

Assessment of Fluoride in Drinking Water



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EXPERIENCE IN MADANAPALLE SUB-DIVISION, CHITTOOR DISTRICT

INTRODUCTION

Ensuring supply of adequate amount of safe water for domestic purposes to all its citizens has been a constant challenge for Government agencies.

A newly emerging issue in water provision is that of quality. Water sources are found to increasingly be contaminated by various contaminants such as bacteria, chemical compounds such as fluoride, arsenic, nitrate, and dissolved solids etc. causing the water to be unfit for drinking.

High amounts of fluoride (>1.5 ppm) in drinking water is a serious issue in many parts of India (See Map: India: Fluorosis Prevalent States). As can be seen from the Map, Fluorosis is a serious issue in Andhra Pradesh as early as in 1999 with maximum reported levels at 29 ppm and 70-100% of the state being affected. Arghyam has taken up a pilot project partnering with a not-for profit organization named OUTREACH in Guntavarepalle village in Chittoor. It was sought to be seen if where high amount of fluoride (>4.00 ppm) adversely affects the health of the people. A survey of the population indicates that 92% of the village population exhibits classic symptoms of Fluorosis. Water quality tests also revealed presence of fluoride above permissible limit in water sources such as - open well water and tank water.

It is suspected that fluoride contamination, above permissible limits, is a problem in the neighbouring villages also. In order to understand if this situation is as grave as in Guntavarepalle, Arghyam suggested that OUTREACH conducts indicative tests for assessing fluoride concentration in drinking water in the other villages. This was carried out in a total of 60 villages and the results from these tests are captured in this document.

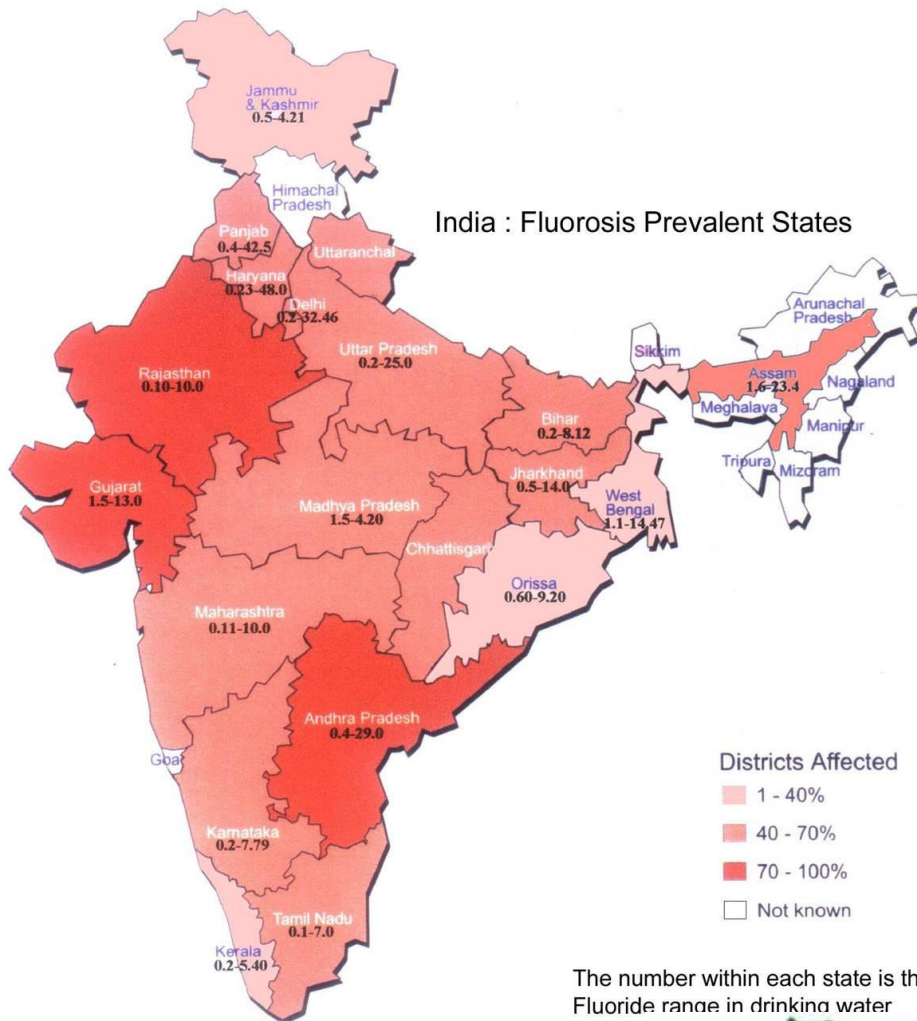
METHODOLOGY

The field staffs of OUTREACH were trained in testing water quality using ORLAB Test Kit supplied to GPs by the Panchayat Raj and Rural Development Department of the Government of Andhra Pradesh. See box: Procedure for water quality testing to understand the procedure adopted.

Typical Challenges include:

- Slipping back of habitations fully covered with water supply
- Drying up of source – especially relevant since 80% of the rural water supply is dependent on groundwater sources.

