

**IN THE HIGH COURT OF NEW ZEALAND
NEW PLYMOUTH REGISTRY**

CIV-2013-443-107

UNDER THE Judicature Amendment Act 1972 and Declaratory
 Judgements Act 1908

IN THE MATTER of an application for judicial review and an application for
 declaration

BETWEEN **NEW HEALTH NEW ZEALAND INC**

Plaintiff

AND **SOUTH TARANAKI DISTRICT COUNCIL**

Defendant

**AFFIDAVIT OF ROBIN ANDREW WHYMAN ON BEHALF OF THE
DEFENDANT**

AFFIRMED 8 October 2013



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I, **Robin Andrew Whyman** of Napier, Clinical Director Oral Health, solemnly and sincerely affirm:

Introduction and profile

1. I hold the following qualifications:
 - (a) Bachelor of Dental Surgery (BDS, 1986); and
 - (b) Master of Community Dentistry (MComDent, 1993).
2. I am a Fellow of the Royal Australasian College of Dental Surgeons holding fellowships by examination in both general dentistry (FRACDS, 1991) and dental public health (FRACDS (DPH), 2011).
3. I hold honorary Fellowships with the International College of Dentists and the Academy of Dentistry International. I am an honorary life member of the New Zealand Dental Association.
4. I am registered with the New Zealand Dental Council as a dental specialist in public health dentistry and as a general dentist.
5. I have been practising dentistry for 26 years. I practised in hospital-based dental house surgeon positions in 1987 and 1988 and then practised in general dental practice in Melbourne. I returned to the University of Otago as an assistant lecturer and registrar in hospital dentistry in 1990 and undertook postgraduate training in community dentistry (dental public health) between 1991 and 1993.
6. I was appointed a Lecturer in Community Dentistry at the University of Otago following postgraduate training and remained until 1995. In late 1995, I was appointed clinical director of dental services at Capital Coast Health. I was the Wellington regional director of dental services for Capital Coast Health and Hutt Valley Health between 1997 and 2000.
7. I have been Executive Director of the New Zealand Dental Association (2000-2003), General Manager, Clinical Services Dental Health Services, Victoria (2003-2004), dental specialist (dental public health) Hutt Valley District Health Board (2004-2012) and concurrently Chief Dental Officer, New Zealand Ministry of Health (2005-2009).

8. I am currently (since January 2013) Clinical Director of Oral Health Services at Hawke's Bay District Health Board and Principal Dental Officer Whanganui District Health Board.
9. I am engaged as an advisor to the National Fluoridation Information Service, which is operated by Hutt Valley District Health Board under a contract with the Ministry of Health, to provide authoritative, accurate, and up-to-date sources of information and critical commentary on research pertaining to water fluoridation.
10. I am clinical leader for the dental services of my employing District Health Boards. I am engaged in specialist dental public health practice including research and public health dentistry projects involving equity of access to oral health services, improving child oral health outcomes, water fluoridation, clinical leadership, and quality improvement for dental services. I am also engaged in hospital-based clinical practice focussed on paediatric dentistry, special needs dentistry, and general dentistry for high need patients.
11. I am currently an appointed member of the New Zealand Dental Council, the New Zealand councillor and treasurer for the Royal Australasian College of Dental Surgeons, and a member of the New Zealand Dental Association Dental Research Foundation Board.

Scope of evidence

12. The defendant has asked me to give an expert opinion on whether:
- (a) the fluoridation of water supplies to levels between 0.7–1.0 parts per million (ppm) could be said to constitute medical treatment; and
 - (b) water fluoridation is an effective, safe and proportionate response to the problem of dental caries.
13. I have read, and agree to comply with, the Code of Conduct for Expert Witnesses set out in Schedule 4 of the High Court Rules.

14. I understand that I have an overriding duty to assist the Court impartially on relevant matters within my expertise.
15. I confirm that the issues which my evidence addresses are within my area of expertise.
16. I have personal knowledge of the facts and matters set out in this affidavit. I have read the affidavits of:
- (a) Associate Professor David Menkes;
 - (b) Emeritus Professor Martin Ferguson; and
 - (c) Patrick Sloan.
 - (d) Professor John McMillan;
 - (e) Dr Gregory Simmons;
 - (f) Dr Sandra Pryor;
 - (g) Howard Wilkinson;
 - (h) Dr Stewart Jessamine; and
 - (i) Dr Robyn Haisman-Welsh,

filed or to be filed in these proceedings.

Summary of evidence

17. In my opinion, community water fluoridation:
- (a) is properly described as the introduction of a chemical supplement into the water supply and is not "medical treatment"; and
 - (b) is effective at reducing dental caries, and is a safe and a proportionate response to the problem of dental caries.

Underlying facts and assumptions

18. Fluoride is a naturally occurring chemical element which is ubiquitously present in the environment. It is present in most water supplies. The level of naturally occurring fluoride levels in New Zealand tends to be low, usually between 0.1 to 0.3ppm in most freshwater supplies.

19. Community water fluoridation is the process of adjusting the concentration of fluoride in drinking water supplies to between 0.7 and 1.0ppm which has been established as a level beneficial to oral health by being the optimal level to provide protection against dental caries.^{1, 2}
20. The term community water fluoridation distinguishes discussions about the adjustment of fluoride levels in drinking water to an optimal level to prevent dental caries from discussions of endemic fluorosis (due to naturally high fluoride levels in drinking water sources) and from discussion of other fluoridation programmes (eg salt, milk).³
21. In this affidavit, I have used the term water fluoridation to refer to community water fluoridation.
22. In other countries, naturally occurring fluoride concentrations in water can occur at varying levels above, below, and at the level beneficial to oral health.
23. The concentration of fluoride is frequently referred to in parts per million (ppm), but sometimes as mg/L. These concentrations are the same, and both are used in publications. In this affidavit, the concentration of fluoride is consistently referred to as ppm, even when the source document may have referred to mg/L.
24. Dental caries is a common health condition in the New Zealand population. The 2009 New Zealand Survey of Oral Health⁴ conducted by the Ministry of Health confirmed that 41% of children aged 2-11 years had experienced dental decay in their primary teeth, and 39% of children aged 5-17 years had experienced dental decay in their permanent teeth.
25. The 2009 New Zealand Survey of Oral Health⁵ also confirmed that adults and children who lived in fluoridated areas had lower experience of

1 Ministry of Health "Water fluoridation" (2012) <http://www.health.govt.nz/our-work/preventative-health-wellness/fluoridation/water-fluoridation-0>.

2 Ministry of Health *Drinking-water Standards for New Zealand 2005 (Revised 2008)* (Ministry of Health Wellington 2008).

3 PE Petersen and P Phantumvanit "Perspectives in the effective use of fluoride in Asia" [2012] *Journal of Dental Research* at 91, 119-121.

4 Ministry of Health "Our Oral Health: Key findings of the 2009 New Zealand Oral Health Survey" (2010) <http://www.health.govt.nz/publication/our-oral-health-key-findings-2009-new-zealand-oral-health-survey>.

5 Ministry of Health, above n 4.

dental caries than those who lived in areas without a fluoridated water supply.

26. The only confirmed adverse health effect from exposure to fluoride at the levels required for water fluoridation to reduce dental caries is dental fluorosis. Dental fluorosis is a condition caused by excessive intake of fluoride during tooth enamel formation and presents with a wide range of severity from white flecking or increased opaqueness of the tooth enamel, which are described as very mild or mild dental fluorosis, through to brown staining or pitting of the tooth enamel which constitutes moderate or severe dental fluorosis.
27. Moderate and severe dental fluorosis are considered an adverse health effect and associated with excessive exposure to fluoride during tooth development. Very mild and mild dental fluorosis do not however structurally change the integrity of the tooth, but create a cosmetic change to the tooth, increased whiteness. They are not considered an adverse health effect.

How water fluoridation affects dental caries

28. Dental caries is a disease process that, in its early stages, involves an acidic environment causing the loss of calcium and phosphate from the crystalline hydroxyapatite structure of dental enamel. This is known as demineralisation.
29. Demineralisation of dental enamel is a dynamic process that in a healthy state is balanced by a process of remineralisation. Remineralisation involves the return of calcium and phosphate to the dental enamel crystals when the environment at the tooth surface returns back to a less acidic or neutral (non-acidic) environment.
30. Fluoride is an ion of fluorine (F): a common chemical element. Fluoride is naturally present in animals, particularly in bone and dental enamel structures.
31. Fluoride is beneficial to dental health. It is understood to reduce the severity of dental decay an individual suffers by altering the chemical structure of some of the dental enamel and assisting the balance

between demineralisation and remineralisation by reducing the solubility of the dental enamel crystal structure and favouring its remineralisation.

