

A Case study on Community Decision Making to Combat Fluorosis in Mae–Son, Thailand

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SUMMARY: Mae–Son subdistrict, is a fluorosis area in the northern part of Thailand. In March 1999, a dental health team from the Intercountry Centre for Oral Health, ICOH, checked the fluorosis occurrence in the area and introduced education materials for the community. The people began to learn how to prevent fluorosis by consuming low fluoride drinking water and wanted to solve their problem. Some villagers went to ICOH to study how to build a bone–char kiln and how to reduce the high fluoride concentration in the drinking water by using the bone char filter. Then they learned about alternative options including long term hydrogeological provision of remote water sources. Finally they decided to go for immediate building of household rainwater tanks.

Key words: Community, decision making, fluorosis, problem solving, Thailand, rainwater collection, bottled water, remote sources.

INTRODUCTION

Study area. Mae-Son is a Subdistrict in the Hang-Chat district, Lampang Province, Thailand. It is about 8 km on the eastern side of the Chiangmai–Lamgpang road. Most of the land is paddy. Some areas are hilly and wooded. There is a hot spring about 2 km from Mae–Son. There are 7 villages in Mae-Son populated by 4,486 people in 1,153 households¹. Most of the Mae-Son native people are farmers. 40 % of the population are poor. The average income is 18,000 baht per household per year². One of the Mae-Son villages has been affected by fluorosis for a long time. At that time they used to drink water from shallow wells. During 1983–1985 the government set up 6 pipe-water systems for 7 villages. Then people stopped using the shallow wells and started using the pipe-water, which they trusted was more pure and comfortable in use.

Affected children. In the past five years, dental fluorosis was observed increasingly in children in 3 villages. A boy, 15 years old, did not drink the pipe-water and had normal teeth. His sister, 12 years old, has been drinking the pipe-water but got dental fluorosis. Many children, about 45 %, had moderate to severe degree of dental-fluorosis. They called the dental fluorosis *Kiaw-Lai*, which means the striped teeth. In March 1999, dental health staff from the Intercountry Center for Oral Health, ICOH, came to the subdistrict and introduced new educational material about fluorosis³.

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People learned about the cause of dental fluorosis and how to prevent it by reducing the fluoride concentration in the drinking water.

Community problem. The community wanted to solve the fluorosis problem and, through the schoolteachers, requested assistance from the subdistrict committee under the local government. There are various options in solving the problem and the decision of the committee would affect the villagers' daily life in the future.

Study objective. The aim of this study was to explore the decision making process in Mae-Son, how and why people choose options to solve the fluorosis problem. This would be helpful in any project aiming at solving the fluorosis problem, as well as in projects aiming at solving other community health problems.

Materials and Methods

Three groups of people in the community were interviewed. These are the local people's organisations, the local leaders and the government officers. Also local people were interviewed and children's teeth were examined.

Moreover data from the surveys and reports of the provincial fluorosis solving committee are utilised.

Results

Occurrence of fluorosis. An oral health survey using Dean's Fluorosis Index⁴ in 12–14 years old children was set between July–August 2000. The data showed that 37.9 % of children have severe dental fluorosis, 7.3 % have moderate dental fluorosis, 15.3 % have mild dental fluorosis and 13.7 % have very mild fluorosis. The community fluorosis index, CFI is 2.2, cf. Table 1. Some children, who have severe fluorosis, polished their anterior teeth with glass-paper, to remove the brown stain. Some of them lost their self-confidence. They do not want to speak with strangers, being afraid to show their teeth.

TABLE 1. Dean's Fluorosis Index of 12 – 14 years children in Mae-Son subdistrict, 2000.

Fluorosis status	persons, f	%	Weight, w	f · w
Normal	14	11.29	0	0
Questionable	18	14.52	0.5	9
Very mild	17	13.71	1	17
Mild	19	15.32	2	38
Moderate	9	7.26	3	27
Severe	47	37.90	4	188
Total	124	100	-	279

Fluoride in water. In February 2000, the Environmental Health Center Region 10, reported that 3 out of 6 village pipe-water systems in Mae–Son had a high fluoride content⁵, cf. Table 2. Furthermore, all villages operated the pipe-water systems with poor revenue. Most of the equipment in the systems, e.g. water pumps, filters, etc, needed repair. Also there was a lack of personnel to maintain the schemes.

