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Research Article

Lymphatic Filariasis Elimination in Boudh District of Odisha, India: A Success Story

MM Pradhan[1], Swati Kumari[2], N Somalkar[3], PK Srivastava[4]

[1]ADPHO, VBD-Health & FW Department, Boudh District, Odisha.
[2]VBD Consultant, Health & FW Department, Boudh District, Odisha.
[3]Regional Director ROHFW, Bhubaneswar, Odisha.
[4]Former Joint Director, NVBDCP, Delhi.
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Corresponding Author:
MM Pradhan, ADPHO, VBD-Health & FW Department, Boudh District, Odisha.
E-mail Id:
drmmpradhan@gmail.com
Orcid Id:
https://orcid.org/0000-0002-6901-5441
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A B S T R A C T

The National Filaria Control Programme (NFCP) has been running in the country since the year 1955 with the strategy of parasite detection, treatment and vector control mainly in urban areas. In the year 1997, the fiftieth World Health Assembly Resolution listed Lymphatic Filariasis (LF) for elimination by 2020 which now has been aligned with the Sustainable Development Goal to be achieved by 2030. India also started its campaign to eliminate LF in 2004. The main strategy of the elimination programme is the Annual Mass Drug Administration (MDA) to progressively reduce and ultimately interrupt LF transmission. The other pillar of the strategy is morbidity management and disability prevention. Odisha state also started its LF elimination campaign in 20 endemic districts out of a total of 30 districts. There has been variable performance among districts and also within the districts at the Sub-district, Block Primary Health Centres or Health Sub-centre levels. Boudh is a centrally located district of Odisha and is one of the LF endemic districts covered under MDA since 2005.

The average population coverage during MDA in Boudh district was reported to be more than 65% since 2004, however, in the last five rounds of MDA. the Mf rate was < 1% with a compliance of > 80%. The district qualified for undertaking the Transmission Assessment Survey (TAS). The district has been validated for having achieved the elimination threshold by successfully clearing the transmission assessment survey (TAS).

Keywords: MDA, ELF, TAS, LF

Introduction

The National Vector Borne Disease Control Programme (NVBDCP) in Odisha addresses malaria, lymphatic filariasis, chikungunya and dengue. Malaria poses a major public health problem in the state with high mortality and morbidity followed by filaria, chikungunya and dengue. Groups with lower socio-economic status such as Schedule Tribes, Schedule castes, and marginalised and disadvantaged groups of the society are the most vulnerable segment of the population. The dynamics of these diseases are largely influenced by eco-epidemiological, socio-economic and environmental management systems.

Programme Management Structure

Under the umbrella of the National Health Mission (NHM), NVBDCP[1] is implemented by the Directorate of Health Services in coordination with other wings of the Department of Health and Family Welfare. Elimination of Lymphatic Filariasis (ELF) is governed through the Filaria cell at the state level whereas, at the district and below, it is integrated under the district VBD officer. A total of 15 NFCP units have been undertaking recurrent weekly anti-larval operation in urban areas by using larvicides and minor engineering methods. The filaria clinics attached to these NFCP units have been involved in the selective treatment of mf carriers in the community. Since the initiation of the elimination strategy, the MDA programme has been implemented in 20 districts.

Lymphatic Filariasis (LF) commonly known as elephantiasis has been a major public health problem in India. It is one of the neglected tropical diseases targeted for elimination.[2–4] In 2004, MDA was launched[5] in sixteen out of thirty districts of Odisha with an annual single dose of Diethyl Carbamazine Citrate (DEC) tablets once a year. In 2007, Albendazole was introduced along with DEC tablets once a year.[6] Boudh district (Figure 1) was one of the LF-affected districts in Odisha selected for MDA in the first phase. Since 2004, 11 rounds of MDA conducted till 2015. From 2011 onwards the district conducted MDA with adequate coverage and compliance. The MDA in Boudh district for ELF is conducted every year with two two-day mop-up rounds. During the three-day period, the drug administrators visited door-to-door and administered DEC and Albendazole tablets to the eligible beneficiaries as per the dosing schedule ensuring drug consumption in their presence ensuring that the drugs were not consumed with an empty stomach. The entire programme is managed by District, CHC and block-level officials with the support of field health staff, community-level health workers and volunteers. The last MDA was conducted in August 2016 with a mop-up round on the 11th & 12th of August 2016. The Night Blood survey conducted prior to the MDA 2016, Mf prevalence in each of the eight sites was found to be < 1%. Subsequently additional Mf survey was conducted in 10 additional random sites of the district and each reported a < 1% Mf prevalence rate.

