



## Mapping of fluorosis affected villages

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EXCESS FLUORIDE IN drinking water sources beyond a tolerance limit is responsible for the disease 'fluorosis', a serious public health problem in several parts of the world. Identification and mapping of fluorosis affected villages is the first step in the direction of mitigating and controlling the problem. A systematic study has been carried out in order to map the fluorotic villages of Dindigul Anna district of Tamil Nadu, South India and a suitable methodology has been developed for the purpose. This methodology for mapping the fluorosis affected villages is presented in this paper.

### Survey of the villages

Survey of the school children (8-16) years age group) in order to examine the symptoms of dental fluorosis (cf. fig 1) is the first and foremost step which can decide the prevalence or absence of fluorosis.

Only when prevalence of dental fluorosis is confirmed in this survey, it is necessary to study further on the magnitude and severity of the problem. Door to door survey of each and every family in the village for examination of the symptoms of dental fluorosis and skeletal fluorosis (cf. fig. 2) is the next step which gives us the percentage incidence of fluorosis as well as community fluorosis index.

Community fluorosis index can be calculated as follows (Dean, H.T. and Elvove, E, 1935). Based on the symptoms dental fluorosis is classified into seven categories, viz., normal, questionable, very mild, mild, moderate, moderately severe and severe and each of these seven



Figure 2. Symptoms of skeletal fluorosis



Figure 1. Symptoms of dental fluorosis

classifications is given a numerical weight such as 0, 0, 1, 1.5, 2, 3 and 4 respectively. During door to door survey, people are classified into various categories as per the above classification. The number of people in each category is multiplied by the corresponding numerical weight, the products thus obtained for the various categories are added up and the sum total divided by the total number of people surveyed, gives the community fluorosis index. Only when the C.F.I. value is greater than 0.6, fluorosis is considered to be a public health problem in that area. The results of percentage incidence of fluorosis and community fluorosis index obtained for different areas based on this methodology are given in tables 1, 2 and 3 respectively.

### Water analysis for fluorides

For those villages which have C.F.I. > 0.6, all the available water sources are analysed for fluoride by the ion-selec-

**Table 1. % incidence of fluorosis among children**

Area	No. of children surveyed	% incidenc of fluorosis	
		dental	skeletal
Control	420	0	0
Fluorotic area 1	412	30	0
Fluorotic area 2	410	58	0
Fluorotic area 3	420	89	0

**Table 2. % incidence of fluorosis among adults**

Area	No. of adults surveyed	% incidenc of fluorosis	
		dental	skeletal
Control	310	0	0
Fluorotic area 1	308	39	0
Fluorotic area 2	312	64	0
Fluorotic area 3	314	93	34

**Table 3. Community fluorosis index data**

Area	No. of subjects surveyed	Community fluorosis index
Control	730	0
Fluorotic area 1	720	0.83
Fluorotic area 2	722	1.85
Fluorotic area 3	734	3.72

tive electrode method (Fluoride Electrode Instruction Manual, 1977). In the present study fluoride was estimated using an expandible ion analyser EA 920, the fluoride ion selective electrode 9409 and the reference electrode 90-00-01 (all Orion, USA make). Total ionic strength adjustment buffer made from cyclohexylene dinitrilotetracetic acid (CDTA), acetic acid and sodium chloride, is added to the standard fluoride solutions as well as the samples before measurement of fluoride. The instrument is calibrated with two standard solutions so chosen that the concentration of one is 10 times the concentration of the other and also that the concentration of the unknown falls between those two standards. Then, the concentration of the unknown is directly read from the digital display of the meter.

### Mapping the fluorotic area

Based on the results of percentage incidence of fluorosis, community fluorosis index and the fluoride levels of drinking water sources for each village, fluorosis maps for each and every block of a district are prepared. The fluorosis map of a block shows the absence/prevalence of fluorosis in any village of that block. It also indicates the priority village panchayats where drinking water sources contain fluoride greater than 1.5 pm, for immediate attention of the Government to provide alternate safe drinking water supply. From the fluorosis map one can know even the range of fluorides in the drinking water sources of the Priority Panchayats. Fluorosis maps have been prepared for all the blocks of the Dindigul Anna District and these are found to be quite useful by the Tamil Nadu Water and Drainage Board, Government of Tamil Nadu in order to implement the scheme of provision of safe drinking water supply to rural areas on a priority basis.

### References

- Dean, H.T. and Elvove, E., Public Health Report, Washington, 50(1935) 1719.
- Fluoride Electrode Instruction Manual, Orion Research Inc., U.S.A. (1977).