32. The surfaces of a person's teeth are covered by a thin layer of dental biofilm which comprises an organic matrix that is progressively colonised by bacteria. Bacteria within the biofilm metabolise sugars into acids which then demineralise the enamel of teeth causing tooth decay. The presence of fluoride within the biofilm favours the replacement of some hydroxy ion elements within the hydroxyapatite crystal structure of dental enamel with fluoride ions, creating fluorapatite crystals.
33. Fluorapatite crystals of dental enamel are more resistant to demineralisation under acid attack and fluoride enhances dental enamel remineralisation. Consequently, demineralisation of enamel is reduced.
34. This effect is "topical". This means it works by the fluoride coming into physical contact with the biofilm and surface of the tooth enamel. However, unless fluoride levels are maintained, the protective effect is lost over time.
35. One way of maintaining a person's salivary fluoride levels at a sufficient concentration to favour tooth enamel remineralisation is via the consumption of fluoridated drinking water. The optimal concentration in drinking water, which balances a reduction in dental caries with minimal dental fluorosis has been identified as between 0.7 and 1.0 parts per million (ppm) fluoride.^{6, 7}
36. Water fluoridation works in the following way:
 - (a) Compounds containing fluoride ions, usually hydrofluorosilicic acid (HFA), sodium fluoride or sodium hexafluorosilicate are added to the water supply.
 - (b) Following addition of the fluoride containing compound to water, it chemically dissociates which releases the fluoride ions. These fluoride ions are chemically the same as fluoride ions that occur naturally in water.

6 Ministry of Health, above n 1.

7 Ministry of Health, above n 2.

- (c) As a result, the concentration of fluoride in the water supply increases to between 0.7 and 1.0ppm. The New Zealand maximum acceptable value (MAV) for fluoride in drinking water is 1.5ppm.⁸
- (d) The population consumes water and thereby consumes the additional fluoride.
- (e) The consumption of water containing optimal levels of fluoride enables some fluoride to come into contact with the dental biofilm and consequently the tooth enamel through direct contact at the time of consumption. Fluoride is also absorbed into the blood stream, and subsequently some is re-secreted into the mouth in the saliva through the saliva glands and again made available to the tooth enamel through contact with the dental biofilm.⁹
- (f) However, if increased levels of fluoride are not maintained by the frequent low level consumption of optimally fluoridated water and/or using fluoride toothpaste, the level of fluoride active in the biofilm quickly dissipates along with the protection against demineralisation it affords.¹⁰

Does water fluoridation constitute medical treatment?

- 37. My opinion is that water fluoridation **does** not constitute "treatment" of a "medical" nature.
- 38. Fluoridation of water, is in my view, a supplement rather than medication:
 - (a) Fluoride ions already exist naturally, both in the human body, primarily in bone and enamel, and in drinking water. Water fluoridation increases the quantity of these ions present in water – and therefore the body – by a small amount. The additional fluoride added to New Zealand drinking water supplies

⁸ Ministry of Health, above n 2.

⁹ Cury and Tenuta "How to Maintain a Cariostatic Fluoride Concentration in the Oral Environment" (2008) 20 Adv Dent Res 13.

¹⁰ Cury and Tenuta, above n 9.

recreates naturally occurring levels in other areas of the world and is therefore in my view a supplement rather than a form of medication.

- (b) The situation is analogous to adding iodine to salt to prevent thyroid difficulties. Like fluoride, iodine and salt have associated nutrient reference values derived by the New Zealand Ministry of Health and the Australian National Health and Research Medical Council.¹¹

39. Water fluoridation is not in my view "medical treatment".

- (a) Water fluoridation is a population health, or public health, measure that works in a prophylactic, or preventive way.
- (b) Water fluoridation increases the community's environmental exposure to fluoride in a way that replicates normal environmental exposure levels in some parts of the world.

40. Providing an enhanced environmental exposure to fluoride is understood to help to reduce demineralisation, and enhance remineralisation, of tooth enamel and overall to reduce the community's level and severity of dental caries.

41. Similarly, the incorporation and use of fluoride in regular strength toothpastes, that are purchased through retail providers, is increasing the community's environmental exposure to fluoride reducing the demineralisation and enhancing remineralisation of the enamel of teeth. Daily toothbrushing with a fluoridated toothpaste is also not appropriately considered medical treatment, even though toothpastes contains a range of active substances to reduce dental caries and improve other aspects or oral health, including periodontal (gum) health.

42. Medical or dental treatments are individually focussed, are sometimes also referred to as personal health measures, and generally arise through interaction and advice from a health practitioner focussed on assessment of the individual's needs and circumstances:

¹¹ National Health and Medical Research Council and Ministry of Health *Nutrient Reference Values for Australia and New Zealand* (National Health and Medical Research Council Canberra 2006).

- (a) Medical or dental treatment activities can be preventive, curative or palliative in intent. An example of preventive dental treatment would be the application of supplementary fluoride (via application of a varnish or gel) to a person's teeth because of an assessment by an oral health professional that the individual is at increased risk of dental caries.
- (b) Dental caries is appropriately considered a disease. It is caused by colonisation of the oral cavity by streptococcus mutans and other bacteria. These bacteria interact with dietary carbohydrate to create acidic environments around the teeth that can damage the integrity of the teeth. Many of the manifestations of dental caries do require dental or medical treatment interventions either with a preventive or curative intent.
- (c) The New Zealand Guidelines for the Use of Fluorides¹² recommend the supplementary use of high concentration fluorides in the form of fluoride varnish, gels or foams or mouthrinses for individuals or groups at increased risk of dental caries.
- (d) These products are recognised as medicines and this is appropriate given that their use is individually prescribed and the concentration of fluoride included in the product is substantially higher than optimally fluoridated water. Fluoride varnish for example contains 22,600ppm fluoride.

The suitability of water fluoridation as a policy response to poor dental health

43. A significant proportion of New Zealanders have poor oral health. The 2009 New Zealand Oral Health Survey reported that:

¹² New Zealand Guidelines Group *Guidelines for the Use of Fluorides* (Ministry of Health Wellington 2009).

- (a) Among children aged 2–11 years, 41% have experienced dental decay in their primary teeth and 17% have untreated decay or caries.¹³
 - (b) Among children aged 5–17 years, 39% have already experienced dental decay in their permanent teeth and 8% have untreated decay or caries.¹⁴
 - (c) Among adults, over 35% have untreated decay, while over 75% have had dental decay at some point.¹⁵
44. In 2009, over 9,700 New Zealanders had a publically-funded hospital admission to treat dental disease. Of these, 60% were children under nine years.¹⁶
45. I consider water fluoridation an effective, safe and proportionate response to a very prevalent disease in the New Zealand community.
46. In the following sections, I will reference information from four international scientific reviews of fluoride and water fluoridation and studies published in scientific journals. I will detail the background to the organisations undertaking the scientific reviews as I cite information from each review for the first time. All of the scientific articles were published in New Zealand or international dental or medical journals that require peer reviewed assessment of submitted articles by independent experts, prior to acceptance.

Effective

47. Several major national and international studies have shown that fluoridation is effective at reducing both the incidence and severity of tooth decay among children and adults:

13 Ministry of Health, above n 4.

14 Ministry of Health, above n 4.

15 Ministry of Health, above n 4.

16 RA Whyman and others "Potentially preventable admissions to New Zealand public hospitals for dental care: a 20-year review" (2013) *Community Dent Oral Epidemiol*.

- (a) McDonagh et al (**York Review**) (2000):¹⁷ A systematic review of the international literature on the effect of water fluoridation on dental caries was undertaken in England by the University of York's National Health Service (**NHS**) Centre for Reviews and Dissemination (**CRD**). The CRD was a facility commissioned by the NHS Research and Development Division with the following aims: *"Its aim is to identify and review the results of good quality health research and to disseminate actively the findings to key decision makers in the NHS and to consumers of health care services."* The York Review reported that the best available evidence suggests that fluoridation of drinking water supplies does reduce caries prevalence, both as measured by the proportion of children who are caries free and by the mean change in dmft/DMFT score. The median difference in the proportion of children decay free in the 26 studies accepted for inclusion in their review was **15%**.
- (b) National Health and Medical Research Council (2007):¹⁸ Seven years after publication of the York Review¹⁹ the Australian National Health and Medical Research Council (**NHMRC**) published an update on the efficacy and safety of fluoride interventions and reviewed studies published between 1996 and 2006. The NHMRC is Australia's peak body for supporting health and medical research; for developing health advice for the Australian community, health professionals and governments; and for providing advice on ethical behaviour in health care and in the conduct of health and medical research. It was first constituted in September 1936 and its current legislative basis is the *National Health and Medical Research Council Act 1992*. The NHMRC is responsible to the Commonwealth Minister for Health and Ageing. The NHMRC found only one relevant original further study that met their inclusion criteria for examining the effect between water fluoridation and caries. After adjusting for confounding factors, the NHMRC meta-analysis estimated a mean difference in the

17 McDonagh and others "A systematic review of public water fluoridation" (2000) 321 British Medical Journal 855.

18 National Health and Medical Research Council *A Systematic Review of the Efficacy and Safety of Fluoridation*. (National Health and Medical Research Council Canberra 2007).

19 McDonagh and others, above n 17.

proportion of caries-free children in fluoridated and non-fluoridated areas of 14.3%.

