

School Based Filariasis Transmission Assessment Survey at Purba Medinipur District, West Bengal; India in 2014

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Abstract—Lymphatic Filariasis is one of the neglected tropical diseases of world. India was set a target to eliminate lymphatic filarial within the year 2015 by administering Mass Drugs Administration (MDA) with diethyl carbamazine and albendazole for five consecutive years. MDA coverage was more than 80% - 92% of different MDA rounds in Purba Medinipur district. Impact of MDA programme was assessed by searching microfilaria through night blood survey. Prevalence of microfilaria was 2.4% to zero in all sentinel sites. Finally transmission assessment survey (TAS) as per WHO guidelines - 2011 of microfilaria was conducted on September and October' 2014 among student of class I and II for making decision to stop or continue MDA. This district was sub-divided into three evaluation units (EUs), named Evaluation Unit-I, Evaluation Unit-II and Evaluation Unit-III to implement TAS programme. Sample Survey Builder (SSB) tool was used for sampling. Cluster survey was conducted with critical cut off value 20 in each EU. Immuno-chromatographic test (ICT) card was used to detect microfilaria among school students of class I and II (6 - 7 years age). All students of class-I and II of selected school were tested with ICT card, no sampling interval. Among the total enrolled school student of class-I and II, 3.67% were tested for microfilaria with ICT card. Among them, 51.3% were boys and 47.3% were girls. Out of total 5108 children surveyed only three (0.06%) was found positive for filarial antigen. All three cases had migratory history to filaria endemic areas and remain with relatives for >11 months. As proportion of positive cases did not cross the critical cut off value. So these three Evaluation Units were qualified to stop further MDA.

Key word: Microfilaria, Transmission Assessment Survey, Purba Medinipur, West Bengal.

I. INTRODUCTION

Lymphatic Filariasis is commonly known as “Elephantiasis” - a disfiguring disease; usually infection occurs in childhood and visible manifestation develops at later life. ¹ It was estimated that 120 million people of tropical and sub-tropical region were infected with lymphatic Filariasis (LF). Among them, 25 million men had genital swelling (Hydrocele) and 15 million women had lymphoedema legs (Elephantiasis), approximately 66% of total Filariasis cases were accounted from South East Asian Country and 33% were from African country. ²

India is a Filariasis endemic country. Out of 600 districts in India, 250 districts of 15 States and five Union territories are Filariasis endemic. ³ Around 650 million population are at risk of developing Filariasis. ⁴ In 2002, India set a target to eliminate filariasis by 2015. ⁵ This goal will be achieved with strategies: (a) Annual single dose Mass Drug Administration (MDA) with Di-ethyl Carbamazine (DEC) and Albendazole tablets to all eligible population of the endemic districts for at least five consecutive years and (b) Alleviation of morbidity by promoting home-base care of lymphoedema cases and up-scaling hospital based hydrocele operation. ⁶ The principle behind MDA programme was successful

administration of DEC and Albendazole tablets and results would be absence of microfilaria in the community. ⁷ In India, impact of Elimination of Lymphatic Filariasis (ELF) was reflected by (a) increasing Mass Drug Administration (MDA) coverage from 73% in 2004 to 83% in 2013, (b) microfilaria (Mf) rate reduced from 1.24% in 2004 to 0.29% in 2013, and 200 districts reported Mf rate < 1% in 2013. ⁸

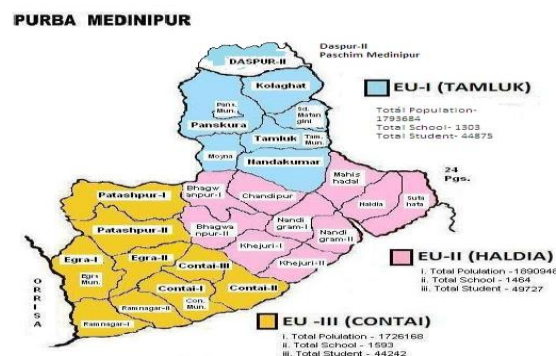
In this district of Purba Medinipur, MDA coverage was increased from 80% in 2007 to 86% in 2013 and Mf rate also decreased from 2.43% to 0.00% in 2013 (sentinel surveillance report). During the year 2013 additional Mf survey was conducted at 10 sites (8 rural + 2 urban sites), Mf rate at additional Mf survey was 0.43%. All the sentinel sites survey report, additional microfilaria sites survey reports and MDA coverage indicated that the district achieved the state of elimination of lymphatic Filariasis (ELF). So, the district Purba Medinipur was eligible for TAS and had been implemented the Transmission Assessment Survey (TAS) programme. TAS is the recommended procedure whether MDA has successfully reduces the prevalence of microfilaria below the threshold and even in the absence of MDA transmission is no longer likely to be continued or not. So that MDA can be stopped. ^{9, 10} District Purba Medinipur has completed the TAS programme successfully with TAS protocol and the results were presented in this article.

