

Oral Health information for the Invercargill City Council

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In response to issues raised by the Council on fluoridation of community water supplies Public Health South would be happy to host a workshop for the Councillors to further discuss oral health issues in Invercargill.

Fluoridation of community water supplies

1. **Is there is any local data that clearly shows a difference in the oral health of people in areas with fluoridated compared to non-fluoridated water supplies? What is the prevalence of fluorosis (white spots on teeth) and its significance?**

Southland/Invercargill

A study was conducted in Southlandⁱ in 2002 that examined fluorosis and dental caries in 9 and 10 year-old children living in fluoridated Invercargill and the non-fluoridated towns of Gore, Winton and Queenstown. 436 children (mean age of 9.8 years) were examined.

Fluorosis was more frequent among children who had lived all their lives in a fluoridated. 29% of children who had continuous exposure to fluoridated water had fluorosis compared to 14% who lived in non-fluoridated areas. Most of the fluorosis affected less than one-third of the surface of the teeth. This study showed that the prevalence of fluorosis on teeth among children who have lived their whole lives in a fluoridated area has not increased compared to earlier studies conducted in New Zealand.

The benefits of water fluoridation as a public health measure remain. Children continuously exposed to fluoridated water during their life having **half the dental caries** (holes in teeth) experience of those who have not.

The trade-off between improved oral health and the presence of fluorosis in one-third of children (instead of the one-fifth of those who did not reside in fluoridated communities up until the age of four) appears to be a worthwhile one from the dental public health perspective.

This study from Southland showed that children in fluoridated areas had half the number of holes in teeth compared to children in non-fluoridated areas. This came at a 'biological price' of more mild fluorosis for children drinking fluoridated water.

Dunedin

A very recently published studyⁱⁱ compared the oral health of children who needed a general anaesthetic for dental care living in areas with fluoridated water compared to non-fluoridated water

in the greater Dunedin area (comparing Dunedin with Mosgiel). They reported that on average, children from low-fluoride areas were 2.4 months younger and presented with more decayed primary teeth than those from fluoridated areas (4.9 and 3.9 teeth respectively; $p < 0.0001$). For each tooth type, the mean number of teeth with caries at presentation was greater among the children from low-fluoride areas. The number of primary teeth affected by caries was lower among older children, those residing in a fluoridated area and among those seen after 2001. It was higher among those living in lower socio-economic areas.

This study shows that children in the Dunedin community had significantly fewer dental lesions if they lived in a fluoridated area. Conversely children in non-fluoridated areas had more severe dental problems and at a younger age.

2. Is there any clear evidence that fluoridation of community water supplies improves the oral health of the population in New Zealand and internationally?

The benefits of community water fluoridation are most pronounced for those at risk of poor oral health. In New Zealand, Maori and Pacific people and people living in more deprived areas experience poorer oral health outcomes compared to other New Zealanders. Fluoride provides health benefits that targeted oral health schemes cannot replicate. Its effects are in addition to measures promoting regular brushing and good diet.

Research into fluoridation has been conducted around the world for many years. Although research questions remain, the weight of scientific evidence supports community water fluoridation as a safe and cost-effective method of improving oral health. Community water fluoridation benefits individuals throughout their lifespan, this is of increasing importance now that more people are retaining their own teeth into later life. There are currently no other options which can compete with community water fluoridation in terms of population coverage and overall clinical effectiveness. Community water fluoridation is supported by a wide range of national and international authorities.

For medium to large populations the cost-effectiveness of fluoridation is established.

Recent review articleⁱⁱⁱ reviewed results of studies published worldwide since 1990 to review the effectiveness of adjusted fluoridation of public water supplies in the prevention of dental caries. Caries reduction for primary (baby) teeth was 30-59%, and for permanent teeth was 40-49%. Studies from New Zealand that were adjusted for confounders reported caries reduction of 10-50%. A study conducted in Invercargill (2002)ⁱ reported a caries reduction in primary teeth of 33% and in permanent teeth of 50%.

These scientific reviews from around the world and New Zealand have consistently found that people who live in areas where water is fluoridated have fewer dental caries (holes in their teeth) compared to those in non-fluoridated areas.

A study conducted in the United Kingdom to assess reduction in 'suffering' due to fluoridation, such as the occurrence of abscesses, toothache, and general anaesthetics for tooth extraction^{iv}.

	Fluoridated	Non-fluoridated
% with 1+ abscesses	0%	5%
% ever had toothache	17%	38%
% ever had GA for dental extraction	7%	22%

They found that those people living in fluoridated areas had significantly fewer tooth abscesses, toothache and need for tooth removal by general anaesthetic.