- (c) Lee and Dennison (2004):²⁰ In a comparison of the children of Canterbury and Wellington water fluoridation was associated with a 31% lower dental caries severity score in primary teeth for 5-year-old children and a 41% lower dental caries severity score in permanent teeth for 12-year-old children.
- (d) Spencer et al (2008):²¹ A higher percentage of lifetime exposure to water fluoridation was a significant predictor for a lower increase in dental caries in the primary and permanent teeth of children in South Australia and in the primary teeth of children in Queensland. These associations persisted even when data were controlled for age, gender, exposure to other sources of fluoride and socio-economic status.
- (e) Kamel et al (2013):²² In a comparison of the severity of dental caries in the primary teeth of children under 7 years treated under general anaesthesia in Otago, New Zealand, children from low fluoride areas were younger and presented with significantly more dental caries than children from the optimally fluoridated areas.
- (f) Slade et al (2013):²³ In a nationally representative sample of Australian adults the caries preventive effects of water fluoridation were similar in cohorts of adults born prior to water fluoridation (pre 1960) and after the widespread implementation of water fluoridation (1960-1990). In both groups, adults who had lived more than 75% of their life in areas with optimal levels of water fluoridation had 11% (pre 1960 cohort) and 10% (1960-1990 cohort) fewer teeth, with active or treated dental caries

20 JM Lee and PD Dennison "Water fluoridation and dental caries in 5- and 12-year-old children from Canterbury and Wellington" (2004) 100 New Zealand Dental Journal 10.

21 AJ Spencer, JM Armfield and GD Slade "Exposure to water fluoridation and caries increment" (2008) 26 Community Dental Health 12.

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

23 Slade and others "Effects of Fluoridated Drinking Water on Dental Caries in Australian Adults" (2013) 92 Journal of Dental Research 376.

than people who had lived 25% or less of their life in areas with optimal water fluoridation.

48. These real improvements in the oral health of populations also have important secondary benefits in terms of savings for public and private healthcare expenditure.
49. As Wright et al (2001)²⁴ established, the net cost of fluoridating a New Zealand water supply decreases exponentially as the size of the population consuming fluoridated water increases. Over a 30-year period when 1,000 people are covered, the net cost (in 1999 dollars) is an estimated -\$17,500, in other words a net saving of \$17,500 is achieved when the cost of fluoridating is offset from the averted dental costs. When 50,000 people are covered, the net cost is an estimated -\$8,390,000 and for coverage of 100,000 people the estimated net cost is -\$16,900,000.
50. Campain et al (2010)²⁵ reported a more contemporary Australian economic analysis of the cost effectiveness of water fluoridation, particularly in light of overall declines in the levels of dental caries in the community and prolonged tooth retention in most of the adult population. They reported that the average annual cost savings per person, using Australian dollars at the 2005 level, had decreased from the 1970s to the 1990s, but net annual cost savings per person persisted in almost all groups. They concluded that water fluoridation remains a cost-effective preventive measure in Australia.
51. Similarly Kroon and van Wyk (2012)²⁶ assessed water fluoridation as an economically viable option to prevent dental caries in South African communities, even when the caries-preventive effectiveness is modest.
52. Population-based fluoride programmes can be delivered through salt or milk fluoridation. However, the National Health and Medical Research Council's 2007 review of fluoridation²⁷ specifically addressed the

24 Wright J and others "The Cost Effectiveness of Fluoridating Water Supplies in New Zealand" (2001) 25 Australian and New Zealand Journal of Public Health 170.

25 AC Campain and others "The impact of changing dental needs on cost savings from fluoridation" (2010) 55 Australian Dental Journal 37.

26 J Kroon and PJ van Wyk "A model to determine the economic viability of water fluoridation" (2012) 72 Journal of Public Health Dentistry 327.

27 National Health and Medical Research Council, above n 18.

questions "*Is intentional milk fluoridation more efficacious than no milk fluoridation in the prevention of dental caries?*" and "*Is intentional salt fluoridation more efficacious than no salt fluoridation in the prevention of dental caries?*" For milk fluoridation, the NHMRC report concluded that milk fluoridation "*...is beneficial in the prevention or reduction of caries, although there is less good quality evidence than is the case for water fluoridation*".

53. Milk fluoridation has generally been associated with school-based programmes and therefore primarily offers benefits only to children at school and those benefits can only be achieved when school is in attendance. For salt fluoridation, the NHMRC report concluded "*No studies were identified which met the criteria for inclusion in this review. The results of the three before-and-after cross-sectional studies suggest that salt fluoridation reduces caries in populations of children aged from 6-15. However, it should be noted that these studies were considered to be of poor methodological quality, primarily due to the lack of assessment of, and adjustment for, potential confounding factors*".
54. It follows in my view that the benefits of water fluoridation are real and are significant. Water fluoridation is cost effective and supported by stronger scientific evidence than other population fluoride programmes involving milk or salt fluoridation.

Safety

55. In this next part of my affidavit, I discuss some common risks said to arise from water fluoridation and the academic literature surrounding them.

Dental fluorosis

56. Dental fluorosis is a change to the structure of the dental enamel that occurs as a result of increased fluoride present at the time of dental enamel formation. Dental fluorosis does not develop once the tooth enamel has formed, or after the teeth are erupted in the mouth.

57. Dental fluorosis is a condition that ranges markedly in severity and is measured using a range of indices. The Deans Index,²⁸ the Thylstrup Fejerskov index²⁹ and the TSIF index³⁰ are the most commonly used. All require diagnosis by a clinician of dental fluorosis to be made and use slight variations in wording of very mild, mild, moderate and severe fluorosis.
58. In the Dean's Index,³¹ the severity of fluorosis is described as follows:
- (a) in very mild fluorosis, *"small opaque paper white areas are scattered irregularly or streaked over the tooth surface"*;
 - (b) in mild fluorosis *"the white, opaque areas on the surfaces of the teeth involve at least half of the tooth surface"*;
 - (c) in moderate fluorosis *"no change is observed in the form of the tooth, but generally all of the tooth surfaces are involved. ... Minute pitting is often present, generally on the labial and buccal surfaces. Brown stain is frequently a disfiguring complication"*; and
 - (d) in severe fluorosis *"the hypoplasia is so marked that the form of the teeth is at times affected"*.
59. Clinically moderate and severe fluorosis involves structural change to the tooth enamel that has resulted in damage to the integrity of the tooth structure through pitting, brown staining and/or loss of areas to the tooth enamel. Both moderate and severe fluorosis are regarded as adverse outcomes and to be avoided in any population fluoride programme.
60. Very mild and mild fluorosis do not involve structural changes to the integrity of the tooth surface enamel, but the tooth or teeth are affected by increased white flecking and marking. Both very mild and mild fluorosis are regarded as aesthetic changes to the tooth only. Tests of

28 HT Dean HT "Classification of mottled enamel diagnosis" (1934) 21 Journal of the American Dental Association 1421.

29 A Thylstrup and O Fejerskov "Clinical appearances of dental fluorosis in permanent teeth in relation to histological changes" (1978) 6 Community Dentistry and Oral Epidemiology 315.

30 HS Horowitz and others "A new method for assessing the prevalence of dental fluorosis - the Tooth Surface Index of Fluorosis" (1984) 100 Journal of the American Dental Association 37.

31 Dean, above n 28.

the assessed attractiveness of teeth by non-dentists have reported that it is anterior teeth with the equivalent of moderate fluorosis (or dental caries) that are assessed as significantly less attractive. Teeth with no fluorosis, or the equivalent of very mild or mild fluorosis are assessed as equally attractive^{32, 33}

61. In New Zealand, multiple studies of children have assessed for the presence of dental enamel defects in permanent front teeth over the past 25 years. Most studies have shown an increase in the prevalence of diffuse enamel opacities,^{34, 35} which are equivalent to very mild or mild dental fluorosis,³⁶ in children from areas with water fluoridation compared to those from areas without water fluoridation. In these studies, the prevalence was increased by about 15%, to about 30% of children having one tooth or more affected by diffuse opacities. However none of the studies reported any difference in the prevalence of dental enamel hypoplasia, the category into which moderate or severe dental fluorosis would be included.
62. The 2009 New Zealand Oral Health Survey³⁷ assessed specifically for the presence of dental fluorosis in the upper front permanent teeth of children and adults aged 8-30 years. The survey found there was no significant difference in the prevalence of any type or severity of enamel fluorosis between people living in fluoridated and non-fluoridated areas.
63. Food Standards Australia New Zealand (FSANZ) also investigated the literature regarding the prevalence of moderate dental fluorosis in Australia and New Zealand when it undertook a risk assessment for an application for approval of bottled water with fluoride added to within the optimal range for reducing dental caries.³⁸

32 O Chankanka and others "A literature review of aesthetic perceptions of dental fluorosis and relationships with psychosocial aspects/oral health-related quality of life" (2010) 38 Community Dentistry and Oral Epidemiology 97.

33 D Browne and others "The aesthetic impact of enamel fluorosis on Irish adolescents" (2011) 39 Community Dentistry and Oral Epidemiology 127.

34 TD Mackay and WM Thomson "Enamel defects and dental caries among Southland children" (2005) 101 New Zealand Dental Journal 35.

35 S Kanagaratnam and others "Enamel defects and dental caries in 9-year-old children living in fluoridated and nonfluoridated areas of Auckland, New Zealand" (2009) 37 Community Dentistry and Oral Epidemiology 250.

36 AR Mohamed, WM Thomson and TD Mackay "An epidemiological comparison of Dean's index and the Developmental Defects of Enamel (DDE) index" (2010) 70 Journal of Public Health Dentistry 344.