II. METHODOLOGY

2.1 Basic Information for implementing TAS programme

The district had a population of 5,410,800 including Daspur-II block population of Paschim Medinipur district. ¹¹ Daspur-II block was included along with the Purba Medinipur district to perform the TAS programme due to administrative pursuance. TAS programme was conducted among children aged 6-7 years between September and October 2014. School based TAS programme was conducted because school student enrolment of Class-I and Class-II was > 75%. Other criteria were also fulfilled to conduct TAS programme. The district was divided in to three Evaluation Units (EU) for implementation of TAS programme, named (i) EU-I (Tamluk- Purba Medinipur), (ii) EU-II (Haldia-Purba Medinipur) and (iii) EU-III (Contai-Purba Medinipur). The population of each EU would be < 20000. (Figure 1)

Figure 1: Evaluation Units of Purba Medinipur district for TAS programme

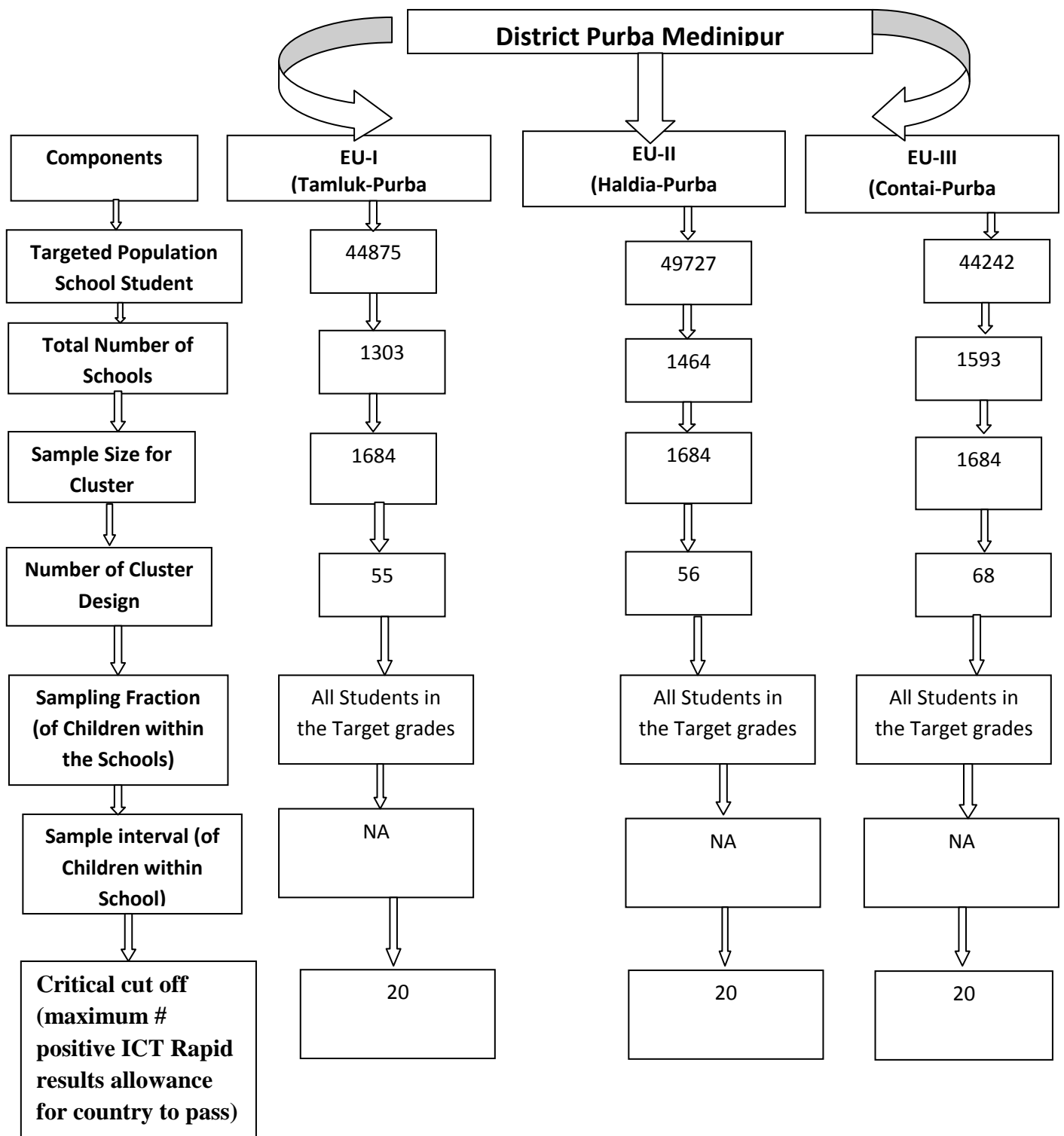


2.2 Survey Design for TAS

Data of 6 - 7 years children was collected from the census of India 2011. School enrolment of class-I & class-II student of three EUs were also collected by visiting all the school separately. All schools were included (Government, Private, Nursery, religious School like Madrasa etc) for this programme.

Eligible children for TAS of class-I & class-II of different EU. Absentee rate of EU wise of students and percentage of students were also enrolled. List of schools for survey were selected with the help of **sample survey builders (SSB)** software for conducting TAS programme.¹² Sample survey builders is a tool which helps researchers for designing the TAS programme. Details were described in the flow diagram. (Figure 2)

Figure 2: Flow diagram described the sample population with critical cut off point for TAS programme at Purba Medinipur district, West Bengal; India 2014



2.3 Target Population

