

# Domestic Defluoridation

community effort for making drinking water safe

Field Note

Rajasthan

Dungarpur is a hilly district situated in the Aravalli ranges of Rajasthan. The main occupation of the people of this economically backward district, 65 per cent of whom are tribals, is agriculture. The area receives scanty rainfall and groundwater hardly gets recharged, with the result that the fluoride content in water sources has gone up sharply. The fluoride content in the drinking water sources of 150 villages in the district varies between 2 and 8.5 ppm (the safe level being 1.5 ppm). The consumption of such water, combined with a poor diet, deficient in calcium and vitamins (A and C), has led to a high incidence of fluorosis in the district. Fluorosis is endemic in three of the five blocks of Dungarpur, with more than a lakh of the rural population either afflicted by fluorosis or at risk of contracting the disease.

It was in this context that the pilot project of the defluoridation programme in Dungarpur district was implemented in eight villages with assistance from UNICEF. The objective was to pilot and demonstrate a fluorosis mitigation project that was community-based, sustainable and replicable.

This field note documents the experience of the fluorosis mitigation project in Dungarpur district.



## Coverage

8 villages, four each in the Aspur and Dungarpur blocks of Dungarpur district

## Project duration

Pilot project since 1996, extension since 1998

## Cost & cost sharing

Rajiv Gandhi National Drinking Water Mission (RGNDWM), UNICEF and the community

## Implemented by

RGNDWM, the NGOs 'Sarita' and 'SWACH'

## Technology

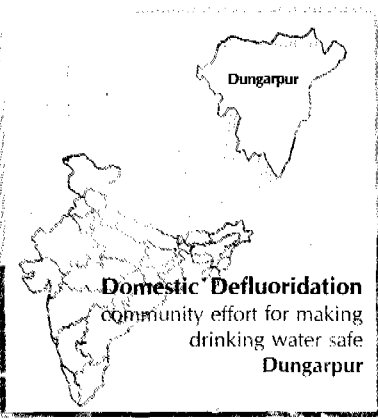
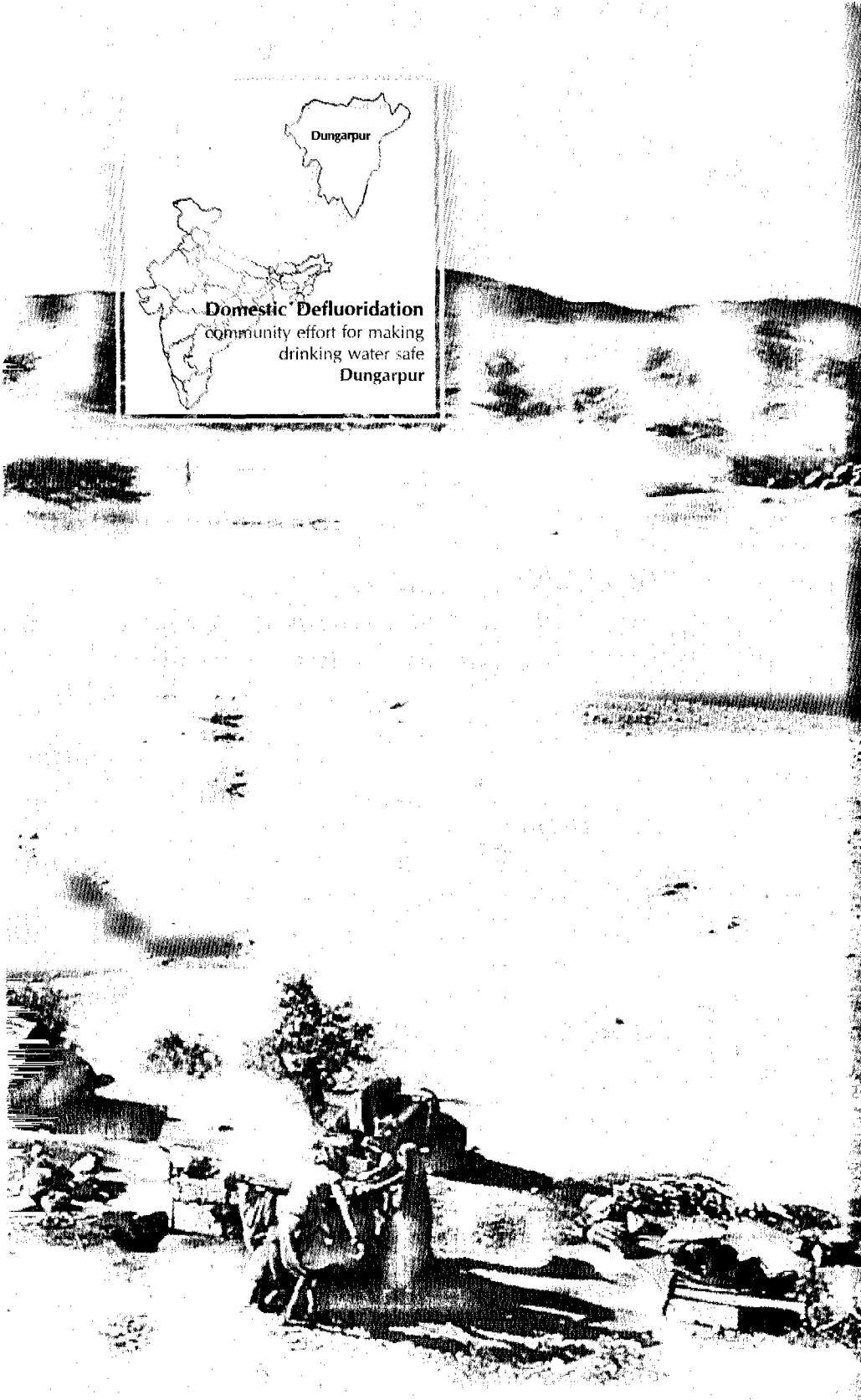
Domestic defluoridation filter units (DDFUs) using activated alumina (AA) and the Nalgonda techniques