37 Ministry of Health, above n 4.

38 Food Standards Australia New Zealand "Final Assessment Report: Application 588: Voluntary Addition of Fluoride to Packaged Water" (2009) www.foodstandards.govt.nz/code/applications/documents/FAR_A588.pdf.

64. FSANZ concluded that there is evidence of very mild and mild dental fluorosis, in the Australian and New Zealand population but that these are not adverse outcomes. FSANZ also concluded that there is no evidence to suggest a prevalence of moderate fluorosis which would be considered to be an adverse outcome and there is no evidence of any other adverse effects, i.e. moderate or severe dental fluorosis, or risk for any vulnerable sub-population groups from current levels of water fluoridation or dietary intakes in Australia or New Zealand.
65. In all other respects, it is my opinion that the purported risks to public health of water fluoridation, at optimal levels to prevent dental caries, are not supported by evidence.
66. In this part of my evidence, I will briefly review the literature regarding the most common claims of risk posed by water fluoridation.

Infant formula

67. Concerns have been raised that infants consuming powdered infant formula reconstituted with water containing 0.7 to 1.0ppm fluoride may exceed the recommended dietary intakes for fluoride.
68. FSANZ in their risk assessment of the application for approval of bottled water with fluoride added to within the optimal range³⁹ considered, whether infants were susceptible to moderate fluorosis if they were fed with water fluoridated to 0.7 – 1.0ppm. The risk assessment concluded that infants fed water of that level of fluoridation could theoretically exceed the recommended upper level of fluoride intake in the Australian and New Zealand dietary reference values for fluoride.⁴⁰
69. This finding concurred with Cressey (2010)⁴¹ who reported that infants (0-6 months) fully formula-fed on formulae prepared with optimally fluoridated water have a high probability of exceeding the upper limit in the dietary reference values for fluoride. Given that the upper limit is set at a level assessed as the point at which there is increased risk of

39 Food Standards Australia New Zealand 2009, above n 38.

40 National Health and Medical Research Council and Ministry of Health, above n 11.

41 P Cressey "Dietary fluoride intake for fully formula-fed infants in New Zealand: impact of formula and water fluoride" (2010) 70 Journal of Public Health Dentistry 285.

moderate dental fluorosis, Cressey also concluded therefore that they are at increased risk of dental fluorosis.

70. However, crucially, FSANZ investigated the derivation of the upper reference value (UL) for fluoride in the Australian and New Zealand Nutrient Reference Values⁴² and concluded that:

"FSANZ considers that the UL values adopted by the NRV/ANZ/WG (NHMRC & NZMoH, 2006) were based upon the best available information at the time and provided a theoretical level for fluoride intake because they were not based on actual food consumption data. The apparent discordance between the theoretical and actual intakes without an increase in the adverse clinical sign of moderate dental fluorosis suggests that the existing UL may need to be revised upward. The absence of an increase in moderate fluorosis in the community indicates that this revision is not urgent and the apparent exceedences of the UL do not indicate a safety concern."

Dietary fluoride intake

71. Additionally, Cressey et al (2010)⁴³ estimated the dietary fluoride intake of New Zealanders from 6 months of age upwards. In that analysis, they reported that estimates of fluoride intake from the diet and toothpaste did not identify any groups at risk of exceeding the upper limit for fluoride in the Australian and New Zealand Nutrient Reference Values,⁴⁴ with the exception of infants (6-12 months) living in areas with fluoridated water supplies and using high-fluoride toothpaste. In this age group, a similar issue to that described above for infants under 6 months applied.
72. Cressey et al actually identified that much of the adult population may be receiving insufficient fluoride for optimum caries protection from dietary and toothpaste sources of fluoride, because they failed to reach the adequate intake values recommended in the Australian and New Zealand Nutrient Reference Values.⁴⁵

42 National Health and Medical Research Council and Ministry of Health, above n 11.

43 P Cressey, S Gavv and J Love "Estimated dietary fluoride intake for New Zealanders" (2010) 70 Journal of Public Health Dentistry 327.

44 National Health and Medical Research Council and Ministry of Health, above n 11.

45 National Health and Medical Research Council and Ministry of Health, above n 11.

Skeletal fluorosis

73. Skeletal fluorosis occurs when fluoride is incorporated into the mineral structure of bones after prolonged exposure to high concentrations of fluoride. However, the overwhelming conclusion from all of the recent major reviews of water fluoridation is that it is not seen when water is fluoridated at between 0.7 – 1.0ppm with a maximum acceptable value of 1.5ppm.
- (a) FSANZ (2009)⁴⁶ reported that skeletal fluorosis, can occur in children and adults when levels in water exceed about 25ppm but this would not occur in Australia or New Zealand with water fluoridated at the current recommended level.
 - (b) Three independent non-food Scientific Committees provide the European Commission with the scientific advice it needs when preparing policy and proposals relating to consumer safety, public health and the environment. The European Union Scientific Committee on Health and Environmental Risks (SCHER) is one of the three committees and in 2011 published a report entitled "Critical review of any new evidence on the hazard profile, health effects, and human exposure to fluoride and the fluoridating agents of drinking water".⁴⁷ This report found no occurrences of endemic skeletal fluorosis reported in the European Union.
 - (c) The York Review (2000)⁴⁸ found no relationship between fluoridation and increased risk of bone fractures.
 - (d) The Australian National Health and Medical Research Council (NHMRC) (2007)⁴⁹ in a public statement, affirmed that fluoridation at levels aimed at reducing dental caries had little or no effect on fracture risk.

⁴⁶ Food Standards Australia New Zealand, above n 38.

⁴⁷ Scientific Committee on Health and Environmental Risks "Critical review of any new evidence on the hazard profile, health effects, and human exposure to fluoride and the fluoridating agents of drinking water" (2011) http://ec.europa.eu/health/scientific_committees/environmental_risks/docs/scher_o_139.pdf.

⁴⁸ McDonagh and others, above n 17.

⁴⁹ National Health and Medical Research Council "Public Statement: Efficacy and Safety of Fluoridation" (2007) www.nhmrc.gov.au/_files_nhmrc/publications/attachments/eh41_statement_efficiency_safety_fluoride.pdf.

- (e) The United States National Research Council (NRC) was organized by the National Academy of Sciences in 1916 to associate the broad community of science and technology with the Academy's purposes of furthering knowledge and advising the federal government. The NRC has become the principal operating agency of both the National Academy of Sciences and the National Academy of Engineering in providing services to the government, the public, and the scientific and engineering communities. The NRC is administered jointly by both Academies and the Institute of Medicine. In 2006 the National Research Council published a report entitled "Fluoride in drinking water. A scientific review of EPA's standards."⁵⁰ This report found that the risk of fracture increases when populations are exposed to water fluoridated at 4.0ppm (well above the 1.5ppm limit in New Zealand).

Osteosarcoma

74. Osteosarcoma is a very rare primary bone cancer that primarily affects teenagers and young adults. The major reviews of fluorides and water fluoridation published in the UK (2000) and US (2006) reported as follows on osteosarcoma:

- (a) The York Review (2000)⁵¹ found there was no observable association between water fluoridation and osteosarcoma.
- (b) The United States National Research Council (2006)⁵² made no conclusions in anticipation of future research, although it did observe that assessing water fluoridation as a risk factor for osteosarcoma is complicated by the rarity of the disease and the fact that human populations are commonly exposed to fluoride from other sources.
- (c) Subsequent to the UK and US review reports, a 2006 Harvard study did report an association between historical water

50 National Research Council *Fluoride in drinking water: A scientific review of EPA's standards* (National Academies Press Washington DC 2006).

51 McDonagh and others, above n 17.

52 National Research Council, above n 50.

fluoridation exposure and osteosarcoma rates in young males.⁵³ However, the authors of that study were cautious in the conclusions pointing out that this was an exploratory analysis, and that future studies would benefit from the inclusion of biomarkers of fluoride exposure, noting that studies with larger numbers of patients are required to confirm or refute the findings of the current study.

- (d) In the same journal, a letter to the editor was published advising readers that the paper was a partial view of an ongoing study. It recommended readers to be especially cautious when interpreting the findings of this paper for several reasons. Firstly, they warned of *"other incident cases that appear not to replicate the findings from the cases presented in their paper"*. Secondly they advised that preliminary analysis of the fluoride content of the bone specimens provided from some of the cases with osteosarcoma suggested that fluoride level within the bone was not consistent with an excess risk of osteosarcoma. Specifically the authors of the letter, who were senior researchers on the overall project team, cautioned readers *"not to generalize and over-interpret the results of the Bassin et al paper and to await the publications from the full study, before making conclusions, and especially before influencing any related policy decisions"*.
- (e) The 2011 European Union review SCHER (2011),⁵⁴ published after the issues associated with the Bassin et al paper concluded that neither epidemiological studies nor animal studies show a relationship between fluoridated water and cancer generally or osteosarcoma specifically; therefore, fluoride could not be classified as carcinogenic.
- (f) In 2007 the World Cancer Research Fund (2007)⁵⁵ concluded there was no substantial epidemiological evidence that fluoride had any significant effect on the risk of any cancer.

