Public water fluoridation and dental health in New South Wales

Jason M. Armfield

Australian Research Centre for Population Oral Health, University of Adelaide, South Australia

Abstract

Objectives: To evaluate whether access to fluoridated public water in New South Wales (NSW) is related to both a reduction in caries experience within NSW regions and to better dental health for disadvantaged children.

Methods: Cross-sectional population data on children attending the School Dental Service in NSW in 2000 were used to calculate and compare the number of decayed, missing and filled teeth (dmft/DMFT) across areas of differing availability of fluoridated water within NSW Area Health Service (AHS) regions. Analyses were also undertaken looking at differences in caries between optimally fluoridated and non-fluoridated communities across strata of socio-economic disadvantage and by Indigenous status.

Results: A total sample of 248,944 children aged 3-15 years was obtained. Caries experience in the deciduous dentition of 5-6 year-olds and the permanent dentition of 11-12 year-olds was significantly lower for children in fluoridated areas than non-fluoridated areas in six of the eight AHSs and six of the 10 AHSs respectively where comparisons could be made. Children living in fluoridated areas had lower caries experience than children living in non-fluoridated areas, regardless of socio-economic disadvantage. Both Indigenous and non-Indigenous children had reduced caries experience in fluoridated compared with non-fluoridated areas.

Conclusions: Water fluoridation was found to be related to significantly reduced caries experience in the majority of AHSs where comparisons could be made, and to benefit all socio-economic strata of the community.

Implications: Water fluoridation should be extended to those areas of NSW that are yet to benefit from this successful caries preventive public health initiative.

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There has been a recent resurgence of interest in the issue of water fluoridation in Australia. The benefit of adding fluoride to the public water supply has been brought into the spotlight by recent trends showing an increase in caries experience in Australian children.[1,2] Media attention has also been drawn to recent Australian research[3] that confirms the results of earlier Australian studies showing the often considerable dental health benefit produced by water fluoridation.[4,5]

Moves to expand water fluoridation coverage in Australia have also been critical in bringing the issue to public attention. In Queensland, for example, reconsideration of the fluoridation of the public water supply of Brisbane has been put back on the agenda and popular debate has taken place over the virtues or otherwise of fluoridating the only capital city in Australia that remains unfluoridated. In Victoria, too, discussions about introducing water fluoridation into Geelong and Bendigo, for example, have led to increased public debate characterised by numerous claims and counter-claims concerning both sides of the issue. Similarly, attempts at fluoridating public water supplies in New South Wales (NSW) have resulted in public plebiscites and considerable media attention at both the State and local level.

The renewed attention given to water fluoridation has roughly coincided with the 50th anniversary of public water fluoridation in Australia. In 1954, Beaconsfield in Tasmania introduced fluoride into the water supply as a result of advocacy by a local chemist, Frank Grey, who learned of the benefits of water fluoridation after reading research from the United States. In 1964, the first Australian capital cities, Hobart and Canberra, were fluoridated and by 1977 the capital city of every Australian State and territory, except Brisbane, had introduced artificial water fluoridation.[6] At present, approximately 70% of the Australian population has access to optimally fluoridated public water. However, this proportion is only growing slowly as the fluoridated capital cities steadily increase in population relative to the entire Australian population. Although there have been some recent changes in the number of fluoridated areas in Australia (for example, the introduction of fluoridated water to Bendigo, Victoria), relatively few changes have occurred in recent times with regards to either the introduction or abolition of water fluoridation around Australia.

Opponents of water fluoridation in NSW have used published oral health statistics to erroneously paint water fluoridation as ineffective and therefore unnecessary. A common tactic has been to find unfluoridated communities with lower caries experience than fluoridated communities, and thereby portray water fluoridation as providing no dental health benefit.[7] For example, the caries experience of children on the mid north coast of NSW, which is predominantly unfluoridated, has been compared with that of some areas of Sydney. Despite such ecological comparisons providing a poor level of evidence due to their inability to take into account other variations between the areas that are also

Correspondence to:
Mr Jason Armfield, Australian Research Centre for Population Oral Health, University of Adelaide, South Australia 5000. Fax: (08) 8303 4858; e-mail: jason.armfield@adelaide.edu.au

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related to dental health (such as differences in diet, socio-economic status, exposure to discretionary fluorides, and oral health behaviours), this type of 'evidence' has been used to shore up the arguments of water fluoridation opponents.

