Pregnant Women's Knowledge and Use of Fluoridated Tap Water

M Rohrbeck,[1] K. Weber-Gasparoni[1], D. Smith[1], A. Miers[1], J. Bowman-Reif[1], F. Seyd[1], E. Striegel[1], J.J. Warren[1], T.A. Marshall[1], S.M. Levy[1], J.A. Banas[1], J. Reeve[2]

[1]The University of Iowa, College of Dentistry and Dental Clinics, Iowa City, IA

[2]Australian Catholic University, Sydney, Australia

Introduction

- Community Water Fluoridation (CWF) is widely recognized as one of the most effective and equitable public health measures for preventing dental caries, a position strongly endorsed by the American Academy of Pediatric Dentistry (AAPD).
- CWF is safe, highly cost-effective, and provides continuous protection against caries for entire communities, regardless of age, socioeconomic status, or access to dental care.
- Many individuals choose bottled water over fluoridated tap water. Several barriers drive this trend including persistent misinformation and concerns about water quality.
- Gaining insight into pregnant women's knowledge, attitudes, and practices related to CWF provides an opportunity to strengthen both maternal and child oral health outcomes.

Objective

The purpose of this study is to explore pregnant women's knowledge, beliefs, and consumption patterns related to CWF using secondary data from the *Birth to Three – Cavity Free* study. By identifying gaps in knowledge and key barriers, the study aims to inform targeted public health strategies that promote fluoridated tap water use among expectant mothers, ultimately supporting better oral health outcomes for the next generation.

Methods

- Secondary analysis of baseline data from 634 pregnant women
- Evaluated drinking water source, tap water safety concern, and fluoride knowledge (Likert-scale).
- Demographics included income, education, race/ethnicity, marital status, employment/student status, and dental insurance.
- Descriptive statistics and chi-square tests ($p<0.05$) were used; fluoride knowledge was assessed using Likert-scale items and stratified by water source and safety concern.

Results

Demographic characteristics stratified by primary drinking water source and concern about tap water safety are summarized in **Table 1**.

<u>Primary Drinking Water Source:</u>

Tap water use was significantly associated with several socioeconomic and demographic factors:

- Household Income ($p < 0.001$)
  - Participants with higher household incomes were more likely to drink tap water.
  - Lower income participants (e.g., ≤$25,000) were more likely to drink non-tap water.
- Marital Status ($p = 0.011$)
  - Married participants were more likely to consume tap water.
  - Single, never married participants more likely to consume non-tap water.
- Highest Education Completed ($p < 0.001$)
  - Participants with a four-year or graduate/professional degree were more likely to consume tap water.
  - Those with less than a high school education were more likely to consume non-tap water.
- Hispanic/Latina Status ($p = 0.032$)
  - Non-Hispanic/Latina participants were more likely to consume tap water.
  - Hispanic/Latina participants more likely to consume non-tap water.
- Race ($p < 0.001$)
  - White participants were more likely to consume tap water.
  - Black/African American participants were more likely to consume non-tap water.
- No significant association was found with employment status ($p = 0.368$), student status ($p = 0.549$), and dental insurance ($p = 0.109$).

<u>Concern About Tap Water Safety:</u>

Household income was the only demographic variable significantly associated with concern about tap water safety ($p=.020$)**:**

- Participants expressing concern were more likely to report very low household incomes, with 27.7% reporting annual incomes below $5,000 compared with 19.1% among those not concerned.

Table 1. Demographic by Main Drinking Water Source (Tap vs. Non-tap) and by Tap Water Safety Concern