53 EB Bassin, D Wypij and RB Davis "Age-specific fluoride exposure in drinking water and osteosarcoma (United States) (2006) 17 Cancer Causes Control 421.

54 Scientific Committee on Health and Environmental Risks, above n 47.

55 World Cancer Research Fund "Food, Nutrition, Physical Activity and the Prevention of Cancer: A Global Perspective" (2007) www.dietandcancerreport.org/.

Reduced brain functioning

75. Some commentary has been made in various forums, and limited research has been undertaken, on the relationships between neurodevelopment and IQ attainment in humans. A number of studies undertaken in China and Iran examining relationships between fluoride and IQ were recently the subject of an advisory published by New Zealand's National Fluoridation Information Service (NFIS).⁵⁶
76. The NFIS advisory points out numerous methodological difficulties with the reported studies that include risks of observer bias and inadequate "blinding" of the study examiners, insufficient control of important confounding factors (eg parental education and family income), and flawed interpretation and extrapolation of the data.
77. The drinking water fluoride concentration exposures the high groups had experienced were several times higher than found in New Zealand drinking water and the level of fluoride in the control groups of these studies was similar to that in New Zealand drinking water when optimally fluoridated.
78. The NFIS advisory concludes that there is limited evidence of a possible negative effect from fluoride on brain development as assessed by IQ at high fluoride exposures. It also concludes that the human data are inconsistent and cannot be readily extrapolated to exposure to 0.7 to 1.0ppm in fluoridated water supplies.
79. Similarly the major reviews of fluorides and water fluoridation previously cited make the following statements:
- (a) NRC (2006):⁵⁷ the Chinese studies lacked sufficient detail for their relationship to US populations. Further, the participants in the Chinese studies were subject to very high exposure levels (between 2.5ppm – 4ppm of fluoride).

56 National Fluoridation Advisory Service "A recent review of literature on potential effects of CW/F programmes of neurological attainment and IQ development" (2013) <http://www.rph.org.nz/content/4fa0560b-f0ad-4533-99da-c5200c3a5128.cmr>.

57 National Research Council, above n 50.

- (b) NHMRC (2007):⁵⁸ the studies referred to do not indicate there is any increased risk of reduced brain function at levels of fluoridation employed in Australia (up to 1.0ppm of fluoride).
- (c) SCHER (2011):⁵⁹ the animal studies referred to do not support any link between fluoride exposure and neurotoxicity. Further, there is no evidence establishing a biological plausibility that there is a negative link between water fluoridation and IQ.

- 80. The Prime Minister's Chief Science Advisor has also, very recently, unconditionally endorsed water fluoridation as safe and effective.⁶⁰
- 81. Community water fluoridation is also supported by numerous reputable national and international bodies including the World Health Organisation, US Surgeon General, US Center for Disease Control, Australian National Health and Medical Research Council, the Royal Society of New Zealand, the New Zealand Cancer Society, and the American, Australian, British and New Zealand Dental Associations.
- 82. In my opinion, the benefits of fluoridation outweigh the scientifically established minor risks.

Proportionate

- 83. Water fluoridation serves an important purpose: improving public dental health. As set out above, some New Zealanders have poor oral health.
- 84. The benefits of fluoridation are concrete and significant:
 - (a) Reduction of the incidence and severity of dental caries;
 - (b) Long term public health cost savings; and
 - (c) Reduced health inequalities, since community water fluoridation affects all those within a population, including subgroups (such

58 National Health and Medical Research Council, above n 18.

59 Scientific Committee on Health and Environmental Risks, above n 47.

60 Sir Peter Gluckman "What is in the water?" (press statement, 12 June 2013) www.pmcasa.org.nz/blog/what-is-in-the-water/.

as children or those in low socio-economic groups) who are less likely to consume fluoride from other sources and who are at an increased risk of dental caries.

85. By contrast, the known risk of very mild or mild dental fluorosis is minor while other purported health risks associated with water fluoridation are not supported by medical and dental literature at the levels of fluoride to reduce dental caries (0.7 - 1.0ppm).
86. In my opinion, the fluoridation of public water supplies is a proportionate response to the problem of widespread dental caries in the New Zealand public:
- (a) On a benefit-cost/risk analysis, the proven benefits (improved oral health for a significant number of the population) significantly outweigh the costs (in terms of the loss of the freedom to receive a public water supply containing only the naturally occurring levels of fluoride) and risk (since the science on major health risks is conclusive that there is no evidence to support such risks);
 - (b) Fluoridation is very low-impact: the increase in fluoride is both very small (from 0.1 – 0.3ppm to 0.7 – 1.0ppm) and avoidable, should someone not wish to consume it.
87. Regular tooth brushing with fluoridated toothpaste does provide a complementary effective means of protection from tooth decay. Twice daily toothbrushing with a fluoridated toothpaste is standard oral health advice. It is readily provided in public health advice formats such as brochures, pamphlets and websites and through personal contact visits with dental therapists, dental hygienists and dentists.
88. Given that all children up to age 18 years are eligible for free dental care in New Zealand and that enrolment levels are very high, it is reasonable to expect that children, adolescents and adults have received the advice to brush twice daily with a fluoridated toothpaste on numerous occasions.

89. However, the 2009 New Zealand Oral Health Survey⁶¹ reported that only about 43% of New Zealand children aged 2-17 years and 65% of adults aged 18 years and over stated that they brushed their teeth twice daily with a fluoridated toothpaste. It is also notable that the respondents were asked the question in the context of an oral health survey, when the potential for response bias overstating home oral health care would be high. Therefore, reliance on tooth brushing with fluoride toothpaste is likely to be a substantially less effective strategy for improving the dental health of the general population.

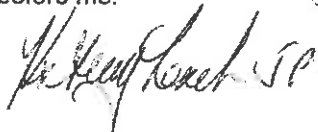
Conclusion

90. It is my view, that community water fluoridation is a positive, proportionate and safe public health measure that benefits all New Zealanders with natural teeth and most benefits those with increased vulnerability and/or poorer oral health.



Robin Andrew Whyman

AFFIRMED at Hastings this 8 day of October 2013
before me:



Kathleen Leach, JP
#95516
4 Judson Place, Taradale, Napier
06 844 7644
Jurat of the Peace for New Zealand

A Solicitor of the
High Court of New Zealand

61 Ministry of Health, above n 4.

**THE HIGH COURT OF NEW ZEALAND
NEW PLYMOUTH REGISTRY**

CIV-2013-443-107

UNDER THE	Judicature Amendment Act 1972 and Declaratory Judgements Act 1908
IN THE MATTER	of an application for judicial review and an application for declaration
BETWEEN	NEW HEALTH NEW ZEALAND INC Plaintiff
AND	SOUTH TARANAKI DISTRICT COUNCIL Defendant

**AFFIDAVIT OF SANDRA ELIZABETH PRYOR ON BEHALF OF THE
DEFENDANT**

AFFIRMED 4th October 2013



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I, Sandra Elizabeth Pryor, of Hawera, Dental Surgeon, solemnly and sincerely affirm:

1. I am a Dental Surgeon based in Patea and Hawera. I have owned and operated a private dental practice in Patea for the past 18 years, treating patients from mainly Hawera and Patea, and some from Waverley (Waverley has a part time dentist). I am also a hospital dentist at the Hawera Hospital.
2. I summarise my relevant experience and qualifications below:
 - (a) I graduated from the University of Otago with a Bachelor of Dental Surgery (BDS) on 10 December 1982.
 - (b) After graduating, I worked at McLeod and Evans' dental surgery in Hawera and then purchased that practice in 1986. I sold the practice in 1991 after the birth of my second child.
 - (c) I started a part-time dental practice in Patea in 1995 from where I still practice all aspects of general dentistry.
 - (d) I have worked as a locum dentist in Wellington, Hutt Valley, Wanganui, New Plymouth, Stratford, Eitham, Inglewood and Greymouth at various times.
 - (e) For the past 11 years, I have also worked part-time as a hospital dentist at the Hawera Hospital.
 - (f) I have contracts with the Ministry of Health to treat adolescents under the Dental Benefit Scheme and I see children under 12 years old when the School Dental Clinics refer them to me.
 - (g) I also hold a District Health Board contract to treat adults with Community Services Cards who present with pain or infection where I provide relief from pain for a very small fee.
 - (h) I was recently involved in a Ministry of Health Survey to determine the oral health status and needs of people aged over 65 years old.

- (i) I am a member of the New Zealand Dental Association (NZDA) and the Taranaki Branch of the NZDA.
 - (j) I have held office as Secretary and Treasurer of the Taranaki Branch of NZDA and am the Consumer Advisory Officer.
- 3. In my thirty years of practice, I have experienced a wide range of dental needs of children and adults ranging from 1 year olds to 96 year olds, from low income and high income backgrounds, and in non-fluoridated and fluoridated areas.
- 4. I confirm that I have read and am familiar with the Code of Conduct for expert witnesses in Schedule 4 to the High Court Rules and agree to comply with it. This evidence is within my area of expertise and I have personal knowledge of the facts and matters set out below.
- 5. I have read the affidavits of:
 - (a) Associate Professor David Menkes;
 - (b) Emeritus Professor Martin Ferguson; and
 - (c) Patrick Sloan.filed on behalf of the plaintiff in these proceedings.
- 6. I have also read the affidavits of Dr Greg Simmons, and a draft affidavit of Dr Robin Whyman on behalf of the Defendant.
- 7. I describe below my observations of the dental health issues in Patea and Waverley. My observations focus on Patea, which is where my current practice is located. However, I also treat patients from Waverley, so I am familiar with state of oral health in Waverley as well. Waverley and Patea face the same oral health issues. They are very similar towns demographically.
- 8. I also briefly describe two informal comparative studies that I carried out which, in my view, demonstrate the benefits Patea and Waverley would gain from fluoridation.

