

# IMPACT OF FLUORIDE CONSUMPTION IN PURULIA DISTRICT WEST BENGAL

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**Abstract:** *Safe Water Network India works toward testing and creating solutions for providing affordable drinking water to communities that have health issues relating to water quality problems. To a certain extent (as per WHO; 0.6 ppm) fluoride ingestion is useful for bone and teeth development, but excessive ingestion causes a disease known as Fluorosis. While the WHO standards<sup>1</sup> and BIS: 10500- 19912 permit only 1.5 mg/l as a safe limit of fluoride in drinking water for human consumption. People in several districts in Rajasthan are consuming water with fluoride concentrations of up to 24 mg/l.*

**Keywords:** *Fluoride, Environmental Impacts, Child Development Structure*

## Introduction

Fluorosis continues to be an endemic problem. More and more areas are being discovered regularly that are affected by fluorosis in different parts of the country. Children in the age group of 0 to 12 years are most prone to fluorosis as their body tissues are in formative / growth stage during this period. Expectant mothers are also to be protected, as there is growing concern about effects of fluoride on fetus. Fluorosis, which was considered to be a problem related to teeth, only, has now, turned up to be a serious health hazard. It seriously affects bones and problems like joint pain, muscular pains etc. are its well known manifestations. It not only affects the body of a person but also renders them socially and culturally crippled. In spite of the progressive spread of disease so far no established data exists to determine the extent of disease, no specialized water testing facilities are available and even the doctors do not have specific orientation to correlate the disease with specific symptoms. In these areas the response of the people is reactive rather than pro-active.

## Fluorosis in Purulia:

Fluorosis is a crippling disease caused by regular intake of water contaminated with fluoride. Purulia is also suspected as endemic for Fluorosis. This is because as against the permissible limit of 1.00 ppm (BIS: Bureau of Indian Standard), the level of fluoride in drinking water ranges from 1.1-32.46 ppm around the India. The incidence of disease may be high especially in those areas where the source of drinking water drawn through hand pump, tube wells and deep open wells. As per latest reports 397 villages in the 17 Blocks among 20 blocks in Purulia are facing the problem of drinking water being contaminated with fluoride. Considering the fluoride content of drinking water, the incidence of fluorosis may be high in those sectors where fluoride content of drinking water level ranges from 1.0 to 10.65 PPM. Estimated approximately, more than 1.3 lakhs population are affected as per the latest report concerned in our district.

## STATE ACTION: HOW EFFECTIVE

State action is in Endemic Area of Purulia with regards to reducing malnutrition among Adivasi women. State action for food security in India is essentially about redistribution of social, economic and asset resources where the ultimate goal should be to secure the **poor's actual acquirement of a sufficient amount of healthful** and culturally acceptable food. The actions taken by post-independent India has been a combination of direct support through redistributive state intervention and indirect strategies like economic growth, where the relative emphasis **has swung towards the latter, especially after the 'opening'** of the Indian economy in 1991. Of direct state interventions in food security the Government of India (GOI) has mainly adopted three approaches. The first is price support, where programs like the Public Distribution System (PDS) make certain staple foods such as food-grains and sugar available at **controlled prices through 'fair-price-shops'**. A **second** increasingly more accentuated approach is income support, like food-for-work and employment guarantee programs. The third approach is direct food transfers, like mid-day meals for pupils and the supplementary feeding by the ICDS. In the post-1991 era several programs from the first and latter approaches were cut down, aiming at cost-effective targeting. These moves, especially the reformation of the PDS into the Targeted PDS, where poverty lines became decisive for selection of beneficiaries, were object to scathing criticism. Although the emphasis in this thesis is on the local implementation of the ICDS, the effectiveness of local state action in reducing malnutrition cannot be seen isolated from shifts in other policies affecting the **poor's' entitlements to food**. Nor can it be seen isolated from the fact that most influence over such policies is contested on national and international levels. Several informants, especially state and district level politicians, pointed to insufficient influence over policies relevant to their own constituency.

## Integrated Child Development Structure in Endemic Area of Purulia

The ICDS in Endemic Area of Purulia was used as a reference point to enter the study field of public action against malnutrition. The thesis therefore focuses mostly on the nature of the local level implementation of the program. Table 1.2 gives an overview of central staff involved in the implementation on District level and lower. The presentation below is based on interviews with representatives from all groups listed, with emphasis on the bureaucracy.

Adm Level	Pure ICDS structure	Corresponding Bureaucratic Body	Corresponding Political Body
District	District Programme Officer (DPO) situated in DM Building	District Magistrate (DM)	Zilla Parishad (ZP) Headed By The Sabhapati
Block	Child Development Project officer (CDPO) Situated in Block level ICDS Office. Staff includes ICDS Supervisor, Monitoring the ICDS performance in their respective GPs.	Block Development Officer (BDO)	Panchayet Samity Headed By The Sabhapati
GP	Anganwadi workers (AWW) some place also Anganwadi Helpers (AWH) work site in their respective ICDS centres if any.	Gram Panchayet Officer (GPO)	Gram Panchayet Samity (GPS) Headed by The Pradhan.