Geographical Description

Boudh District is bound by River Mahanadi and Angul District at the north, Kandhamal District at the south, Nayagarh District at the east and Subarnapur District at the west (Figure 1). Covering a geographical area of 3444.8 sq km, the district lies 20 degrees 22' to 20 degrees 50' North Latitude and 83 degrees 34' to 84 degrees 49' east longitude. As per the demography is concerned, the district has got total population of 441162 with 221625 male and 219537 female population. The total SC population of the district is 104934 and the ST population is 55364 as per 2011 census.[7] The district comprises one subdivision, 3 Tahsils, 3 Blocks, 1186 villages and 63 Gram Panchayats. The climatic condition of the district is subtropical, being hot and dry in summer and cold and dry in winter. The rainy season is hot and humid. In summer temperature reaches 45 ºC and in winter temperature may come down to as low as 10 ºC. Industry is a source which has lately been contributing to the growth of Boudh District's economy. There are a number of agro-based small-scale industries functioning in the district. Textile-based income is quite appreciable and more than 6000 weavers are engaged in the textile zone of this district.

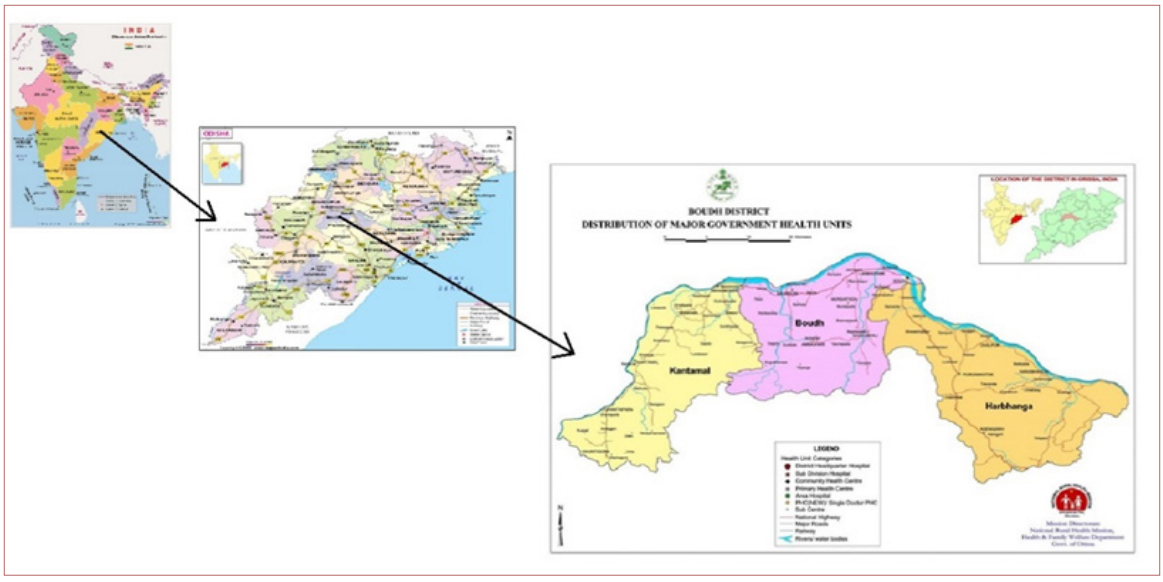

Figure 1.Map of Boudh District

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Boudh district has been traditionally endemic for Lymphatic Filariasis. As a part of the elimination of Lymphatic Filariasis (ELF), Boudh district has started the Mass Drug Administration (MDA) since 2004. Under the MDA programme, the district had conducted 11 rounds of annual MDA till 2016 with an average reported coverage of 84.06 %. MDA coverage and compliance since 2014 are indicated in Table 1. Before each MDA round Night Blood Survey (NBS) was conducted for Microfilaria (Mf) in 4 fixed and 4 random sites as per the national guidelines. The Mf rate was 3.74 % to start with and gradually decreased to less than 1% in each survey site since 2014 (Table 2).

Table 1.Population Covered Under MDA for LF Elimination in Boudh District, Odisha

	MDA 2014 (February 18–20, 2015)				
Name of the Block	**Total Population**	**Eligible Population**	**Covered Population**	**Coverage (%)**	**Compliance (%)**
Harabhanga	130974	120000	110266	91.89	76
Boudh	155139	142727	127772	89.52	76
Kantamal	153972	143194	138152	96.48	72
NAC, Boudh	20594	19152	17920	93.57	68
	MDA 2015 (December 19–21, 2015)				
Name of the Block	**Total Population**	**Eligible Population**	**Covered Population**	**Coverage (%)**	**Compliance (%)**
Harabhanga	135159	125562	116254	92.59	75
Boudh	155139	144000	132058	91.71	78
Kantamal	156385	144837	139935	96.62	76
NAC, Boudh	21939	19627	18912	96.36	65
MDA 2016 (August 10–12, 2016)					
Name of the Block	**Total Population**	**Eligible Population**	**Covered Population**	**Coverage (%)**	**Compliance (%)**
Harabhanga	131639	121762	113721	93.4	76
Boudh	154267	142334	127510	89.59	78
Kantamal	156333	144046	136660	94.87	77
NAC, Boudh	22045	20281	16325	80.49	68