9. The first study compared differences in the level of tooth decay between Patea and Hawera for 15 and 17 year olds. The water supply in Hawera has been fluoridated for 40 years, whereas Patea and Waverleys' water supplies are yet to be fluoridated. The study confirmed my observations that decay in teenagers is two to three times worse in Patea than it is in Hawera.
10. The second study compared treatment requirements in Hawera during a three year period when Hawera's water supply was not fluoridated. During that period, the number of Hawera children who required treatment under general anaesthetic nearly doubled. Additionally, many more children required crowns as opposed to small fillings, which indicates tooth decay increased during the three year period Hawera was without fluoridated water.

Dental decay in Patea and Waverley

Demographics of Patea and Waverley

11. Patea and Waverley are rural towns with populations of approximately 1100 and 850 residents respectively. The 2006 census reported that in Patea:
 - (a) 47% of over 15 year olds have no formal qualifications;
 - (b) 11.3% are unemployed (compared with 4.7% in the Taranaki region);
 - (c) 'labourer' is the most common occupational group;
 - (d) 64% of the population earn less than \$20,000;
 - (e) 35% of households are one parent families (compared with 18% in the Taranaki region);
 - (f) 18% of households have no transport;
 - (g) nearly 10% of households have no access to phones of any description; and
 - (h) 51% of the population are Maori (compared with 15.8% in the Taranaki region).
12. Patea Area School is classified as Decile 1 (compared to Hawera High School which is Decile 5).

13. The demographics in Waverley are similar to Patea.¹

My experience of dental health in Patea

14. I was invited to practice in Patea 18 years ago by the Principal Dental Officer of the Taranaki School Dental Service, who identified the huge need for a dentist in Patea. I had already witnessed that need through the severe cases of dental decay in the adolescents from Patea that I saw in my Hawera practice. I was under no illusion as to what I would be faced with.
15. Patea was without a dentist from 1983 until 1995. During that time, it was up to parents to get their adolescents to a Hawera dentist, which was difficult for many people who do not have access to cars. As mentioned above, the 2006 census indicated that 18% of the Patea households had no form of transport. When I retire from my Patea practice, it is most likely that Patea will not get another dentist and adolescents will once again have to travel to Hawera to visit a dentist.
16. Many people in Patea suffer significant dental decay. The majority of the community does not have the same ability or inclination to access oral health care as other, more prosperous, and better educated parts of New Zealand. As indicated above, 64% of households in Patea earn less than \$20,000 and 35% of families are single parent families. It is perhaps unsurprising that there are a lot of children and adults who do not have access to a toothbrush or toothpaste, and why adults do not attend regular dental care.
17. As an example of the state of dental decay in Patea, in 2010 I treated approximately 398 individuals (not including multiple visits). Of these, 86 were for Community Service Card Holders presenting with pain or infection, generally requiring extraction, 83 were adolescents, and 179 were private patients (of those, less than half are from the Patea township).

¹ 2006 Census.

18. The local Doctor also refers adult patients with severe toothache directly to the Hospital. As I work at the Hawera hospital I am aware of these referrals – they would amount to approximately 10 per year.
19. I also refer approximately 10 to 15 low income adults each year to the Hospital for full dental clearances (due to extensive decay).
20. Occasionally I will see an adolescent for their first dental assessment at the ages of 15/16/17 (they are supposed to enrol at the age of 13) due to advanced decay and pain.
21. Despite treatment being free for children up to the age of 18, there are some Patea adolescents who do not take up the service or if they do enrol, choose not to attend appointments on a regular basis. For example, I currently have 95 adolescents enrolled with me and 21 of them either repeatedly failed to turn up for their annual check or failed to complete their treatment for the year to date.
22. Considerable time and effort by myself, my staff and the school is put in to getting these teenagers to their appointments which sometimes means personally collecting them in my car.
23. Contacting some Patea children (and parents) is often difficult too – 10% have no access to any form of phone, and so I cannot ring them. Some houses do not have letterboxes, and so I cannot mail them appointments. Often the children move around from one home to another.
24. I have discussed the difference in decay between pre-schoolers and primary school children from Patea and Hawera with School Dental Therapists who work in both towns. They agree that decay is significantly worse in Patea than in Hawera. The dental therapists also have noted the decay rate in Waverley children is worse than in Hawera. Waverley has a part time dentist (Dianne Lance) and she also has commented on the high rate of dental decay in Waverley children and adolescents. This accords with my own experience treating children and adolescents from Waverley.

My two informal studies

Background

25. In 2009, I made a submission to the South Taranaki District Council recommending fluoridation of the Patea and Waverley water supplies to help prevent the high incidence and severity of tooth decay in those towns. I submitted again in 2011, when I learned that the Council was considering upgrading the water treatment plants for Patea and Waverley.
26. Before I made my 2011 submission, I wanted to compare the decay rates between Patea and Hawera to see if there was any difference between two South Taranaki towns where one had access to fluoridated water and the other did not. I also wanted to analyse the effect of the temporary closure of the Hawera fluoridation facility between 2006 and 2009 due to a breakdown at the Water Treatment Plant.
27. To do this, I undertook two informal comparative studies in 2011. I note that my studies were not published nor peer reviewed and should be viewed in that light. However, I consider that the results of my studies were informative.

First study: a comparison between decay rates of 15 to 17 year olds in Patea and Hawera

28. In my first study, I compared the decayed, missing, or filled teeth (DMFT) scores in 15 and 17 year olds for the years of 2007 and 2010 in both Hawera and Patea. I chose 15 and 17 year olds because the Ministry of Health claim forms required the DMFT scores to be recorded at these two ages. I used the claim forms from my practice in Patea and a colleague's practise in Hawera to produce average DMFT scores for my samples.
29. For the 2007 study, I had DMFT scores from 26 patients from Patea and 260 patients from Hawera. For the 2010 study, I had 40 patients from Patea and 305 from Hawera. Even though the Patea sample sizes were small compared to those of Hawera, the Taranaki District Health Board

(TDHB) statisticians informed me that the data was statistically significant and able to be used.

30. I note that not all adolescents from Patea are enrolled in my practice as some Patea students attend Hawera High School and attend a Hawera dentist. There may be some students who are not enrolled with any dentist at all. Some are enrolled but never attend.
31. There are some limitations with the information provided by the DMFT scores. DMFT scores count the number of teeth that have decay, are missing, or have been filled. But, a tooth can be decayed on more than one surface. So, a DMFT score of one could be a tooth that has anywhere from one filled or decayed surface to five, or the tooth could be missing as a result of an extraction due to extensive decay. A study counting the actual decayed or filled surfaces and their extent would be superior. A range of DMFT scores would also give a better picture of the distribution of decay experience amongst individuals as some adolescents have considerably more than others.
32. However, my comparison showed that the average DMFT scores for 15 to 17 year olds in Patea were two to three times worse than those in Hawera.
33. In 2007, the average DMFT score for 15 year olds in Patea was 5.1, whereas in Hawera it was 3. The average DMFT scores for 17 year olds in Patea was 8.6, and in Hawera it was 3.9.
34. In 2010, the average DMFT score for 15 year olds was 6.4 in Patea and 2.7 in Hawera. For 17 year olds, the average DMFT score was 10.4 in Patea and 3.6 in Hawera.
35. I noted that the Hawera DMFT scores were slightly lower in 2010 compared to 2007. As I have already mentioned, Hawera's water supply was not fluoridated from some time in 2006 until January 2009 due to a breakdown of the fluoride facility at the water treatment plant in Kapuni. I believe that the small improvement in the average 2010 DMFT score was because Hawera children were once again receiving

fluoridated water for one to two years (depending on the time of the year their DMFT scores were recorded).

36. I accept that my study does not account for other factors, such as the differences in socio-economic conditions between the two towns. But I note that the comparative study by TDBH in full discussed at paragraphs 19 to 22 of Dr Simmons' affidavit compared decay rates between very similar communities in Taranaki. The outcome of that study also demonstrated the potential benefits that fluoridation could have for Patea and Waverley.
37. However, all limitations of my study aside, I consider based on my own experiences that the results indicate that tooth decay is very high in teenagers from Patea, and tooth decay in Patea is considerably worse than Hawera, where the water is fluoridated. My view is that fluoridation contributes to the lower average DMFT scores in Hawera.
38. The average DMFT scores for 17 year olds in Patea of 8.6 and 10.4 indicates extremely high incidence of tooth decay. 17 year olds have 28 teeth (not counting wisdom teeth, which generally erupt later) and so 8.6 and 10.4 DMFT represents 30-37% of their adult teeth being affected by decay. The 2009 NZ Oral Health Survey stated that the average DMFT scores for 12-17 year olds was 1.9 (6% of their dentition).
39. I note that the average DMFT scores do not fully reflect the true extent of decay in individual mouths. Some of my patients have little or no decay, and lower individual DMFT scores, whereas others have more prevalent decay and higher individual DMFT scores.
40. Unless the teenagers take steps to treat the existing decay and prevent further decay, their teeth will continue to decay causing unnecessary pain and disruption to their lives. The rate of increase in decayed teeth between the ages of 15 to 17 is significant as seen by the difference between the DMFT scores for 15 and 17 year olds in both samples.²

² The DMFT scores for 15 years olds was 5.1 and 6.4 in 2007 and 2010 respectively, whereas for 17 years olds the average DMFT scores was 8.6 and 10.4.