UNICEF INDIA COUNTRY OFFICE



822-INRA.97-19103



## Background

Fluorosis is a major problem in Durgapur district, with more than 60 per cent of its villages being affected by the disease. The tribals attributed it to the curse of the local deity and even the doctors in the area were not quite aware of its cause. The task of spreading awareness and involving the people in the defluoridation programme has been monumental.

Initially, eight villages were chosen for the pilot project on the basis of two criteria: (a) the severity of the problem established by epidemiological manifestations and water quality surveys, and (b) the willingness of the panchayats to work closely with the implementing agencies towards creating awareness and promoting cost-sharing among the people.

Since most people were not aware of the reasons for fluorosis and ground water quality issues, information, education and communication (IEC) was recognised as an essential component of the project. The two known techniques of domestic defluoridation (Nalgonda and activated alumina) were tried in the pilot project in eight villages of two blocks.

## Objectives

- To demonstrate the two types of techniques, to identify their merits and demerits and to evaluate their acceptance by the users.
- To enable the community to

## Glossary of local terms

*Gram panchayat*—Village local self-governing body; *Gram Sampark Abhiyan*—Village contact drive; *Gram sevak*—Village social worker; *Panchayat samiti*—Panchayat committee; *Pani*—Water; *Sarpanch*—Panchayat head; *Tantric*—A person who performs black magic.

Villagers walk for miles to reach this water source—Katisore village

operate and maintain the selected technology option.

- To carry out research and development for effective interventions in fluorosis mitigation.
- To strengthen the ability of local NGOs to implement and support the communities.