Schools were selected by the SSB software randomly. Cluster survey was conducted from the selected school list. Student of class-I & II (age 6 - 7 years) were surveyed and they were the target population for study. Positive result would be indicative of recent and active filarial transmission and the older children and adult people who may have been previously exposed with filaria.¹³

2.4 Ethical clearance and administrative approval

Administrative approval was obtained from department of Family Welfare, Government of West Bengal. No written consent was taken but verbal consent was taken from the head of the institution as a part of disease control programme. Number was used instead of name was used to analyzed data.

2.5 Sample size & sample selection

SSB software calculated sample size according to EU wise study population. At EU-I sample size was 1684 and cluster of school were 55. At EU-II sample size was 1684 and cluster of school was 56. At EU-III sample size was 1684 and cluster of school was 68. Additional ten schools were also randomly selected and these school students may be surveyed when necessary. There was no sampling interval. All students of selected school of class-I & II were tested for microfilaria.

2.6 Diagnostic Tools for TAS

Immuno-chromatographic Test (ICT) card was used to detect microfilaria among the school student of class-I and class-II. It is a rapid test kit, using to detect microfilaria at any time of day. It is an antigen antibody test. If microfilaria is present in the blood, the test result will be positive.

2.7 Critical Cut off Value

Critical cut off value represents the threshold of infection, below which means transmission of infection will no longer persist, even absence of MDA programme. Cut off value for TAS was 20 for each evaluation units. If the positive test results cross this number, then the EU will be failed to pass "STOP MDA" which means that EU will have to conduct MDA programme at least two more round. If the total number of positive test result is at or below critical cut off value of 20, then the EU passes the survey and decision will be "STOP MDA". No further MDA programme will be needed.