Table 2.Mf Survey in Boudh District, Odisha

Site	**2014**			**2015**			**2016**		
	Persons examined	**Positives**	**Mf rate**	**Persons examined**	**Positives**	**Mf rate**	**Persons examined**	**Positives**	**Mf rate**
Sentinel 1	500	0	0	500	0	0	500	0	0
Sentinel 2	500	1	0.2	500	0	0	500	0	0
Sentinel 3	500	6	1.2	500	0	0	500	1	0.2
Sentinel 4	500	2	0.4	500	15	3	500	0	0
Random 1	500	0	0	500	0	0	500	0	0
Random 2	500	0	10	500	2	0.4	500	0	0
Random 3	500	0	2	500	6	1.2	500	0	0
Random 4	500	0	3	500	0	0	500	2	0.4

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Table 3.Template for Entering Information of Evaluation Unit Boudh for TAS-I

Name of State: Odisha																	
Identification name or number of EU: Boudh																	
Current estimated population of EU: 478219																	
Estimated total number 6-7 years old children in EU: 19128																	
Total number of 1st & 2nd standard enrolment in primary schools in EU: 14928																	
Proportion of primary school enrolment in 6-7 years old children in EU: 78.04%																	
Decision About School-Based or Community-Based Cluster Survey	Year of Initiation of MDA in the EU	Number of Total Rounds of MDA Done in the EU	**Year**	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013					
			MDA coverage Compliance	90.39 58.24	91.32 63.47	92.56 59.64	93.98 64.84	89.15 68.95	89.66 72.41	92.39 85.92	92.38 86.64	90.23 88.39	92.80 89.67					
As the enrolment in the schools is above 75% - school-based survey is chosen	2004	12 Rounds	BSE	2822	4016	3520	3800	4003	4010	4017	4026	4026	4037					
			Mf +ves	3	120	60	30	23	93	19	13	13	18					
Individual site-wise results of the last Mf survey before TAS	Mf rate%	0.10%	2.98%	1.70%	0.78%	0.57%	2.31%	0.47%	0.32%	0.32%	0.44%							
Indicators	R1	R2	R3	R4	S1	S2	S3	**S4**	**AR1**	**AR2**	**AR3**	**AR4**	**AR5**	**AR6**	**AR7**	**AR8**	**AR9**	**AR10**
No. BSE	497	500	500	500	503	514	500	500	500	500	500	500	500	500	505	500	500	500
Number Mf +ve	0	0	0	2	0	0	1	0	1	0	0	0	0	0	1	0	0	0
Mf rate (%)	0	0	0	0.4%	0	0	0.2%	0	0.2%	0	0	0	0	0	0.2%	0	0	0

BSE: Number of blood slides examined; **R:** Random (spot) site; **S:** Sentinel site; **AR:** Additional random (spot) site.*All the eleven mf positive cases are the natives of outside Boudh. They all are staying at Boudh for 10 months to 18 months. So, the corrected Mf rate is zero after deducting the positive cases.

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Methodology Followed for Transmission Assessment

An Mf survey in 10 additional random sites following WHO[8] and national guidelines[9-10] was conducted in 2017 which showed an Mf rate of less than 1% in all selected sites. Boudh district thus met the criteria of drug compliance above 65% of the total population and Mf prevalence below 1% in each site. The district therefore qualified for the Transmission Assessment Survey (TAS) to assess the transmission of Lymphatic Filariasis (Table 3).

Standard WHO methodology was followed to conduct TAS using Filaria Test Strip (FTS) for *W. bancrofti* among 6-7-year-old children based on the clusters survey method. After estimating the total 6-7-year-old children in the EU during 2017 (the year of Conducting TAS), a total school-wise 1 & 2 standard students enrolled were enlisted. The school enrolment was found to be 78%. The 'absentee rate' was estimated from randomly selected schools in the district and the absentee rate was found to be 9%.WHO software 'Survey Sample Builder'[8] was used by giving different EU-related inputs. Boudh district was taken as one Evaluation Unit (EU) as the population was 4,74,930 which is less than 2 million. In the EU, a school-based survey was chosen as the proportion of 6-7-year-old children enrolled in schools for standard (class) 1 and 2 was 78%. With the help of the Sample Survey Builder (SSB) tool, 102 primary schools were selected for TAS. The TAS was conducted from 30.08.2017 to 13.10.2017 in the selected 102 primary schools.