3. Is fluoridation of community water supplies “mass medication”?

The established legal and ethical position in New Zealand is that individual consent in relation to fluoridation of community water supplies is not required. This makes it especially important that due process is followed in relation to consulting with local communities and in decision-making bodies considering fluoridation of water supplies.

The Health Act permits local councils to make decisions which have a direct bearing on the health of their communities and this includes decisions on the fluoridation of community water supplies.

Public Health South is available to provide information and support to bodies engaged in a decision making process in relation to the fluoridation of community water supplies.

4. Is there a link between fluoride intake and arthritis?

There is an association between very high fluoride intakes and skeletal fluorosis. An intake of at least 10 mg of fluoride daily for 10 years seems necessary for “preclinical skeletal fluorosis”. This is considerably higher than people would consume through drinking fluoridated water and brushing teeth with fluoridated toothpaste at the levels recommended in New Zealand. For adults in New Zealand the normal amount of fluoride ingested per day through diet and drinking fluoridated water is about 2.0 to 2.5 mg/day. If they also use fluoridated toothpaste there would be an additional 0.1 to 0.3 mg/day giving **an average total amount of up to 2.8 mg/day** – well below the upper limit of 10 mg/day^v.

5. How much fluoride do we normally consume through food and water in New Zealand?

A study was commissioned by the Ministry of Health and undertaken by the **Institute of Environmental Science & Research Limited** (ESR) in 2009^v to estimate dietary fluoride intakes for a range of age and gender sub-populations based on New Zealand data. The aim of this study was to identify for further investigation any groups at risk of high exposure to fluoride.

Average and 95th percentile (highest level) estimations of dietary fluoride intake were well below the recommended upper level of intake (UL) when intakes were calculated on the basis of a non-fluoridated water supply for all age and gender groups. **The corresponding estimated dietary intakes, calculated on the basis of fluoridated water supply containing the maximum**

recommended fluoride concentration were also below the UL, with the exception of estimates for a fully formula-fed infant.

The Ministry of Health promotes breastfeeding as the best source of food for infants. The Ministry of Health recommends that New Zealand mothers breastfeed their babies exclusively for the first six months of life, with continued breastfeeding until at least 12 months of age. If babies are not breastfed, the Ministry of Health recommends that an infant formula is used until 12 months of age.

For the small number of children who are exclusively formula fed for the first six months of life and where the formula is made up with fluoridated water from any source, there is a theoretical risk that the cumulative fluoride ingestion will exceed the normal recommended limit. The consequence of the fluoride ingestion which would occur in such a situation is an increased risk of mild fluorosis (mild white spotting on teeth) which has no impact on tooth structure, function or health, and aesthetically is of no consequence.

The number of children in Invercargill who are potentially at risk from this situation at any one time is likely to be small assuming 6 months to weaning and based on current breast feeding rates.

In New Zealand fluoride is not permitted as an additive to infant formula marketed here. The upper level of fluoride intake is set as the average safe upper level if consumed at that amount daily. The upper limits are averages over 6-month periods when infants will be consuming varying volumes of breast milk, formula and/or food.

There are recommendations elsewhere in the world that infants who are exclusively formula fed should have formula constituted from non-fluoridated water. These recommendations have been considered by the Ministry of Health however they have not been adopted in New Zealand as it is not considered to be a safety issue. The Ministry of Health will continue to monitor the issue.

The benefits of improved oral health arising from water fluoridation accrue to anyone in the population who has their own teeth and this increasingly includes older people.

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ⁱ Mackay T, Thomson M. Enamel defects and dental caries among Southland children. *New Zealand Dental Journal* 101, No. 2: 35-43; June 2005.

ⁱⁱ Kamel MS, Thomson WM, Drummond BK. Fluoridation and dental caries severity in young children treated under general anaesthesia: an analysis of treatment records in a 10-year case series. *Community Dental Health* 2013, 30(1):15-18

ⁱⁱⁱ Effectiveness of water fluoridation in caries prevention. Rugg-Gunn AJ. *Community Dent Oral Epidemiol* 2012; 40 (Suppl.2): 55-64

^{iv} Rugg-Gunn AJ, Carmichael CL, French AD, Furness JA. Fluoridation in Newcastle and Northumberland: A clinical study of 5-year-old children. *Br Dent J* 1977;142:375-402.

^v Estimated Dietary Fluoride Intake for New Zealanders. Institute of Environmental Science & Research Limited, 2009.