2.8 Data collection, Constitute Survey team and Training

Six members were included in each survey team such as (i) Laboratory technician, (ii) Block Public Health Nurse (BPHN)/Public Health Nurse (PHN), (iii) Auxiliary Nurse Midwives (ANM), (iv) Health Supervisor (Male/Female), (v) Health Assistant (Male/Female) and (vi) Medical Officer to conduct the TAS programme at school student. Five teams were made to conduct TAS programme of each EU. For three EUs, a total of 90 health personnel were recruited and trained about TAS programme on use of ICT card, report writing, record keeping, result dissemination etc. Their duties had been defined at the time of training and instructed to perform accordingly. All the survey schools had been informed before the date of TAS programme and result of TAS was shared with the school teachers. Details of travel history were obtained from the parents and guardian of ICT positive student. All data were recorded in data collection formats. Invalid and incomplete test due to insufficient blood and refusal to test was recorded.

2.9 Data Analysis

All data were entered in the excel software, then compiled and analysed with the help of statistical software SPSS (trial Version).

III. RESULTS

3.1 Basic information

TAS programme was started on 06.09.2014 and completed on 08.10.2014. Total population of the district was 5410800 including Daspur-II block of Paschim Medinipur district. The population EU-I was 1793684, EU-II was 1890948 and EU-III was 1726168. Total eligible children [Age 6-7 years, (Class-I & II)] in the district were 178557 and total primary schools were 4360. Total school student of class-I & II were enrolled 78% with absentee rate 10% in the district (Table 1).

Table 1
Year wise Status of Filaria Indicators and Percentage of MDA Coverage in student of class-I & II in Purba Medinipur district (West Bengal) India

Indicators	Name of Evaluation Unit			Year of Survey
	EU-I (Tamluk-Purba Medinipur)	EU-II(Haldia-Purba Medinipur)	EU-III (Contai-Purba Medinipur)	
Pre-MDA NBS				
BSE*	515	533	2873	2013
Mf +	0	0	0	
% of Mf +	0	0	0	
Additional NBS				
BSE	1006	2455	1530	2013
Mf +	0	2	0	
% of Mf +	0	0.08	0	
MDA Coverage (%)	84	87	87	
Pre-MDA NBS				
BSE	510	1006	2311	2012
Mf +	0	0	0	
% of Mf +	0	0	0	
MDA Coverage (%)	78	81	80	2012
Pre-MDA NBS				
BSE	508	1503	2012	2010
Mf +	0	0	0	
% of Mf +	0	0	0	
MDA Coverage (%)	92	92	86	2010
Pre-MDA NBS				
BSE	489	1499	1998	2008
Mf +	0	1	3	
% of Mf +	0	0.06	0.15	
MDA Coverage (%)	88	88	82	2008
Pre-MDA NBS				
BSE	501	1478	1998	2007
Mf +	0	11	85	
% of Mf +	0	0.74	4.25	
MDA Coverage (%)	82	82	76	2007
Pre-MDA NBS				
BSE	488	1503	2011	2005
Mf +	0	15	103	
% of Mf +	0	0.99	5.12	
MDA Coverage (%)	58	43	34	2005

*Blood Slide Examination

MDA coverage was 45% in the year 2005 and increased to 86% in the year 2013. At the same time Mf rate at Night Blood Survey (NBS) was reduced from 6.11% in the year 2005 to 0.00% in the year 2013. The result of additional NBS report also was less than 0.08% (Table 1 & 2).

Basic information of target population and sample population was given in following table. (Table 2)

Table 2
Basic information for TAS in district Purba Medinipur, West Bengal; India 2014

Evaluation Unit (EU)	Population	Eligible Children	Total school	Student enrolled			% of Absentee			% of student enrolled
				Class-I	Class-II	Total	Class-I	Class-II	Total	
EU – II	1793684*	59192	1303	21534	23341	44875	5	5	10	76
EU – II	1890948	62401	1464	23273	26454	49727	5	3	8	80
EU – III	1726168	56964	1593	21493	22749	44242	6	6	12	78
Total	5410800	178557	4360	66300	72544	138844	5	4	10	78

***Daspur-II block population of Paschim Medinipur included**

Total 5108 student of class-I and class-II (age 6 & 7 years) were tested with ICT card. Among them 1696 were tested negative and one were found positive in EU-I, 1712 were tested and none was detected positive from EU-II and 1696 were tested negative and two were found positive from EU-III. Three additional schools were surveyed in EU-I and II and four additional schools were surveyed from EU-III to complete desire number of test. Total three cases were tested positive for microfilaria (Table 3).