Claims have also been made that water fluoridation is particularly damaging to the oral health of those children who come from the most socio-economically disadvantaged families.[8,9] It is argued that these children suffer the worst fluorosis, or dental mottling, due to poor nutrition and that the fluorosis actually leads to a physiological weakening of the tooth structure leading to greater caries experience.[10] Although there is some evidence for this relationship in severely malnourished children from some poor countries,[11] opponents of water fluoridation have been quick to generalise these results to wealthier countries such as Australia.

This paper looks at differences between fluoridated and non-fluoridated areas in NSW to determine if there is a difference in the prevalence of dental caries associated with access to fluoridated water in that State. In addition, the caries experience of the most socio-economically disadvantaged children shall be compared with that of children from more socio-economically advantaged backgrounds to determine whether these children are adversely affected by water fluoridation.

Methods

Data were obtained from the 2000 Child Dental Health Survey from children enrolled in and examined within the NSW School Dental Service (SDS). Data were de-identified, thereby preventing access to the personal information of study participants. There was no attempt to obtain information about those children in NSW not enrolled in the SDS. This is in keeping with the implicit goals of the original School Dental Service evaluation, which was the collection of routine data from all patients of the Australian School Dental Scheme, to be administered through each of the State and Territory health authorities. Consequently, the results of this study do not represent the complete NSW child population, but only that portion of the population that is enrolled in the SDS. Information available for 1998 shows participation rates in the NSW SDS ranging from 72.4% of children in kindergarten to 40.3% of children in Year 8.[12] The overall participation rate was almost two-thirds (63%).

The SDS provides general dental care for pre-school and primary school children in government and non-government schools. The targeted children were in kindergarten and Years 2, 4, 6 and 8. In contrast to some other States and Territories where a random sampling procedure is used to select children from those receiving care in the school dental services, a full enumeration of children was used for analyses for NSW in 2000. Where children received more than one examination during this 12-month period, the information derived from examinations other than the first was excluded.

In 2000, NSW was implementing a screening program called Save Our Kids Smiles (SOKS). The SOKS program utilised oral assessments in the field as the primary environment for data