### Institutional-Level Partners

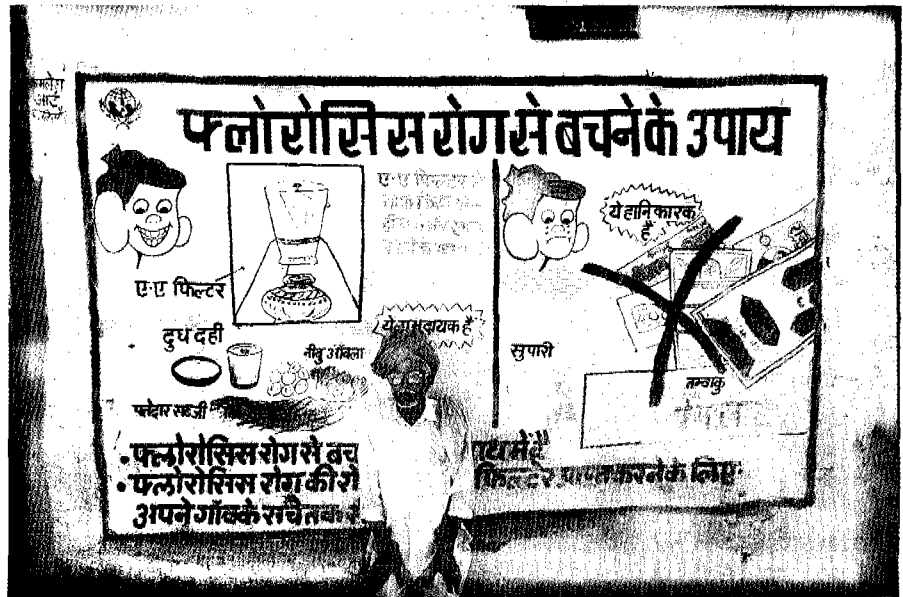
Rajiv Gandhi National Drinking Water Mission (RGNDWM) and UNICEF are implementing the domestic defluoridation pilot project.

Other partners include RNT Medical College, Udaipur, IIT Kanpur, Fluorosis Research and Rural Development Foundation, Delhi, PHED, Health Department and PRIs.

✓ Sarita, an Udaipur-based NGO, has taken charge of two more villages, under an extension of the project.

SWACH (Sanitation, Water and Community Health), an NGO which has done seminal work in southern Rajasthan, especially on eradication of the guinea worm, is responsible for implementation of this project in four villages of the district.

The NGO animators and coordinators work in the villages and are responsible for mobilising and educating the communities. They also follow up with the households after they have adopted the defluoridation units and started using them.



An old man in front of a wall painting depicting the methods of preventing fluorosis—Gehuvara village

### Community-Level Partners People's gram panchayats and water panchayats

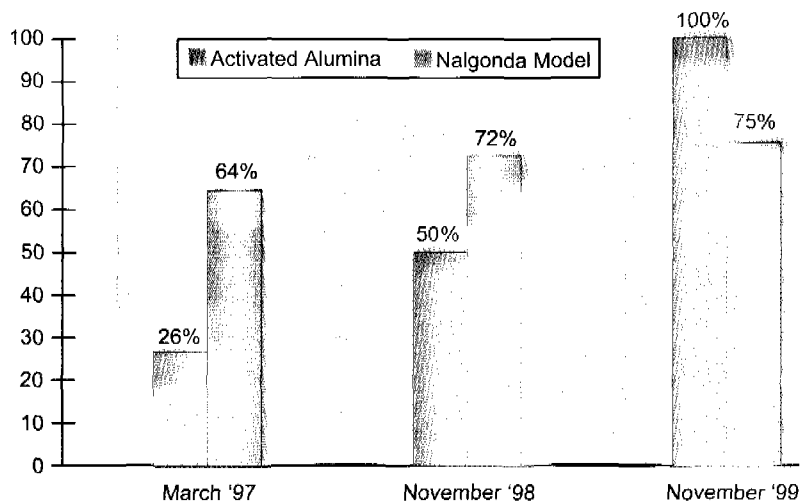
A *pani panchayat* (water panchayat) usually consists of seven members—five men and two women. The members are chosen from among village-level motivators, teachers, anganwadi workers, panchayat members and other active citizens of the

community. They are trained by experts in managing the water resources of the community. The pani panchayats are supported by the users, through monthly contributions.