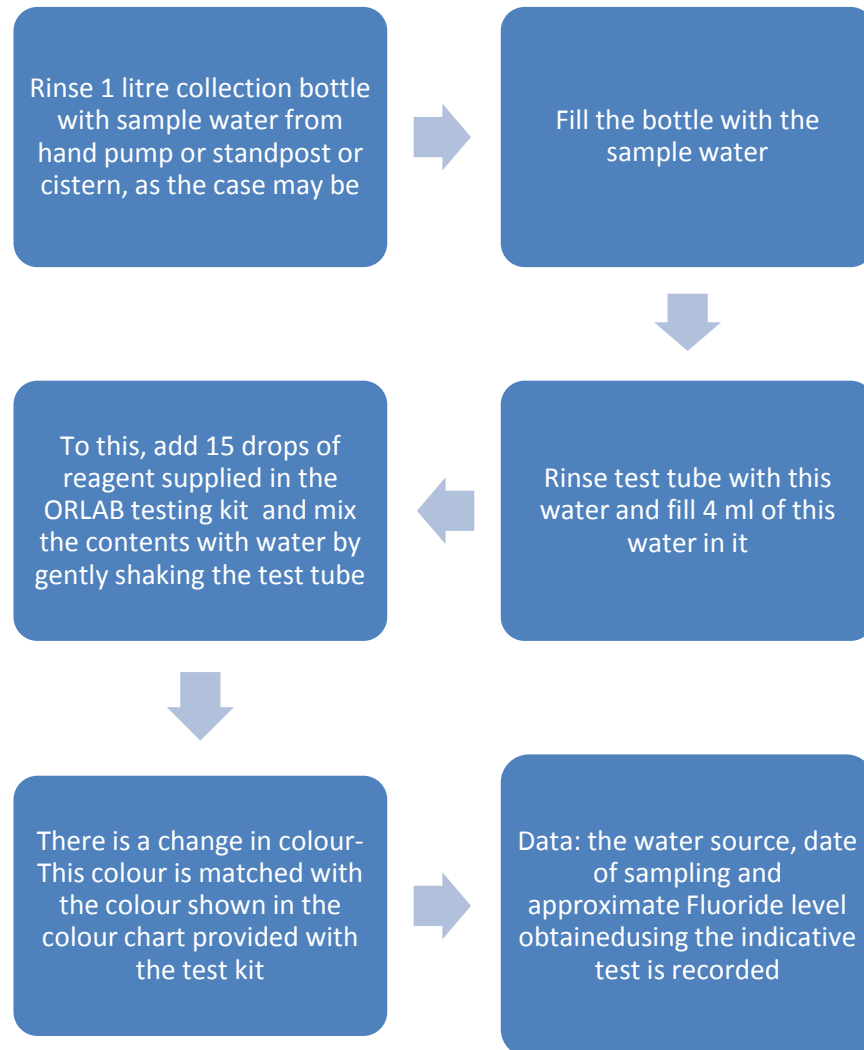
India: Fluorosis Prevalent States



Source of information: 1) UNICEF State of Art Report, 1999
2) FR & RDF data bank

Location of Chittoor District, Andhra Pradesh



Procedure for water quality testing

Water quality testing was carried out in 60 villages spread across 3 Mandals of Chittoor district – B.Kothakota, Molakalacheruvu and Thamballapalle which comprise of 12 Gram Panchayats. Details of the Mandals can be found in the Table below.

The community was involved in the testing of water in all 60 villages. This facilitated increase in awareness on the problem of fluoride contamination, and building local capacity so that routine testing could be carried forward by the community itself using the testing kits available with the Panchayat. The testing was done during May – June 2010.

Details of Villages where water quality testing was carried out				
Mandal	No. of Panchayats	No. of Villages tested	No. of households	Population
B.Kothakota	5	19	1333	6757
Molakalacheruvu	6	39	2521	11994
Thamballapalle	1	2	161	803
Total	12	60	4015	19554

RESULTS

It is evident from the above table that all the 60 villages in Chittoor district where indicative tests for Fluoride was carried out indicated its presence in levels that are much above permissible levels. When this data is read along with data from the Table: Details of Mandals, it follows that the 4015 families – approximately 19000 people are potential victims of Fluorosis. Given that the concentration in the 60 villages was also found to be equal to or higher than 2.5 ppm, the risks of skeletal and dental Fluorosis are pretty high.

CONCLUSION AND RECOMMENDATIONS

It is critical that the district Rural Water Supply Agency takes note of the drinking water situation in the 3 Mandals and takes appropriate measures for providing safe water to its people. Thought needs to go into creating measures that factor in sustainability of any interventions proposed – both financial and social. An example has been set by the Karnataka Government for ensuring Fluoride-free water to households in about 65 villages through a programme titled Sachetana Drinking Water Project. The key areas of focus of this project include rooftop rainwater, harvesting and recharging the groundwater through several methods like borewell recharge, aquifer recharge, construction of percolation ponds etc. An experienced and reputed NGO was roped in for executing the programme through the village Panchayats.