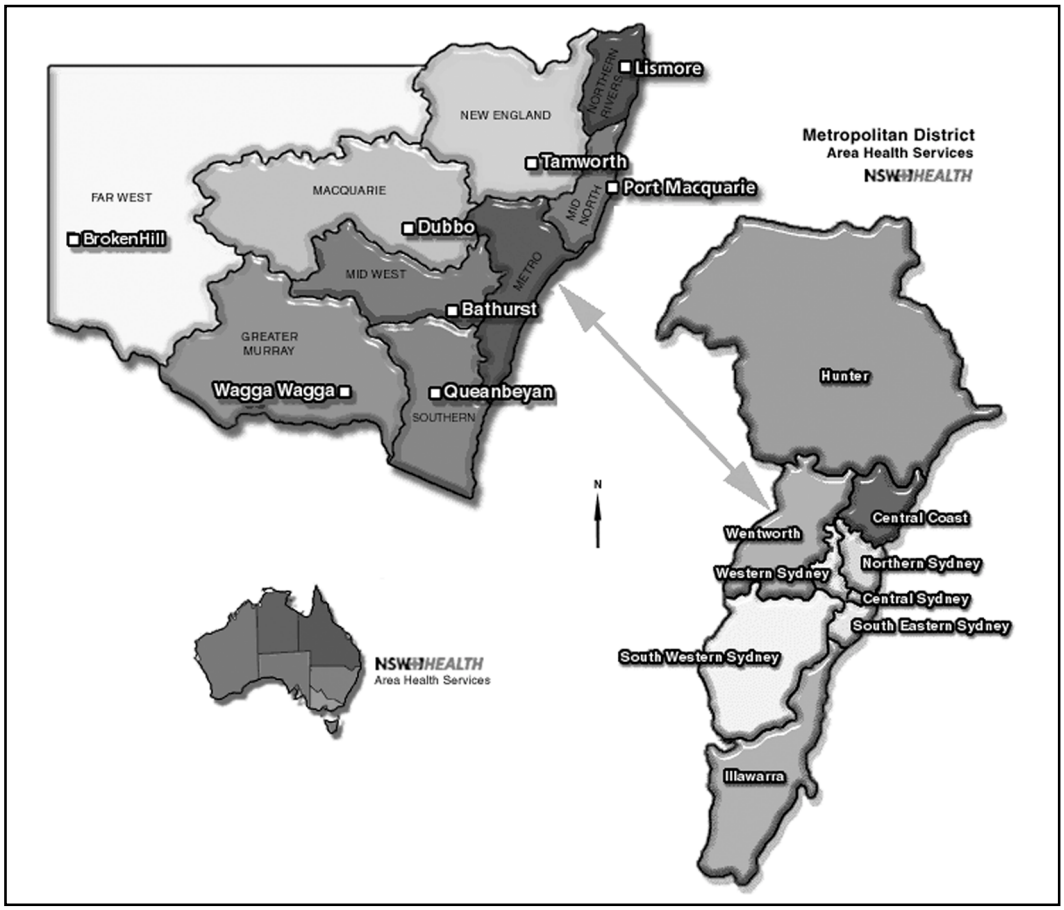

Figure 1: Area Health Services (AHSs) within New South Wales.

collection. Children were examined primarily in classrooms at their school by dental therapists and aggregate full-mouth counts of the number of decayed, missing, filled and fissure-sealed teeth for each child were recorded. For the deciduous dentition, the dmft index was calculated by summing for each child the number of decayed, missing and filled deciduous teeth. Similarly, the DMFT index was calculated for the permanent dentition by summing the number of decayed, missing and filled permanent teeth.

Postcode information for each child, provided from SOKS, was matched with an electronic database of fluoride content of water for each postcode within New South Wales. This information was obtained from a number of health and water authorities within the State. Because of variations in the precision with which fluoride concentrations were specified, fluoride content was generally categorised as being negligible or 0 ppm (less than 0.3 ppm F), suboptimal or 0.5 ppm (0.3 to 0.7 ppm F), or optimal or 1 ppm (greater than 0.7 ppm F). Because of the small number of children in NSW regarded as having suboptimal exposure, results for these children are not reported here.

Socio-economic status was assessed using two indicators, the Socio-Economic Indexes for Areas (SEIFA) 2001 and Indigenous status. The SEIFA 2001 was used to ascribe a relative socio-economic score to each child based on their postcode of residence.

Table 1: Demographic characteristics of the sample.

Demographic characteristics	n	%
Age		
3	49	0.0
4	3,899	1.6
5	43,113	17.3
6	16,835	6.8
7	41,179	16.5
8	16,709	6.7
9	37,802	15.2
10	15,344	6.2
11	32,789	13.2
12	12,461	5.0
13	22,488	9.0
14	5,978	2.4
15	248	0.1
Sex		
Male	112,692	45.3
Female	136,202	54.7
Indigenous status		
Indigenous	4,383	1.8
Non-Indigenous	244,561	98.2
Region of birth		
Australia	233,989	94.0
New Zealand and other Oceania	2,497	1.0
Europe	2,516	1.0
Africa and Middle East	2,021	0.8
Asia	7,060	2.8
Northern America and other Americas	634	0.3
Language spoken at home		
English	199,995	80.3
Language other than English	48,899	19.6

SEIFA 2001 consists of four indexes that each concentrate on a different aspect of the socio-economic conditions in an area. High values indicate areas of advantage, and low values correspond to areas of disadvantage. This study used the Index of Disadvantage, which is derived from attributes such as income, educational attainment, unemployment, and dwellings without motor vehicles. In particular, the SEIFA Index of Disadvantage relates to low income earners, relatively lower educational attainment, and high unemployment. The index was divided into four categories by defining cut-points at the scores 930, 965 and 1,000. This allowed for sufficient numbers of cases in the four categories after breaking down the analyses by age and water fluoridation status.