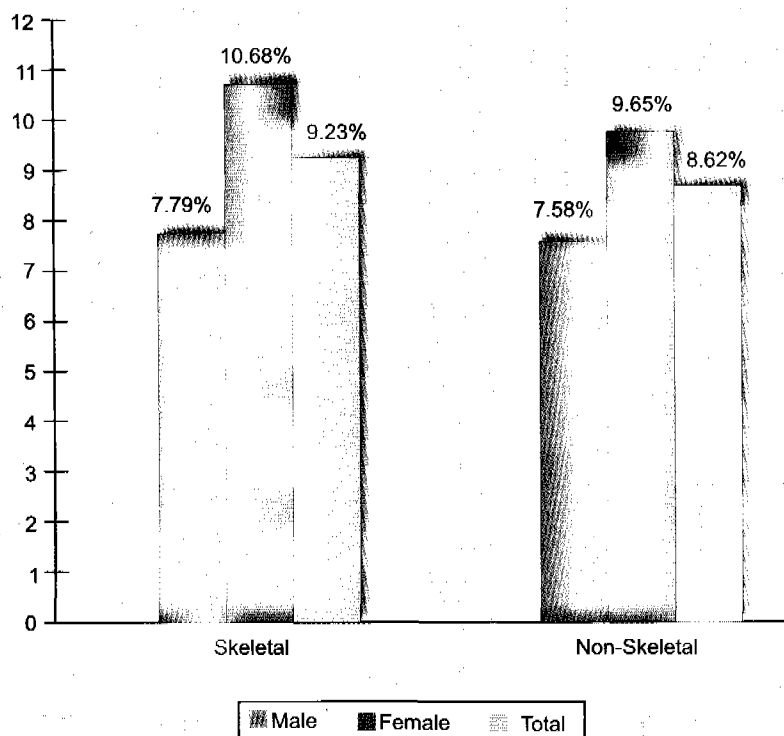
### Project Phasing Planning

As a first step, fresh water samples were collected and analysed for

**Increase in rate of usage of defluoridation units**  
(Based on data from 800 households of Dungarpur district)



## Sexwise prevalence of skeletal and non-skeletal fluorosis in Aspur block



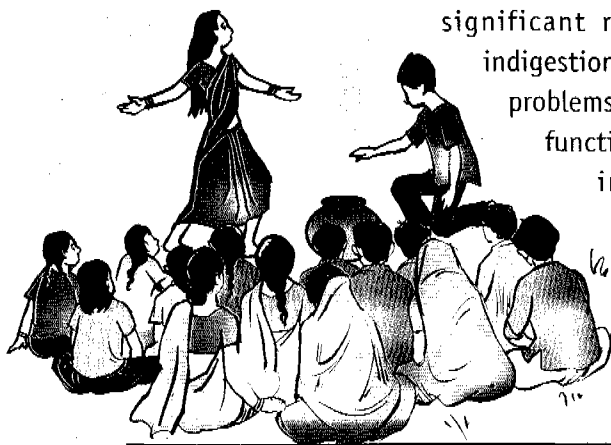
fluoride content in all villages. They demonstrated fluoride content in excess of 1.5 mg/litre as per the water analysis records of the Public Health and Engineering Department (PHED). Such villages were selected where excess fluoride was detected in a majority of the water sources.

Baseline surveys were conducted in each village to mark the quality of each water source and the health status of the community. Water sources were marked on the basis of fluoride content. A team of surveyors who had been trained by a doctor further surveyed each household that used a water source with high-fluoride content. The aim was to detect symptoms of dental, skeletal and non-skeletal fluorosis.