TABLE 2. Village Pipe–water system in Mae–Son subdistrict, in February 2000.

Village	Size	Source	Capacity, m ³ /hr	Households	mg F/L
1	Large	Artesian well	12.0	156	10.0
2	Medium	Artesian well	10.0	129	4.6
3	Large	Artesian well	10.0	270	0.2
4	Medium	Artesian well	7.3	185	8.5
5	Medium	Shallow well	7.0	132	0.3
6	Large	Shallow well	7.2	149	0.14

Not only the village pipe-water had a high fluoride content, also the school pipe-water had fluoride concentration of 11 mg/L. The principal of Mae–Son secondary school observed that many students suffered from dental fluorosis. She informed the subdistrict committee and the committee agreed that fluorosis is their community's problem. They knew many of their children had mottle enamel or brown stained teeth. They tried to find ways of solving this problem. In April 1999 the subdistrict committee, teachers and some villagers visited ICOH in Chiang Mai to learn more about fluorosis and defluoridation of water. They also visited some villages in Chiang Mai and Lamphoon to see how they had solved the problem there.

Defluoridators. The villagers then set up a plan to build a bone-char kiln costing 100,000 baths. They also planned to make household defluoridators to supply people in three villages. They thought that bone-char defluoridators were the best answer to their problem. They asked for funds from the subdistrict health office. This office forwarded the request to the Provincial Health Office, which then asked for technical assistance from the Health Department in Bangkok. This resulted in involvement of several groups and several discussions on how to attack the problem. In September 1999 it was proposed to the subdistrict committee to focus on alternative ways to solve the problem through people's participation. The subdistrict committee abandoned the original plan to build a bone-char kiln for three reasons: A) Lack of funds B) Lack of personnel to work with the kiln and C) Experiences on bad odour from the kiln during operation.

Pipe schemes. An alternative plan was set, based on development of the village 3 pipe–water system to sell low fluoride water to other villages. The subdistrict

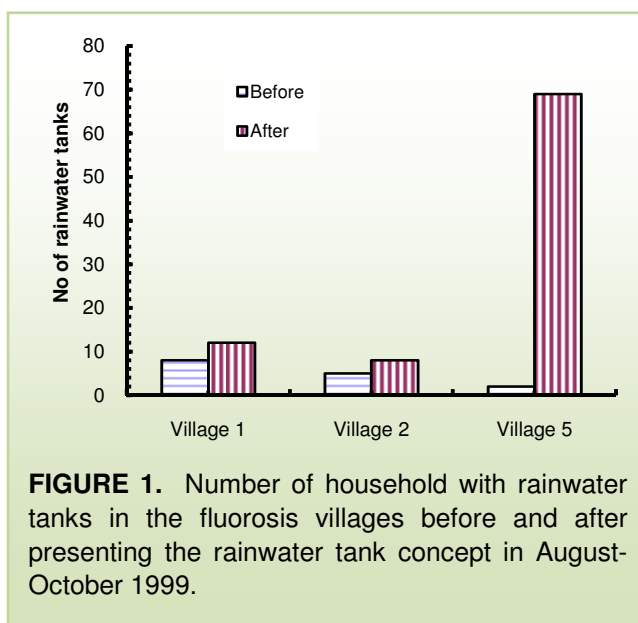
committee wanted to sell union water shares to people in village 3 and villages 1, 2 and 5. People in village 3 should hold most of the shares. The other villages would hold less. The profit from selling pipe–water would be distributed to everyone who held share at the end of the year. When the committee purposed this plan to the village 3, the community did not agree. They were afraid that the water supply would not be enough for all villages. They set up water collection sites with meter for each neighbouring village. The neighbouring villagers could collect the water and pay according to recorded consumption. But only few people came to fetch the water.