Table 3
Evaluation Unit wise Immuno-Chromatographic Test (ICT) result for TAS of Study Population

Evaluation Unit	Total Tested	Result		
		Positive	Negative	Positivity Rate (%)
Evaluation Unit-I	1697	1	1696	0.06
Evaluation Unit-II	1712	0	1712	0.00
Evaluation Unit-III	1696	2	1694	0.11
Total	5108	3	5102	0.06

Total ICT positivity rate for filaria was 0.06%. Proportion of boys and girls tested with ICT card were nearly same such as 51.3% (2621/5108) boys and 47.7% (2437/5108) girls. All three cases were treated with Di-ethylcarbamazine Citrate (DEC) for two weeks and Albendazole 400 mg tablets single dose. All the positive school students had migratory history from filaria endemic (Odisha State) areas and resided there along with their relatives for > 11 months. They did not take DEC tablets during MDA programme. So, there was no indigenous source of filarial transmission. (Table 3)

IV. DISCUSSION

Post MDA surveillance of microfilaria was assessed by WHO protocol of TAS programme in the district of Purba Medinipur. MDA programme was successfully performed for six years (Table 2). Microfilaria rate also was reduced to zero level during last NBS in 2013. The district was eligible to perform TAS programme. TAS programme was conducted among the school student of class-I and II. Only three cases were detected positive for microfilaria. All positive cases were treated with DEC and Albendazole tablets. Lymphatic Filariasis is targeted to eliminate globally by 2020 with administration of DEC tablet and single dose of albendazole tablet.¹⁴ With this view 53 countries launched the programme in 2007 and 13 countries achieved the goal under post MDA surveillance.¹⁵ Government of India launched the programme to eliminate microfilaria in all 250 endemic districts.¹⁶ In 2011 a revised protocol (Transmission Assessment Survey) was developed and recommended to assess post MDA microfilaria endemicity.

ICT card was used to test school students for detecting microfilaria in blood. It was useful tools for TAS programme, used at field level and result could be obtained within 10 minutes. This instrument was used different countries to assess the microfilaria survey at field level. This ICT card was used for TAS programme at South India and Bangladesh.^{17, 18}

School based TAS is highly feasible than the community based survey. Here involvement of the health staff and education department was good. Microfilaria endemicity was assessed before each round of MDA in night blood survey (NBS) of filaria at sentinel sites and random sites. At final round of MDA along with additional microfilaria survey was conducted. Result of NBS was reduced to zero percent at last round of MDA.

In this survey, critical cut off value of each EUs were 20. The result of tests of school student did not cross the critical cut off value in any evaluation unit. Only three ICT tests were positive for microfilaria. All these three positive cases had migration history to filarial endemic areas. They also stayed at endemic area for three to four months. They did not consume DEC and Albendazole tablets during the last MDA programme. No other lymphoedema case was detected in that village. So, there was no indigenous transmission of microfilaria. These three cases were treated with DEC and Albendazole tablets with full course. Similar kind of study performed at Tanzania in 2012 and decision was one part of study setting was in favour of "Stop MDA" and other part of the study crossed the critical cut off point.¹⁹

TAS programme was conducted successfully at different evaluation units in the district of Purba Medinipur. School student of Class-I and II were tested with ICT card for filarial antigenemia. Only three cases were tested positive. Critical cut off point did not cross the danger point. For this, all the evaluation units of the district had passed the TAS programme and were qualified for stoppage of further annual MDA programme. TAS is an effective tool to stoppage of MDA but it longer term post MDA surveillance need further evidence based research that will be supported by complementary instruments.

V. CONCLUSION

In this present study Filaria positivity rate was found 0.06% i.e. out of total 5108 students test for filaria only 3 were positive. And all these positive students had migratory history from filaria endemic (Odisha State) areas and resided there along with their relatives for > 11 months. They did not take DEC tablets

during MDA programme. So, there was no indigenous source of filarial transmission. With the view of this fact MDA may be stopped in district Purba Medinipur (West Bengal) India.

CONFLICT

None declared till date.

LIMITATION

Vector survey was not conducted along with this study.

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