## Now there is a demand

Kamala Bhai Nagda is an animator in Batewar village. His work involves patient and persuasive explanations to break down the decades-old belief that paralysis afflicting the villagers is a punishment by the Gods. He visits the village every day, covering 15-20 houses on an average. Apart from the village contact drives, the animator organises popular public events such as puppet shows and street theatre. He is convinced that the project has made a big difference in the village. The community is already demonstrating the favourable impact of reduced fluoride ingestion. There has been

significant reduction in complaints of indigestion, joint pains and other related problems. He says that now the project functionaries have to cope with an increasing demand for the domestic defluoridation filter units (DDFUs), while earlier they spent more time persuading the people to adopt the DDFUs.



A meeting was called in each of the surveyed villages. The results of the survey were shared with the people and their feedback obtained. The cause of the disease and the measures to be taken for preventing its spread and reversing it were discussed. Given the alternatives, the community, as a whole, had to be willing to adopt the system, to pay part of the capital cost and the entire operation and maintenance costs of the defluoridation measures. Villages prepared to bear these costs were identified for implementation of the domestic defluoridation techniques.

District, block and village-level meetings were subsequently held

## First for the filter

A teacher at the Katisore higher secondary school, Ganeshlal Sharma is also the treasurer of the *pani panchayat*. He says that the involvement of schools in awareness generation campaigns has had a favourable impact on the community. Parents and elders have a tendency to listen to their children! The first filter in the village was installed in the school.

He is a proud activist of the *pani panchayat*. There are monthly meetings, which are open to everybody from the village. His own personal experience tells a convincing story of relief and recovery from skeletal fluorosis. Just two years after adopting the use of the filter, the symptom of loss of sensation in his left foot has almost disappeared.



Ganeshlal Sharma has adopted a filter for drinking water—  
Katisore village

in the identified villages to plan for the project and its implementation. Block-level orientation meetings were held in each block and these were attended by ward officials, sarpanchs, members of Panchayat samitis, Block Development Officers (BDOs) and other block-level development functionaries.

### Implementation

The first 10 months of project implementation were dedicated to the primary task of spreading awareness in the community regarding the cause of fluorosis and the means of fighting it. This was not an easy task, considering the low literacy level and the community's traditional beliefs. The NGO team focused on getting to know

the community better and identifying their problems.



A wall painting showing the symptoms of fluorosis—  
Palmandav village

The district panchayat leaders were used to reach out to the community. The tribals held monthly meetings to discuss their problems. Grassroots level workers of the NGOs utilised these meetings to disseminate information on defluoridation techniques.

### Development of IEC Materials

Slogans in Hindi for use in village contact drives and for writing on walls were developed. Audio cassettes were prepared with songs based on popular folk tunes, with messages on fluorosis and its control.

Door-to-door campaigns were conducted. Puppet shows, street plays, cultural shows and awareness campaigns, in which school children played an active

role, were organised. Wall paintings and posters were also used.

### Early Detection of Fluorosis

A module for early detection of suspected fluoride toxicity manifestation was developed for use in hospitals by the Fluorosis Control Cell functioning till July 1997 at the All India Institute of Medical Sciences (AIIMS). The development of the module was funded by RGNDWM. The doctors were guided to look for the following early manifestations:

- Aches and pain in the joints, viz. neck, back, hip, shoulder and knee joint without visible signs of fluid accumulation
- Nausea, feeling of vomiting, pain in the stomach, gas formation in the stomach, constipation followed by diarrhoea.
- Frequent tendency for urination and excessive thirst.



A woman using an AA filter

## Saying it with dance and drama

A theatrical demonstration of the misconceptions about fluorosis, its causes and treatment is a frequent event in the village squares of Dungarpur district. Ever since the project began, these street plays have been staged many times over. A typical theme played out for the audience begins with songs that contain information on the affliction, its implication and cure. The language is the local dialect.



Gram Sampark Abhiyan at Chhapra village

The drama then unfolds with a fluorosis patient developing stiffness all over his body and inability to move. The *tantric* (witch doctor) goes into a frenzy of rituals to remove the affliction through spells and magic. He earns a heavy fee, one that the patient can ill afford, but the affliction does not go away. The village animator then informs and educates the patient, who adopts the use of a filter. Sure enough, he is on the way to being cured. The *tantric* is served a just punishment and the family of the patient rejoices!