Statistical analysis

One-way analysis of variance tests was used to compare children from fluoridated and non-fluoridated areas within each of the Area Health Services (AHSs) in NSW. The geographic boundaries of the AHSs are shown in Figure 1. Analysis of variance was again used to test for both differences in caries experience across SEIFA categories within exposure groups and between exposure groups within SEIFA categories. Finally, bivariate analyses were carried out by using χ^2 tests to assess associations between Indigenous status and fluoridated water exposure on the number of decayed, missing and filled teeth. Analyses were conducted for only two age-groups: 5-6 year-olds and 11-12 year-olds. This has the dual benefits of reducing the analytic output had all separate age groups been used and of employing key age groups that have been commonly utilised in Australian Institute of Health and Welfare publications of the Child Dental Health Surveys for NSW.[13]

Table 2: Per cent sampled child population by water fluoridation status by Area Health Service in NSW, 2000.

		Fluoride in public water		
	n	<0.3 ppm %	0.3-0.7 ppm %	>0.7 ppm %
Central Coast	15,811	0.0	0.0	100.0
Central Sydney	15,728	0.0	0.0	100.0
Far West	66	42.4	4.5	53.0
Greater Murray	13,782	18.7	2.1	79.2
Hunter	21,933	4.1	0.5	95.4
Illawarra	2,925	17.6	0.0	82.4
Macquarie	1,672	19.6	16.4	64.0
Mid North Coast	5,478	83.8	0.0	16.2
Mid West	7,280	16.1	0.9	83.0
New England	11,318	38.4	4.3	57.4
Northern Rivers	12,182	51.2	0.0	48.8
Northern Sydney	22,875	0.8	0.0	99.1
South Eastern Sydney	26,101	0.0	0.0	100.0
South Western Sydney	33,287	3.6	0.0	96.4
Southern	6,676	37.0	0.0	63.0
Wentworth	10,528	0.2	0.0	99.8
Western Sydney	35,864	0.0	0.0	100.0

Results

Study population

Demographic statistics on the sample are provided in Table 1. Data were obtained on 248,894 children, with numbers of children concentrated in the age ranges coinciding with the target population of SOKS (grades K, 2, 4, 6 and 8 represented primarily by children aged 5, 7, 9, 11 and 13). The 5-14 year-old children sampled represented 27.6% of the total estimated resident population of 885,519 5-14 year-olds in NSW in 2000.[14] Given that the SOKS program aimed to examine children only every second year during primary and secondary schooling up to Year 8, this represents approximately 55% of children who would have been expected to be examined by the NSW SDS in 2000 had every child in the State been enrolled. Consistent with the drop-off in participation with increasing age,[12] the sampled number of children decreased across increasingly older age groups. A slightly higher percentage of females than males were sampled and the sample was overwhelmingly non-Indigenous. Although 94% of children were born in Australia, almost 20% of children spoke a language other than English at home.

The distribution of children across water fluoridation categories for each AHS is shown in Table 2. In the Central Coast, Central Sydney, Northern Sydney, South Eastern Sydney, South Western Sydney, Wentworth and Western Sydney AHSs, either a small number of children or no children were determined as residing in non-fluoridated areas. Additionally, only a relatively small number of children were sampled from Illawarra and Macquarie AHSs and very few children were sampled from the Far West AHS.