Results and Discussions

Transmission Assessment Survey (TAS-I)

The IU had completed 9 rounds of annual MDA since 2004 with coverage of more than 65% and also achieved < 1% Mf prevalence in four sentinels, four spots and 10 additional spot sites. Thus, the EU qualified for TAS. The output data generated by the software are given below:

- Number of 6-7 years children in target population: 19128
- Number of children enrolled in schools: 14982 (78%)
- Number of Primary schools: 786
- Number of students to be screened: 1548
- Number of schools to be screened: 96
- Critical cut-off: 18

The number of students screened by FTS was 1763 out of 2073 students enrolled in the selected schools. A total of 18 positives were recorded due to which the EU passed TAS I and qualified for stoppage of annual MDA. As a follow-up action, all FTS-positive students were given 12 days DEC and follow-up was done by ASHAs. The Mf survey continued in sentinel and random sites during the post-MDA period two years after the first TAS. The Mf rate was found to be 0%, the district was subjected to the second TAS. After estimating the total 6-7-year-old children in the EU during 2019 (the year of Conducting the 2nd TAS), the total school-wise class 1 & 2 standard students enrolled were enlisted. The school enrolment was found to be 78%. The 'absentee rate' was estimated from randomly selected schools in the district. The absentee rate was found to be 8%. WHO software 'Survey Sample Builder' was used by giving different EU-related inputs. The output data generated by the software are given below:

- Number of 6-7 years children in target population: 19480
- Number of children enrolled in schools: 15275 (78%)
- Number of students to be screened: 1799
- Number of schools to be screened: 96
- Critical cut-off: 18

Result of TAS-2

A total of 1575 was tested out of 1799 targeted students from 96 nos., of selected schools for filarial antigenemia by using ICT cards. The pre-fixed positivity cut-off was 18. In EU (Boudh District) 9 students were found positive. As such the EU has passed in TAS**.** All 9 positive students were given DEC tablets for 12 days.

Subsequent to the successful clearance of the first and second TAS, the mf survey continued in sentinel and random sites for two consecutive years after 2nd TAS i.e., in 2020 and 2021.

The 3rd TAS was conducted in November 2021. Before conducting the 3rd TAS, an MF survey among 5–9-year-old children was conducted and no MF positive case was detected. However, it is pertinent to mention that during COVID-19, the schools were closed and 8 districts of Odisha state were due for TAS. Under the circumstances of schools being closed, technical advice was sought from central and WHO experts and based on technical discussions considering the clause of less than 75% of students in school, the community-based TAS was conducted. The SSB tools were used for the selection of villages and children to be tested as per standard protocol. A total of 1561 children were tested out of 1662 targeted children from 129 selected villages for filarial antigenemia by using FTS cards. The positivity cut-off was 18 was fixed but in the EU (Boudh District), only 14 children were found positive. As such the EU (total Boudh District) successfully passed in TAS III.

Follow-up

All 14 positive children were treated with DEC tablets for 12 days. Night blood samples were collected from each of the 14 positive children and were found negative for the presence of microfilaria.

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Conclusion

The Boudh District of Odisha state has been traditionally endemic for the Bancroftian Lymphatic Filariasis. As a part of the elimination of Lymphatic Filariasis (ELF) in the country, the district was covered under the Mass Drug Administration (MDA) with DEC since 2004 and DEC and Albendazole since 2008. The district had undergone 11 rounds of annual MDA until 2016 with average reported coverage of 84.06 %. Before each MDA round, a Night Blood Survey (NBS) for Microfilaria (Mf) in 4 fixed and 4 random sites was conducted. The Mf rate declined from 3.74% in 2004 to less than 1% in 2016. During 2017, Mf prevalence in 10 additional random sites was reported to be less than 1% in all selected sites making the district qualified for Transmission Assessment Survey (TAS). TAS was done by using Filaria Test Strip (FTS) *W. bancrofti* as per the WHO standard methodology. Boudh district successfully cleared all three TAS (the first two through school-based and the third through community-based due to the closure of schools during the COVID period). The post-MDA activities are continued in the district and positive cases detected during TAS were given DEC for 12 days. All were found later to be negative for mf in follow-up. However, the importance of entomological monitoring during the post-MDA period may not be ignored. The WHO has also emphasised entomological monitoring in its guidance document.[11]

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Conflict of Interest: None

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