- Muscle weakness, loss of energy, anaemia with very low haemoglobin levels
- Repeated abortions/stillbirths in females and complaints of male infertility

### Training Programmes

- A two-day orientation-cum-training camp was held for village animators (one in each village) and for supervisors/coordinators.
- A one-day orientation-cum-training camp for about 5-10 workers from each village (teacher, health worker, gram sevak, anganwadi worker, etc.), was held. In this camp, the use of the defluoridation equipment was demonstrated

and comprehensive orientation regarding the disease, its causes and treatment was imparted. This preceded the distribution of the defluoridation equipment.

- A two-day training camp was held to demonstrate the regeneration of AA filter media, for three persons from each village (an animator, a teacher and one person who should have studied science at least up to the secondary level).
- Before the defluoridation units were distributed, awareness camps were organised in each village to demonstrate their use.

Medical camps were organised in the project villages. People from the adjoining villages also participated in these.

### Contribution Towards Cost and Providing Regeneration Facilities

Initially, filters were distributed at a subsidised rate of Rs. 50 for SC/ST households and Rs. 100 for others. However, later the subsidy was reduced to instill in the users a sense of ownership that would motivate them to get involved in the maintenance of the filters. The new prices were Rs. 200 for SC/ST households and Rs. 400 for others. At present, there are three options of AA filters at the Fluorosis Mart in Dungarpur. The costs are Rs. 700, Rs. 750 and Rs. 1,600, respectively, depending on the type of containers. Only the cost equivalent of 5 kg or 3 kg activated alumina is provided to



Gram panchayat members of Aspur discuss project activities

BPL families. This subsidy will be further reduced as follows:

- For Nalgonda: Rs. 3 for a packet of alum and lime, which will last about a month. The market price for distribution of the lime and alum packet will be Rs. 6.
- For AA: Rs. 10 for regeneration,

which should be done once every three months. The actual cost of regeneration is about Rs. 6 for the material and about Rs. 10 for labour. However, if it is to be made self-sustaining, the charges will have to be increased to Rs. 20 per regeneration.



School children of Harhmatia village cheer their school's achievements in sanitation



## What made the difference

Navi Kaki, a 40-year-old woman of Chhapra village remembers her early years in the village as a young bride. Despite a completely healthy and robust physique at that time, she started suffering from body aches, which got progressively worse till she became bent 90 degrees forward.

When project workers explained the reasons for the symptoms, she opted for an AA filter at Rs. 200, one of the first in the village to do so. Navi Kaki has found great relief from pain and further debilitation ever since she and her family began using the filter. Paying Rs. 200 for an AA filter has saved her from worse deformation and degeneration.



Navi Kaki of Chhapra village

### Achievements

A tangible achievement of the project has been that around 4,400 AA filters are being used by households and schools in the project area. Low cost and affordable models of AA filters have been standardised—three options of the filter are available. The

community is bearing the full cost of operation and also managing the maintenance and regeneration in a sustainable manner. This is nothing short of a revolution, considering that before 1996, even the doctors in the area were not aware of the cause of fluorosis.

The project has been extended to 243 villages. The state government has appointed a committee for fluorosis mitigation and this has become a state-level priority, due to UNICEF's continuing advocacy and promotion of fluorosis mitigation interventions.



Fit for drinking—Rebo Devi of Gehuwara village pours water into a filter

### Key interventions

- Community mobilisation and effective IEC activities on awareness on fluorosis, need for change in food habits, multiple use of water sources for consumption and other purposes
- Mapping of fluorosis-affected areas and communities
- Mapping of water quality in the affected areas
- Pre- and post-medical check-ups to find out key health impacts
- Capacity building and institutional strengthening at all levels
- Research and development
- Introduction of household defluoridation filters and support to community-based operation and maintenance systems