Thus, several options available for providing fluoride-free water needs to be looked into in Madanapalle region. They are:

- Rooftop rainwater harvesting for meeting the drinking and cooking requirements
- Large number of groundwater recharge structures for diluting the Fluoride in aquifers
- Promotion of household Activated Alumina filters – It is important to note that the mere distribution of household fluoride filters has failed miserably earlier mainly because the villagers did not know how to reactivate the alumina filter or who to approach for maintenance. Thus, a strong back up support is essential to make it a successful low cost technology in accessing Fluoride-free drinking water on a sustainable basis. (with facilities for reactivating the filter material) for those who have constraints in harvesting rainwater
- Community-managed defluoridation units with adequate technical support for management
- Creation of awareness on Fluorosis and promotion of calcium rich diet to reduce the ill effects of Fluorosis

A multi-pronged approach is required for mitigating the fluoride related health issues in many parts of Andhra Pradesh.

ANNEXURE

Level of Fluoride in drinking water in the sixty villages

S. No.	Name of the village	No. of HHs	Population	Fluoride (ppm)
Panchayat: Gattu; Mandal: B.Kothakota				
1	Tharigodu	49	313	>3.00
2	Gattu	354	1714	>2.50
3	Akulavaripalle	49	301	>3.00
4	Morumpalle	34	242	>3.00
5	Mogasalamarri	120	481	>3.00
Panchayat: Gollapalle; Mandal: B.Kothakota				
6	Kothapalle	58	249	>2.50
7	Chakiletivaripalle	64	294	>3.00
8	Raghunahapuram	76	384	2.5
9	Dinnemeedapalle	31	268	>3.00
10	Gollapalle	59	341	>3.00
11	Gudisivaripalle	53	292	>3.00
Panchayat: Kotavuru; Mandal: B.Kothakota				
12	Pathakuravapalle	40	195	2.5
Panchayat: Seelamvaripalle; Mandal: B.Kothakota				
13	Gudupalle	13	42	>3.00
14	Jangalapalle	53	276	2.5
15	Seelamvaripalle	29	248	>3.00
Panchayat: Thummanamgutta; Mandal: B.Kothakota				
16	Subbireddigaripalle	74	297	3

17	Thummanamgutta	69	314	3
18	Kothapalle	82	365	2.5
19	Kanikalathopu	26	141	2.5
Panchayat: Burakayalakota; Mandal: Molakalacheruvu				
20	Balakavaripalle	76	388	>3.00
21	Peddamoravapalle	58	313	2.75
22	Thimmireddigaripalle	67	296	>3.00
23	Devarapalle	32	174	>3.00
24	Boyamalapalle	77	327	>3.00
25	Burakayalakota colony	218	784	>3.00
26	Peddarajulapalle	43	168	>2.5
27	Nallaguttapalle	56	238	>3.00
28	Yarragudivaripalle	24	102	>2.5
29	Kothmalapalle	123	518	>3.00
30	Guntrajulapalle	32	115	>2.5
31	Markurivaripalle	22	76	>3.00
Panchayat: Kadirinathuni Kota; Mandal: Molakalacheruvu				
32	Kadirinathunikota	136	686	>3.00
33	Gollapalle	36	218	>2.75
34	Chennaiahgaripalle	29	179	>2.75
35	Galetivaripalle	34	188	>3.00
Panchayat: Maddinayanipalle; Mandal: Molakalacheruvu				
36	Yarmareddigaripalle	82	354	>3.00
37	Nayanivaripalle	81	342	>3.00
38	Maddinayanipalle	193	616	>3.00
39	Beedulapalle	32	214	>3.50

40	Enumulavaripalle	86	412	>3.00
41	Bisaiahgaripalle	36	252	>3.00
42	Maligivaripalle	67	347	>3.00
43	Pakkireddigaripalle	44	267	>3.00
44	Jenevandlapalle	34	263	>3.00
45	Pottilingannagaripalle	56	291	>3.00
46	Dharamorapalle	154	529	>3.00
Panchayat: Mulakalacheruvu; Mandal: Molakalacheruvu				
47	Ragimanupalle	41	228	>3.00
48	Dugasanivaripalle	31	187	>2.75
49	Vaddipalle	39	203	>3.00
Panchayat: Peddapalyam; Mandal: Molakalacheruvu				
50	Peddapalem	113	684	>2.75
Panchayat: Vepuri Kota; Mandal: Molakalacheruvu				
51	Avulavaripalle	37	228	2.5
52	Reddivaripalle	68	412	>3.00
53	Vepurikota	52	268	>3.00
54	Kutagollapalle	39	197	>2.75
55	Peddaiahgaripalle	46	236	>3.00
56	Peddapalle	48	284	>2.75
57	Yeddulavaripalle	43	221	>3.00
58	Cheekichettipalle	36	189	>2.75
Panchayat: Balireddi Gari Palli; Mandal: Thamballapalle				
59	Balakavaripalle	94	482	>3.00
60	Mondiragimanipalle	67	321	>3.00