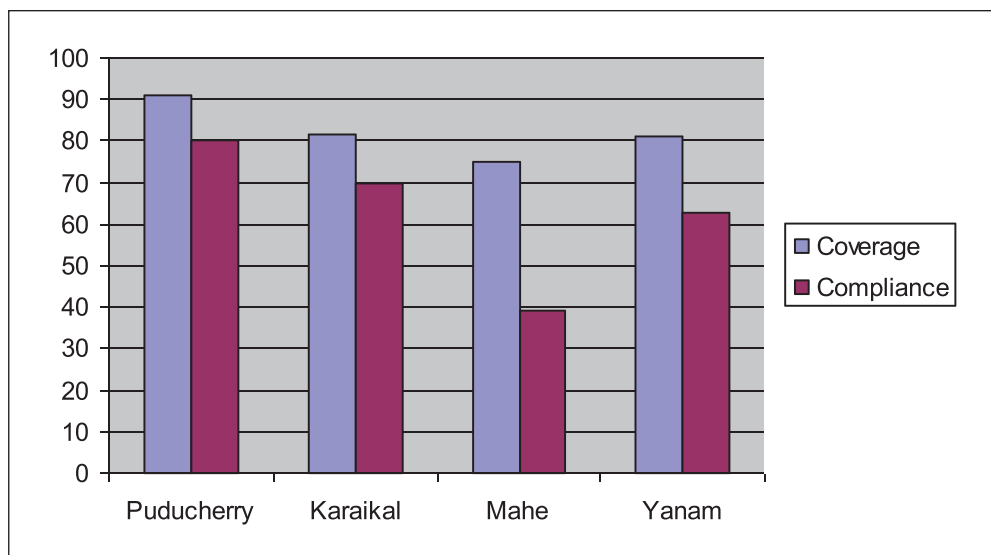


Figure 1. Showing the Coverage and Compliance of District/ Regions

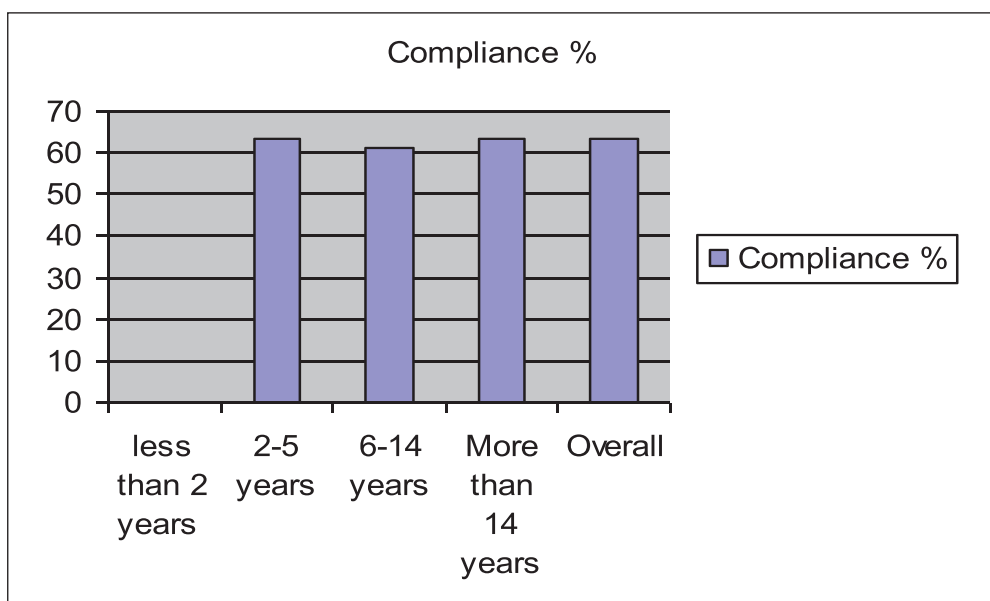


Figure 2. Showing the Age group wise Compliance

mobilization and training have to be strengthened to overcome issues related to dosing.

About 52% of the target population reported to have consumed the drug and consumption was significantly higher in rural areas. Mahe continue to record low consumption rates (19-42% in different wards). Also, selective intake of albendazole was observed in Mahe. Compliance, a marker to assess social mobilization was about 63%, demanding strengthening of efforts. There was about 18% gap in consumption levels between rural and urban areas. The gap between coverage and compliance was higher in Mahe region when compared to Puducherry. Enhanced social mobilization and behavioral change communication will improve compliance. Supervised consumption may not be possible in the programme conducted on single day with large scale population.

Acknowledgments. The study was supported by internal resources of NVBDCP unit of Puducherry. The authors would like to thank the Director, VCRC for technical support. The work conducted by Mr. E. Murugasamy, Assistant Entomologist, Mr. R. Saravanan,

DEO and Technical wing of Filariasis Division is all thankfully acknowledged.

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