**Table 1.2: Main implementing actors of the ICDS in Endemic Area of Purulia**

### Problem Description and Responsibility

While most of the bureaucrats and local elected government leaders interviewed had a relatively good understanding of the causes of malnutrition in the area, weight was given to causes quite difficult to hold anyone but the Adivasis responsible for. For instance, when elites pointed to illiteracy and lack of awareness as a main contributor to Adivasi malnutrition, most **added that these people traditionally had been 'hard to integrate' into services. Some, like the BDO in Raghunathpur, claimed that the "the tribals are not very conducive to development. It is really hard to convince them of new ideas. They often appear as a closed group, not open to outsiders". The BDO did not mean to blame the Adivasis for their own misfortune. However, he downplayed the role the local government could play in claiming that the paternalistic and exploitative way both politicians and administration had approached the Adivasis in the past had created problems for the new emphasis on 'participation'.**

### Environmental Impacts and Mitigation Measures

West Bengal is a small state but because of an interspersed variety of agro-climatic zones, topographical features, altitudinal variation from the sea level to about 3600m in the Himalayas, the floral and faunal resources of the state are diverse. Eight forest types spread all over the state account for 13.4% of its geographical area – mainly in the six districts of Darjeeling, Jalpaiguri, Purulia, Bankura, Paschim Medinipur and South 24-Parganas, but also in patches of three other districts of Bardhaman, Bankura and Coochbehar. The protected area network in the state covers different bio-geographic regions, and includes 5 National Parks, 15 Wildlife Sanctuaries, and 2 Tiger Reserves. Further, the state has 54 natural and 9 man-made wetlands of area larger than 100ha, which in total account for 344,527ha (a substantial area constituting 8.5% of the total wetland area in India), which support substantial floral and faunal diversity. Sacred Groves are more abundant in forested districts where the forest tract is interspersed with traditional tribal settlements, more in the four southwestern Endemic Area of Purulia, West Medinipur, Purulia, and Jalpaiguri; and a few in Darjeeling. In contrast, sacred groves are conspicuously absent in the alluvial districts either side of the Ganga. The study of various health hazards following prolonged exposure of fluoride in Endemic Area of Purulia of South Bengal revealed a wide occurrence of fluorosis, ranging from mild to acute [Bronstein AC 2009]. The concentration of fluoride ions in plasma is directly related to the fluoride content of the drinking water [Kao WF, 2004]. This close relationship has been clearly demonstrated by several authors [Kubota K, 2005].

### Malnutrition In Purulia

District ICDS cell is the nodal agency at the district level which is entrusted with the responsibility of management of interventions related to malnutrition in children. Each child is supposed to be weighed by an Anganwadi worker (AWW). At the district level the malnutrition data comes in two broad categories, viz. 0-1 year, 1-3 years and 3-6 years. Considering **the secondary data that comes to the district periodically, it's difficult to understand the pattern of malnutrition. Malnutrition as in other parts of the country is also a chronic problem in Endemic Area of Purulia. In Purulia more than 90 percent of the children born (both institutional and home delivery) are normal (birth weight more than 2.5kg). It is important to note that malnutrition curve remain constant till the age of 6-7 months. Thereafter the curve represents a sudden decrease of normal children from 90 percent to 30 percent. That means within a period of 11-12 months the percentage of normal children comes down by 60 percent. Once the children reached 17 months of age, the curve stabilize further and don't represent further rise. But the fact remains that even if one feeds the child adequately after 17 months, the condition doesn't improve.**

### Fluoride Contamination in Ground Water Purulia

Fluorine is a fairly common element that does not occur in the elemental state in nature because of its high reactivity. It **accounts for about 0.3 gm/kg of the earth's crust** and exists in the form of fluorides in a number of minerals. Fluoride is found almost everywhere in the environment. It is available in air, water and virtually all foodstuffs. In sea-water, a total concentration of 1.3mg/litre has been reported. In areas rich in fluoride containing minerals, well-waters may contain up to 10mg or more fluoride per liter. Level of daily exposure to fluoride depends mainly on the geographical area. Daily intakes ranging from 0.46 to 3.6-5.4 mg have been reported in several studies. After oral intake, water-soluble fluorides are rapidly and almost completely absorbed in the gastrointestinal tract. Fluorides less soluble in water are absorbed to a lesser degree. Absorbed fluoride is transported via the blood; with prolonged intake of fluoride from drinking water, concentration in the blood is the same as those in the drinking water, a relationship that remains valid up to a concentration of drinking water of 10 mg/litre. In warmer areas like Endemic Area of Purulia, dental fluorosis occurs at a concentration below 1.5-2.0 mg/litre of drinking water, skeletal fluorosis takes place at a concentration of 3.6 mg/litre, crippling skeletal fluorosis develops where drinking water contains over 10 mg/litre of fluoride. A study of samples

tested from various districts is shown in the following table from which it is seen that Purulia has the highest concentration so far as presence of fluoride in ground-water is concerned. It is well established that India has two acute public-health problems induced by utilization of groundwater as a source of drinking water having excess fluoride and arsenic. Fluorine is the most electronegative of all chemical elements and is therefore never found in nature in elemental form. Combined chemically in the form of fluorides, it ranks 17<sup>th</sup> in abundance of elements in the earth's crust representing about 0.06–0.09% of the earth's crust (WHO, 1994).

### Conclusion

Fluorosis in relation to water and urine fluoride content and nutritional status, Schools with “poor” nutritional status showed and the highest fluoride level incidence of water fluoride and urine fluoride content, whereas those with good and fair nutritional status had the lowest. The correlations were statistically analyzed and found to be highly positive. As seen in Tables are given below, a high incidence of dental and skeletal fluorosis was observed for habitual users of high fluoride content water, tea, tobacco., whereas a relatively a very low incidence of fluorosis was observed among users of citrus fruits and ghee. The statistical correlation between the incidence of dental and skeletal fluorosis in users and non-users were also found to be highly positive. I have been visited the schools and surrounding of affected area for screening of Dental & Skeletal Fluorosis. The survey was done by questioner method & Screening method. The test of water-sample and urine taken by me, in polyethilin non fluoride reactive plastic pot has been done the District Fluorosis Control Laboratory, Purulia.

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