Caries experience by access to water fluoridation

Differences in caries experience between children from fluoridated and non-fluoridated areas were examined for two age groups: 5-6 year-olds and 11-12 year-olds (see Table 3). Among 5-6 year-olds, deciduous dmft was significantly higher in the non-fluoridated area than the fluoridated area for six of the eight AHSs where the sample size was greater than 100 children. In only two regions (Mid West and South Western Sydney) was the dmft of 5-6 year-olds higher in the fluoridated area and these differences were not significant. Looking at the permanent dentition of 11-12 year-olds, the DMFT index was significantly higher in the non-fluoridated area than the fluoridated area for six of the 10 AHSs. Only one AHS showed a contrary result (Hunter AHS) and this difference was not significant. Summarising the result for the combined dentitions, there were 16 instances where there were higher caries indices in non-fluoridated than fluoridated areas and 12 of these were statistically different. In contrast, there were only three instances where there was higher caries indices in fluoridated compared with non-fluoridated areas and none of these differences were statistically significant.

Water fluoridation and social disadvantage

Table 4 shows caries indices broken down by SEIFA categories and water fluoridation status. In the deciduous dentition of 5-6 year-olds a clear socio-economic gradient was shown in both fluoridated and non-fluoridated areas, with children from the most disadvantaged backgrounds (lowest SEIFA scores) having the greatest caries experience. The effect of socio-economic disadvantage on deciduous caries experience was significant for

Table 3: Difference in caries experience between non-fluoridated and optimally fluoridated (1ppm) areas by health regions in NSW, 2000.

	5-6 year-old dmft			11-12 year-old DMFT		
	Non-fluoridated	Fluoridated	*p*	Non-fluoridated	Fluoridated	*p*
Central Coast	[a]	0.94	N/A	[a]	0.54	N/A
Central Sydney	[a]	0.98	N/A	[a]	0.48	N/A
Far West	[a]	[a]	N/A	1.71[a]	0.20[a]	0.049
Greater Murray	1.94	1.02	<0.001	0.59	0.35	<0.001
Hunter	1.90	0.75	<0.001	0.40	0.44	0.577
Illawarra	[a]	1.17	N/A	[a]	0.75	N/A
Macquarie	[a]	1.04	N/A	[a]	0.40	N/A
Mid North Coast	1.53	0.96	0.001	0.48	0.17	<0.001
Mid West	1.11	1.14	0.831	0.41	0.39	0.760
New England	1.69	0.87	<0.001	0.43	0.29	0.001
Northern Rivers	1.83	1.27	<0.001	0.66	0.56	0.052
Northern Sydney	[a]	0.64	N/A	0.94[a]	0.38	<0.001
South Eastern Sydney	[a]	0.71	N/A	[a]	0.48	N/A
South Western Sydney	0.83	0.93	0.426	0.53	0.47	0.395
Southern	1.37	0.89	<0.001	0.47	0.32	0.005
Wentworth	[a]	0.71	N/A	[a]	0.50	N/A
Western Sydney	[a]	1.05	N/A	[a]	0.48	N/A

Note:
(a) Less than 100 cases present, result not presented unless difference significant at p<0.05.
N/A = Not applicable.

both fluoridated and non-fluoridated areas. In addition, caries experience was significantly lower within each SEIFA category for children from fluoridated areas than for children from non-fluoridated areas. The per cent difference in dmft between non-fluoridated and fluoridated areas ranged from 47.6% to 75.0%. The only overlap in caries experience between fluoridated and non-fluoridated areas was with the most disadvantaged children from fluoridated areas, who had poorer oral health than the most socio-economically advantaged children from non-fluoridated areas.

The relationship between disadvantage and water fluoridation status was not as strong in terms of caries experience in the permanent dentition as it was in the deciduous dentition. Again, however, there was a significant association between disadvantage and caries experience in the permanent dentition of 11-12 year-olds in both fluoridated and non-fluoridated areas. Within SEIFA categories of disadvantage, children from non-fluoridated areas had higher DMFT indices than did children from fluoridated areas; however, these differences were statistically significant only for children from the most and least disadvantaged backgrounds.