41. I also note that my study does not take into account teenagers who have never seen a dentist. The presence or absence of the other factors which contribute to good oral and dental health will determine their caries risk, but generally you would expect if early dental care is avoided then the consequences would be a significant amount of decay.
42. My study also does not differentiate between different socioeconomic groups or which school Patea students attend. The 'Patea town' students tend to be lower socioeconomic groups and the 'out of Patea town' students tend to be a mixture of low and high.
43. Also, some of my students attend Hawera High School or the New Plymouth boarding schools. Some of these students, although from a non fluoridated area, were exposed to some fluoridated water in Hawera and New Plymouth at the time of the study (New Plymouth removed fluoride from its water in 2011). The students who receive some fluoridated water appear to have lower DMFT scores compared to those who live in Patea and attend school there. Interestingly, I have started to notice some increase in early decay in the past year in those attending New Plymouth schools (presumably due to the absence of fluoride).

Second study: the effect of a nearly three year absence of fluoride from the Hawera water supply on the treatment needs of children

44. My second study focused on a specific time period in Hawera alone. Hawera's fluoridation plant broke down in 2006 and Hawera went without fluoridation for nearly three years until it was reinstated in around January 2009. This provided an opportunity to compare the effects of fluoridation on the same population. I have included the town of Normanby in the results as it receives Hawera water.
45. I chose to review the number of children being referred for treatment under general anaesthetic (GA) in 2006 and 2010 because the sample would include Hawera children who had no exposure to fluoridated water. Children born in 2005, 2006, and 2007 and would be the 3, 4, 5 year olds in 2010 – which tend to be the age groups which most require GAs. I hypothesised that in 2006 the impact on dental health from a

lack of fluoride would not yet have taken effect, whereas by 2010 the effect of a nearly three year absence of fluoride in the water would be evident.

46. Data was provided by a Hawera dentist who performs dental treatment under GA on the Mobile Services Surgical Bus (MSSB) in South Taranaki. Dental treatment is done under GA for several reasons:

- (a) children with behavioural management issues who may have single or multiple lesions and require treatment done in the least traumatic environment. Decay may involve few or multiple teeth, may be extensive or moderate in individual teeth, and the children may have abscessed teeth requiring extraction. A child who has behavioural issues, often will not be able to tolerate dental work being carried out in a normal clinic setting just with local anaesthetic.
- (b) Well-behaved children are seen also if they have multiple cavities – it is very easy to lose a child's confidence if they have to have multiple treatments in a normal setting.
- (c) Children requiring extractions for impacted teeth, or biopsies, and other surgeries – all unrelated to dental decay (these extractions were not included in the GA numbers)
- (d) Intellectually compromised children are often best treated under GA – the decay can be of various degrees.

47. I also compared the types of treatment that the dentist was performing. Small decay requires a filling, whereas more advanced, multi surface decay, requires stainless steel crowns (SSC). Lastly, the worst decayed teeth require extraction.

48. Over this period, I became aware that there was anecdotal evidence from School Dental Therapists that decay was occurring at a younger age and that more children were being referred for dental treatment under GA on the MSSB.

49. In 2006, of the 17 South Taranaki children who required a GA on the MSSB, six of them were from Hawera and Normanby representing 35% of the sample. In comparison, in 2010, eleven of the twenty South Taranaki children who required a GA on the MSSB were from Hawera and Normanby, representing 55% of the sample.
50. The number of Hawera children who required GAs on the MSSB nearly doubled between 2006 and 2010, from six in 2006 to eleven in 2010.
51. In 2010, five of the Hawera children requiring GAs were 5 year olds, while in 2006, there were no five year olds, but three six year olds. This suggests that teeth were experiencing decay at a younger age during the period where the Hawera water supply lacked fluoride.
52. I found that in the two sample years, the number of Hawera and Normanby 3 year olds who required dental work under GA on the MSSB rose from 0 in 2006 to two in 2010. These children would have been born in 2006-2007 and would not have been exposed to fluoridated water in Hawera until 2009.
53. The difference in treatment needs for Hawera children between 2006 and 2010 in my view was also significant.
54. In 2006, for the six children from Hawera and Normandy, 27 fillings were placed, 9 SSCs and 13 extractions which represents 55%, 18%, 26% respectively of tooth treatments. In 2010, for the eleven children from Hawera and Normandy 13 fillings were placed, 51 SSCs and 20 extractions representing 15%, 60% and 23% of treatments required. The number of small fillings dropped from 2006 to 2010, but the multi-surface decay had increased resulting in an increase in the number of crowns from 9 to 51 needing to be placed – almost a perfect reversal of the percentage of fillings to crowns. Therefore, the extent of the decay on individual teeth was worse in 2010 than it was in 2006.
55. In my opinion, the absence of fluoride from drinking water appears to have had a harmful effect on the oral health of Hawera children during this period.

56. Not all South Taranaki children who require GAs are treated on the MSSB due to its limited visits to the region. Most of the dental GAs are performed at Taranaki Base Hospital in New Plymouth. However, from 2001-2005, 9% of the dental GAs in Taranaki were performed on the MSSB (Lyndie Foster-Page, 2009).³ Unfortunately, GA records from the TDHB do not distinguish between South and North Taranaki and so I do not have access to complete numbers for South Taranaki children. The study also does not account for the number of children who go untreated – these can be children who are never assessed and who live with untreated dental disease and chronic pain, or children who are assessed but never turn up for their GA appointment.

Fluoridation would significantly reduce tooth decay in Patea and Waverley


57. My observations, over thirty years of practise, clearly indicate to me the benefits of fluoridated water. In fluoridated areas, decay, when present, is not as severe or prevalent. Having worked in a non-fluoridated area for 18 years, I particularly enjoy treating adolescents from a fluoridated area (regardless of social status) because their teeth are usually in far better condition.
58. Water fluoridation is only one of the many factors which influence dental health. Lifestyle and diet, home oral hygiene (frequency of tooth brushing and flossing, use of fluoride containing toothpastes) and regular dental checks all impact on dental health.
59. However, in my experience, water fluoridation is most beneficial to those who have less access to other dental health measures to prevent tooth decay (like many areas in Patea and Waverley).
60. There is a large portion of the Patea community who would only come to me when they have a problem – usually toothache – and unfortunately extractions are often the only option left available to them. These adults probably make up the majority of Patea and it is these people who are most at risk.

³ Lyndie Foster-Page "Retrospective audit of Taranaki children undergoing dental care under general anaesthetic from 2001 to 2005" (2009) New Zealand Dental Journal 105: 8-12, page 10.

61. Fluoridated water is, in my view, the most effective and safe way that some of the inequalities in dental decay can be improved in communities like Patea and Waverley.
62. Fluoridated water will also benefit the rest of the community. Those who look after their teeth are generally keeping them for longer – however, an increasing number of people with medical conditions require medication that increases the risk of caries, especially where saliva flow is affected.
63. Root caries is an important issue that is evident with a lot of my elderly patients. Diseases like arthritis can seriously compromise the ability to brush properly. I often see that oral hygiene is more challenging for these patients and decay becomes more prevalent. Fluoridated water is one way of providing extra protection at minimal cost.
64. Diabetes and heart disease are also common medical conditions for the people of Patea and dental infections put them at risk of complications. It is in their interest to make the changes required to give them good oral and general health. Fluoridated water plays a significant part in contributing to those improvements.


Sandra Elizabeth Pryor

AFFIRMED at Hawera this 4th day of October 2013 before me:


A Solicitor of the
High Court of New Zealand

Ross Dunlop
Justice of the Peace
174 Ohawe Rd, Hawera
Ph: 06 278 5839

**IN THE HIGH COURT OF NEW ZEALAND
NEW PLYMOUTH REGISTRY**

CIV-2013-443-107

UNDER THE Judicature Amendment Act 1972 and Declaratory
 Judgements Act 1908

IN THE MATTER of an application for judicial review and an application for
 declaration

BETWEEN **NEW HEALTH NEW ZEALAND INC**

Plaintiff

AND **SOUTH TARANAKI DISTRICT COUNCIL**

Defendant

**AFFIDAVIT OF ROBYN JAN HAISMAN-WELSH ON BEHALF OF THE
DEFENDANT**

AFFIRMED 9 October 2013



Simpson Grierson
Barristers & Solicitors

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I, Robyn Jan Haisman-Welsh, Chief Dental Officer of Wellington affirm:

1. I am the Chief Dental Officer for the Ministry of Health ("the Ministry"), a role to which I was appointed in August 2010. I am a New Zealand qualified and registered dentist with a PhD in oral microbiology.
2. I am familiar with the matters at issue in this proceeding. While I am a dentist by training and I am knowledgeable about matters relating to dental health, the purpose of this evidence is to set out the Ministry's position on the fluoridation of water and how that position has been reached. I do not purport to give expert evidence as to the efficacy and safety of fluoridation *per se*.
3. I am authorised to attest to these matters on the Ministry's behalf.