The subdistrict leader discussed with the chairman of the subdistrict committee and the subdistrict health worker to ask other government offices for help. The Geological– Resources Department came to sink 4 artesian wells in three of the villages. All four wells had high fluoride content. Their hope to get a safe water supply vanished, but they did not give up. They asked the Irrigation Department to sink another three wells. Two of these wells had a low fluoride content, but one well was remote, 0.5 km from the system. The other was about 1.5 km from the system, and the electricity did not extend to this area. So they needed funds to make a pipeline and a water pump. The Provincial Health Office suggested that they could draw up a budget for the pipeline for the next year, 2001.

Rainwater tanks. When the subdistrict committee found that constructing the pipe–water system was a long-term plan, they started to think that household rainwater tanks might be a better option. A rainwater tank costs 5,000 baht or US\$ 200, thus unaffordable to some villagers. The committee agreed to provide 1,000 baht for every household that built a rain–water tank, but the government officer in Hang-Chat district said that the law does not permit for such arrangements.

Different households in village 1, 2 and 5 took immediate action and installed rainwater tanks on their own. 74 household rainwater tanks were set up within 3 months. This corresponds to only 16.7 % of households. The subdistrict committee planned to build 99 m³ water tanks for each village in 2001. These tanks can store rainwater or water from other sources for the villages. It is hoped that this would solve the problem for the other 83.3 % households.

The committee also asked the owner of shallow wells that have low fluoride water to



clean their wells and share with other people. Because people believe that generosity with water brings health, wealth and happiness, the owners of the wells were happy to share their water with their neighbours. But water from shallow wells is microbially contaminated. The health worker advised the people to boil the water before drinking. But people did not like to drink boiled water they preferred raw water, which they thought tastes better.

Bottled water. While the subdistrict committee planned to build a community water tank for each village in 2001, people started to help themselves. Some of them bought a cement jar. Some of them bought bottled water for daily drinking, because they can buy bottled-water easily and pay a small price at a time, even if it is more costly in the long run, compared with both pipe-water and rainwater. The Thai standard fluoride level in bottled water is 1.5 mg/L in agreement with the WHO guidelines of 1984⁷. There was a study showed that the optimum level of fluoride content in water for Thais was 0.5 mg/L, which would not create Dental Fluorosis⁸. Previous investigations have shown that 11.72 % of the bottled water in this area is above 0.5 mg/L⁹, so people are still at fluoride risk when using the bottled water.

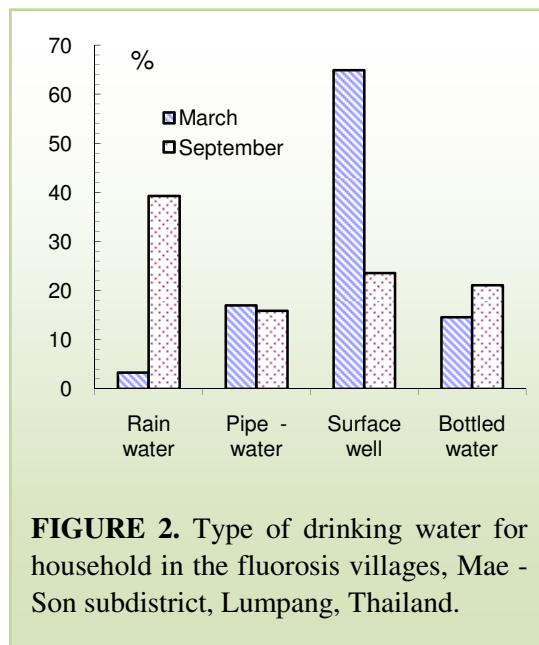


FIGURE 2. Type of drinking water for household in the fluorosis villages, Mae - Son subdistrict, Lumpang, Thailand.

CONCLUSION

Multiple options. There are many alternative ways of solving the problem of high fluoride content in drinking water. People make their own decision, depending on their affords, their knowledge, their values and their culture. The subdistrict committee may not be able to make the most suitable decisions for the villagers. It is the responsibility of the health teams to inform the people as much as possible about the options so they can select their own ways to deal with the problem. The technology to detect and to reduce the fluoride in drinking water should be simple enough to be handled by the villagers and easy to find in the market. The national standard of fluoride in drinking water should be low enough to protect people from fluoride toxicity.

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