The caries experience by fluoridation status for Indigenous and non-Indigenous children is shown in Figure 2. Within each age group Indigenous children had greater caries experience than non-Indigenous children. Both Indigenous and non-Indigenous children from fluoridated areas had less caries experience than respective children from non-fluoridated areas. Among 5-6 year-olds, deciduous dmft was 42.9% lower for non-Indigenous children residing in fluoridated areas and 51.1% lower for Indigenous children residing in fluoridated areas. The deciduous dmft of 5-6 year-old Indigenous children living in fluoridated areas was only 11.7% higher than for non-Indigenous children living in non-fluoridated areas. However, the caries experience of Indigenous children living in non-fluoridated areas was 400% higher than for non-Indigenous children living in fluoridated areas.

The extent of caries exhibited in the permanent dentition for Indigenous and non-Indigenous children was considerably lower than that shown in the deciduous dentition; however, caries experience again significantly varied by Indigenous status and access to fluoridated water (see Figure 2). The DMFT of Indigenous children was 45.7% higher than for non-Indigenous children in optimally fluoridated areas and 69.2% higher in non-fluoridated areas. Again, access to water fluoridation had a stronger association with DMFT for Indigenous than for non-Indigenous children, with differences in DMFT between optimally fluoridated and non-fluoridated areas of 31.3% and 13.0% respectively.

Discussion

This cross-sectional study analysed data on almost one-quarter of a million children in NSW and found a consistent association between access to fluoridated water and reduced caries experience. This was more apparent in the deciduous dentition of younger children (aged 5 and 6) than in the permanent dentition of older pre-teen children (aged 11 and 12). Differences in caries experience between children residing in fluoridated compared with non-fluoridated areas were also found within various strata of disadvantage, indicating that the association between access to water fluoridation and caries experience is not a result of differences between the two populations in terms of socio-economic disadvantage.

It has frequently been claimed by opponents of water fluoridation that adding fluoride to the water actually harms the oral health of those children who are most disadvantaged in our community. It is argued that exposure to fluoride leads to dental fluorosis, a mottling of the tooth enamel that weakens the tooth structure, making it more amenable to decay. However, no support for this hypothesis was found in this study. The most economically disadvantaged 5-6 year-old children in the study had 47.6% less decay experience if they resided in optimally fluoridated areas in comparison to residing in non-fluoridated areas. Among the permanent dentition of 11-12 year-olds this difference was smaller, yet a 19.3% differences was

Table 4: Difference in caries experience between non-fluoridated and optimally fluoridated (1ppm) areas by SEIFA Index of Relative Disadvantage in NSW, 2000.

	Non-Fluoridated			Fluoridated			Difference	
	n	Mean	95% CI	n	Mean	95% CI	%	*p*
5-6 year-olds								
SEIFA Disadvantage								
Low – 950.64 (Most)	598	1.86	1.64-2.08	6,710	1.26	1.20-1.31	47.6	<0.001
950.65 – 986.80	2,156	1.72	1.61-1.83	8708	1.06	1.02-1.11	62.3	<0.001
986.81 – 1033.76	2,056	1.61	1.49-1.72	14,184	0.92	0.89-0.96	75.0	<0.001
1033.77 – High (Least)	774	1.16	1.01-1.32	23,098	0.69	0.67-0.71	68.1	<0.001
	$F = 10.94$, $p < 0.001$			$F = 199.27$, $p < 0.001$				
11-12 year-olds								
SEIFA Disadvantage								
Low – 950.64 (Most)	543	0.68	0.56-0.80	4,966	0.57	0.54-0.60	19.3	0.042
950.65 – 986.80	1,695	0.52	0.46-0.57	6,829	0.51	0.48-0.53	2.0	0.769
986.81 – 1033.76	1,741	0.49	0.44-0.54	11,128	0.45	0.43-0.47	8.9	0.111
1033.77 – High (Least)	633	0.56	0.47-0.65	16,437	0.41	0.39-0.42	36.6	<0.001
	$F = 4.06$, $p = 0.007$			$F = 38.63$, $p < 0.001$				

still found. This finding was reconfirmed when looking at Indigenous people, who represent one of the most marginalised and disadvantaged segments of the Australian population. The caries experience of Indigenous children was 51.1% lower in optimally fluoridated areas for 5-6 year-olds and 31.3% lower for 11-12 year-olds. However, it was not just the most disadvantaged who enjoyed lower decay experience in optimally fluoridated areas. Even children with the least disadvantage in the community had lower caries experience in fluoridated areas compared with non-fluoridated areas, with reductions of 68.1% among 5-6 year-olds and 36.6% among 11-12 year-olds.