Summary of the Ministry Policy Position on Fluoridation

4. The Ministry is the government's agent and key advisor on health and disability issues. The Ministry recommends water fluoridation as a safe, effective and affordable way to prevent and reduce tooth decay, for all people in a community with natural teeth. The Ministry, formerly the Department of Health, has supported water fluoridation in New Zealand since March 1952, when it gave its approval to the Hastings Borough Council to implement fluoridation.
5. In 2008, the Ministry's Executive Leadership Team reaffirmed the Ministry's position on water fluoridation and adopted the following statement:

'The Ministry of Health specifically recommends the adjustment of fluoride to between 0.7 ppm and 1.0 ppm in drinking water as the most effective and efficient way of preventing dental caries in communities receiving a reticulated water supply, and strongly recommends the continuation and extension of water fluoridation programmes where technically feasible'.

6. That remains the Ministry's position on community water fluoridation.

The Ministry's Role in Fluoridation Decisions

7. Most New Zealanders are supplied with water by their local authority. Decision-making on community water fluoridation sits with local authorities rather than central government, neither the Minister of Health, the Ministry/Director-General of Health nor the District Health Boards has any direct influence over decisions to fluoridate community water supplies.
8. The Ministry's principal role, with respect to water supplies, is administering the requirements of the Health Act 1956 to mitigate any risks to public health. The Ministry and District Health Boards do play a role in supporting population, district and community-wide measures to improve, promote and protect public health.
9. It is in furtherance of its function to improve, promote and protect public health for the benefit of New Zealanders that the Ministry continues to take a leading role in reviewing the literature on the safety and effectiveness of fluoridation of water supplies, within New Zealand and internationally, and has taken steps to actively support the fluoridation of water supplies.

Review of Research on Fluoridation

10. One aspect of the Ministry's role as advisor on health and disability issues is to provide advice on a range of health topics such as immunisation, breast-feeding, alcohol and tobacco consumption, infectious disease control and fluoridation.
11. In order to perform that function responsibly the Ministry gathers and analyses local and international evidence, considers the advice of other key health bodies, consults diverse and respected experts and regularly reviews its position on issues. The Ministry has developed its position on community water fluoridation using this approach.
12. The Ministry is aware that there are a number of individuals and organisations, both in New Zealand and overseas, that oppose fluoridation and believe fluoridation poses significant risks to public

health. As with most areas of research there are often individual papers that may report findings at odds with the mainstream.

13. The Ministry is concerned to ensure that it does not recommend public health measures that are, in fact, detrimental to public health. It is for that reason that, in reaching its stance in support of community water fluoridation, the Ministry has looked to be guided by a body of scientific experts and their review of the available international scientific research on community water fluoridation. The process of scientific inquiry ensures on-going testing, debate and comparison of evidence from a variety of sources.

NFIS

14. The Ministry of Health has funded a National Fluoridation Information Service (NFIS), a consortium of experts in community water fluoridation coordinated by Regional Public Health. NFIS includes the Hutt Valley DHB Community Dental Services, Environmental Science and Research (ESR), Centre for Public Health Research at Massey University and the National Poisons Centre. These partners provide expertise in toxicology, epidemiology, public health medicine and dental public health.
15. NFIS are tasked with monitoring and assessing international scientific research looking at the effectiveness and safety of water fluoridation programmes. NFIS then provide robust and independent scientific and technical information, advice and critical commentary on community water fluoridation in New Zealand to District Health Boards, Territorial Authorities and the Ministry. NFIS regularly publishes detailed scientific reports summarising international scientific research and reviews relevant to community water fluoridation. As part of that review NFIS specifically consider the implications of the review findings for the Ministry of Health's fluoridation policy. NFIS also publish "Advisories", which are brief, plain English reports on a particular fluoridation issue, intended to assist local decision makers in making decisions about the appropriateness or otherwise of fluoridation in their area. These documents are all publicly available on the NFIS website, www.rph.org.nz.

16. The work of this body assists the Ministry in ensuring its position on community water fluoridation is based on evidence, is consistent with best practice and is appropriate for the New Zealand context.
17. To date the reviews have confirmed the benefits of fluoridation as a public health measure. NFIS's *Review of Scientific Reviews Relating to Water Fluoridation Published between January 2000 and July 2010*, published in 2011, advised the Ministry that the implications of that research, for the Ministry's fluoridation policy, are that the beneficial effects of fluoridation are evident, as is the importance of the retention of fluoridation as a public health intervention.¹
18. I have read Robin Whyman's affidavit, setting out his opinion that community water fluoridation is an effective, safe and proportionate response to the problems of dental caries. Dr Whyman is one of the advisors engaged by NFIS to provide information and analysis on fluoridation research. His evidence is consistent with the advice that the Ministry has received on the benefits, safety and cost effectiveness of community water fluoridation.

Research

19. Over the years, in addition to the Ministry monitoring the scientific literature, it has commissioned research, advisories and commentaries when issues have been raised about the safety and effectiveness of community water fluoridation. In addition to the work undertaken by NFIS these include:
- (a) A report in 2000 by ESR that investigated if there was any persuasive epidemiological evidence associated with optimal fluoridation, particularly bone fracture, osteosarcoma, fluorosis and other adverse health effects.²
 - (b) Research in 2010 by ESR of New Zealanders' fluoride intake from diet and toothpaste, and a survey of infant and toddler

¹ National Fluoridation Information Service *Review of Scientific Reviews Relating to Water Fluoridation Published between January 2000 and July 2010* (National Fluoridation Information Service Advisory Wellington 2011). Available at <http://www.rph.org.nz/content/7bb9e0f5-05e2-46b8-b572-1579687f979d.cmr>.

formulae on the New Zealand market. The relevant reports, Cressey P et al 2010 *Estimated Dietary Fluoride Intake for New Zealanders* and Cressey P 2010 *Dietary fluoride intake for fully formula-fed infants in New Zealand: impact of formula and water fluoride*, are referred to in Dr Whyman's affidavit.

Oral Health Surveys in New Zealand

20. The Ministry has also funded two of the three oral health surveys undertaken in New Zealand. The first survey, funded by the Medical Research Council, took place in 1976. The second national oral health survey, in 1988, was undertaken by the Department of Health. In 2009 the Ministry of Health was the principal sponsor of the *New Zealand Oral Health Survey*, the first nationwide survey in over 20 years to collect information on the oral health status of New Zealand adults and children. The Ministry's report, outlining the key findings of that survey, *Our Oral Health: Key findings of the 2009 New Zealand Oral Health Survey*, is referred to in the affidavit of Dr Whyman.
21. The Community Oral Health Service continues to routinely collect data on the dental health of New Zealand children. The latest report on that data states that in localities where the water supply is fluoridated, children have better oral health outcomes with generally better caries-free rates and a lower average number of decayed, missing and filled primary or permanent teeth across all three identified ethnic groupings (Maori, Pacific and European/other) and in both age groups (age 5 years and Year 8 children).³

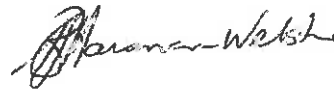
The Ministry's Support for Fluoridation

22. Based on the advice the Ministry has received on the benefits of community water fluoridation, the Ministry recognises fluoridation as having benefits for oral health. As a consequence, it actively supports District Councils looking to establish fluoridation systems in their area.

² Michael Bates *Fluoridation of water supplies- an evaluation of the recent epidemiological evidence* (Institute of Environmental Science and Research Porirua 2000).

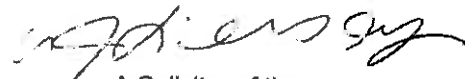
³ Ministry of Health *Annual Report for the year ended 30 June 2012 including the Director-General of Health's Annual Report on the State of Public Health* (Ministry of Health Wellington 2012) on page 188. Available at <http://www.health.govt.nz/publication/annual-report-year-ended-30-june-2012>.

23. The Ministry provides councils with information on the benefits of fluoridation and councils can apply to the Ministry for financial assistance with the set-up costs of fluoridation systems. A subsidy of around 50 percent may be provided by the Ministry to contribute to the cost of relevant capital works and up to 100 percent of costs may be covered in special circumstances at the Minister's discretion.
24. The Ministry offered a written submission to the South Taranaki District Council in support of its proposal to fluoridate the Waverley and Patea water supplies, outlining what the Ministry understands to be the current best science on the benefits and risks of fluoridation. The Ministry has provided similar submissions to other local authorities considering fluoridation.



Robyn Jan Haisman-Welsh

AFFIRMED at Wellington this 9th day of October 2013 before me:



A Solicitor of the
High Court of New Zealand

Wendy Jane Lindsey
Lawyer
Hayman Lawyers
Wellington