The difference between results for the deciduous and permanent dentitions have been encountered in other studies investigating water fluoridation,[3,4] with larger effects evident in the deciduous dentition than in the permanent. One reason for this might be that the permanent teeth of 12-year-old children have been in the mouth for a relatively short time (at least 12 months and no more than about six years). Analyses of children over the age of 15 would prove useful in testing this hypothesis.

Approximately half of the AHSs in NSW had sufficient numbers of children residing in both fluoridated and non-fluoridated areas, for who data were available, to make meaningful comparisons. The areas that allowed comparisons were predominantly rural (e.g. Greater Murray, Mid North Coast, etc.) with a number of the metropolitan AHSs containing none or very small numbers of children recorded as living in non-fluoridated localities. Of those AHS comparisons where at least 100 children were in both the fluoridated and non-fluoridated groups or the comparison reached significance with smaller numbers of children, two-thirds (12 out of 18) showed significantly lower caries experience in fluoridated compared with non-fluoridated communities. In only three of the 18 comparisons was a fluoridated area found to have more caries experience than in a non-fluoridated area, and these differences were small and not statistically significant.

Recently, what may be called ecological comparisons have been used to make the argument that either no difference exists between fluoridated and non-fluoridated communities in terms of dental health or indeed that the dental health of fluoridated areas is actually worse than that in non-fluoridated areas. Such an approach fails to take into account other variables that may be related to dental health in the different communities and instead attributes any difference, or lack of, to just one variable, i.e. water fluoridation. Although the present study also uses ecological comparisons of fluoridated and non-fluoridated areas it does not, however, suffer from selective reporting. Rather than using geographically and often demographically disparate areas, the analyses in this paper are conducted within AHSs, with the fluoridated and non-fluoridated communities therefore sharing some similarities. More importantly, although any one comparison in this study may be influenced by factors other than the level of fluoride contained in the public water supply, it is unlikely that every comparison would be confounded in this way. The finding that out of 16 comparisons only three showed marginally higher caries experience in fluoridated areas, with the other comparisons showing higher caries experience in non-fluoridated areas, provides strong circumstantial evidence for the effectiveness of water fluoridation.

One of the main limitations of this study is that it does not measure individual exposure to water fluoridation. Instead, it is assumed that residing in an area equates to exposure to fluoridated water. In reality, many children in fluoridated areas may be consuming drinking water predominantly from rainwater tanks or bottled sources. In NSW, in 2001, 7.1% of households used water from a rainwater tank as their main source of drinking water while 7.5% of households used bottled water as their main source of drinking water.[15] It might be expected that the use of rainwater tanks is more common outside of metropolitan Sydney, meaning that differences in caries experience between children from

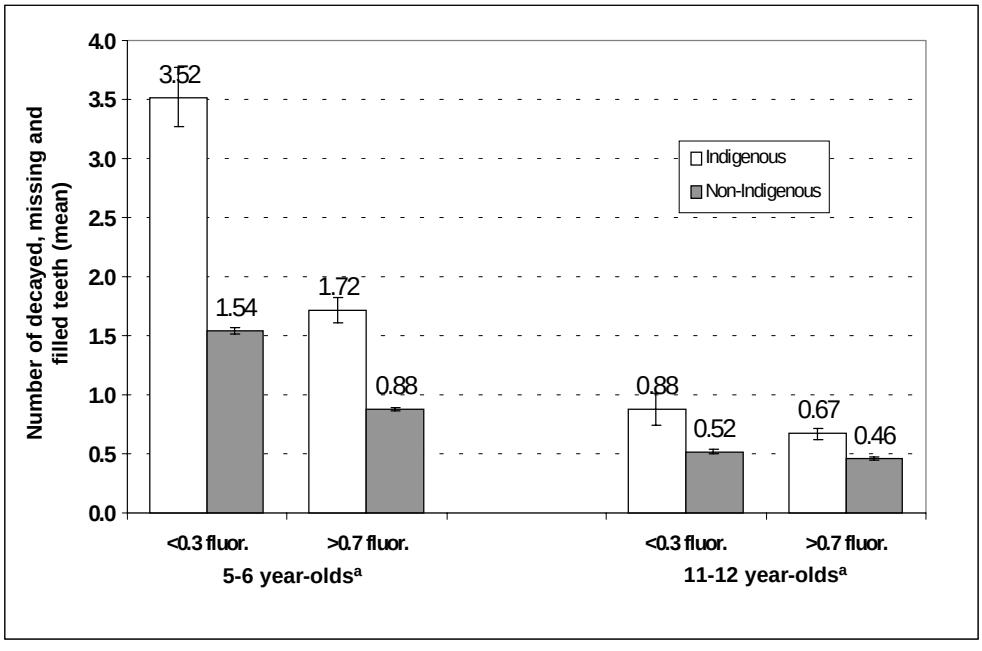

Figure 2: Mean caries experience (and standard error) by Indigenous status and water fluoridation for 5-6 year-old and 11-12 year-old children in NSW, 2000.

Note:
(a) p<0.001, chi-square.

fluoridated and non-fluoridated areas might be diluted by a degree of misclassification. Some children residing in fluoridated areas may not be receiving optimal exposure to fluoridated water. If actual exposure to fluoridated water, rather than just availability of fluoridated water, were measured an even larger effect for fluoridated water on caries experience would be expected.

It is also the case that children residing in non-fluoridated areas may be receiving the benefit of fluoridated water through exposure to foods and beverages that were manufactured in fluoridated areas and therefore contain fluoride.[16] This has been termed the 'halo effect'. Research suggests that the halo effect of community water fluoridation may result in a significantly greater intake of fluoride for people in non-fluoridated communities than they would otherwise obtain.[16,17] Studies done previously in Australia using individual-level assessment of fluoridated water exposure have attributed the difficulty in finding statistically significant results, especially among older children in the permanent dentition, to a diminution of the effect of fluoridated water brought about by the halo effect.[3,4] Therefore the finding of often appreciable differences between fluoridated and non-fluoridated areas in this study further highlights the effectiveness of water fluoridation.

Another limitation of this study is that other variables that may be related to the association between exposure to fluoridated water and caries were not available for inclusion in the analyses. For instance, although the area-based SEIFA Index could be derived from the postcode of each child's residence, individual-level SES indicators such as family income or parental education were not measured. These and other factors, such as use of and access to dental services, may have differed between fluoridated and non-fluoridated localities within AHSs. Controlling for such variables in future analyses would add further weight to the findings of this paper and rule out possible confounding.

The results of this study in NSW are not surprising given the extensive existing research on water fluoridation. Reviews of a large number of these studies have concluded that the consumption of fluoridated water confers a positive dental health benefit.[18-20] Indeed, the US Centers for Disease Control and Prevention has labelled water fluoridation as one of 10 great public health achievements of the 20th century[21] and the US Surgeon-General has recently called water fluoridation "the single most effective public health measure to prevent tooth decay and improve oral health over the lifetime, for both children and adults".[22] Given the weight of past evidence showing the benefits of water fluoridation, the absence of scientifically credible research showing any serious health detriments, and the findings from this study showing both lower caries experience in fluoridated NSW regions and the considerable improvements in dental health gained by the most disadvantaged children in the community, there is a strong argument for extending water fluoridation into those areas of NSW yet to benefit from this caries preventive public health initiative.

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