Characteristic	Overall n (%)	Tap n (%)	Non-tap n (%)	p	Concerned n (%)	Not Concerned n (%)	p
	634	216	418		166	467	
Employment Status:				0.368			0.789
Disabled	14 (2.2)	5 (2.3)	9 (2.2)		4 (2.4)	10 (2.1)	
Full-time	201 (31.7)	73 (33.6)	128 (30.7)		48 (28.9)	152 (32.5)	
Part-time	153 (24.1)	57 (26.3)	96 (23.0)		41 (24.7)	112 (24.0)	
Homemaker/Stay at home mom	78 (12.3)	31 (14.3)	47 (11.3)		26 (15.7)	52 (11.1)	
On medical leave	9 (1.4)	2 (0.9)	7 (1.7)		3 (1.8)	6 (1.3)	
Unemployed	174 (27.4)	47 (21.8)	127 (30.4)		43 (25.9)	131 (28.1)	
Missing	5 (0.8)	1 (0.5)	4 (1.0)		1 (0.6)	4 (0.9)	
Student Status:				0.549			0.315
Full time	35 (5.5)	14 (6.5)	21 (5.0)		5 (3.0)	30 (6.4)	
Not a student	563 (88.8)	194 (89.4)	369 (88.5)		149 (89.8)	413 (88.4)	
Part time	30 (4.7)	8 (3.7)	22 (5.3)		10 (6.0)	20 (4.3)	
Missing	6 (0.9)	1 (0.5)	5 (1.2)		2 (1.2)	4 (0.9)	
Income:				<0.001			0.020
<$10,000	173 (27.3)	50 (23.1)	123 (29.4)		56 (33.7)	117 (25.1)	
$10,001-25,000	138 (21.8)	37 (17.1)	101 (24.2)		36 (21.7)	102 (21.8)	
$25,001-40,000	137 (21.6)	52(24.1)	85 (20.3)		32 (19.3)	104 (22.3)	
$>40,000	132 (20.8)	68 (31.5)	66 (15.8)		36 (21.7)	96 (20.6)	
Missing	54 (8.5)	10 (4.6)	44 (10.6)		6 (3.6)	48 (10.3)	
Marital Status:				0.011			0.734
Divorced	16 (2.5)	4 (1.8)	12 (2.9)		5 (3.0)	11 (2.4)	
Live w/ partner	134 (21.1)	45 (20.7)	89 (21.3)		41 (24.7)	93 (19.9)	
Married	169 (26.7)	71 (32.7)	98 (23.5)		41 (24.7)	128 (27.4)	
Separated	13 (2.1)	8 (3.7)	5 (1.2)		4 (2.4)	9 (1.9)	
Single	298 (47.0)	86 (39.6)	212 (50.8)		75 (45.2)	222 (47.5)	
Widowed	1 (0.2)	1 (0.5)	0 (0.0)		0 (0.0)	1 (0.2)	
Missing	3 (0.5)	2 (0.9)	1 (0.2)		0 (0.0)	3 (0.6)	
Education:				<0.001			0.251
<8th grade	7 (1.1)	0 (0.0)	7 (1.7)		0 (0.0)	7 (1.5)	
4-year College degree	48 (7.6)	27 (12.4)	21 (5.0)		17 (10.2)	31 (6.6)	
Graduate degree	18 (2.8)	7 (3.2)	11 (2.6)		4 (2.4)	14 (3.0)	
Highschool or GED	406 (64.0)	139 (64.1)	267 (64.0)		107 (64.5)	299 (64.0)	
Some high school	76 (12.0)	13 (6.0)	63 (15.1)		23 (13.9)	52 (11.1)	
2-year College degree	78 (12.3)	30 (13.8)	48 (11.5)		15 (9.0)	63 (13.5)	
Missing	1 (0.2)	1 (0.5)	0 (0.0)		0 (0.0)	1 (0.2)	
Hispanic/Latina:				0.032			0.526
No	517 (81.5)	189 (87.1)	328 (78.7)		134 (80.7)	382 (81.8)	
Yes	114 (18.0)	27 (12.4)	87 (20.9)		32 (19.3)	82 (17.6)	
Missing	3 (0.5)	1 (0.5)	2 (0.5)		0 (0.0)	3 (0.6)	
Race:				<0.001			0.564
White/Caucasian	399 (62.9)	165 (76.0)	234 (56.1)		96 (57.8)	302 (64.7)	
Black/African American	118 (18.6)	24 (11.1)	94 (22.5)		31 (18.7)	87 (18.6)	
American Indian/Alaska Native	4 (0.6)	0 (0.0)	4 (1.0)		2 (1.2)	2 (0.4)	
Native Hawaiian/Other Pacific Islander	4 (0.6)	0 (0.0)	4 (1.0)		1 (0.6)	3 (0.6)	
Asian	6 (0.9)	1 (0.5)	5 (1.2)		2 (1.2)	4 (0.9)	
Other	27 (4.3)	2 (0.9)	25 (6.0)		10 (6.0)	17 (3.6)	
Multiple	66 (10.4)	23 (10.6)	43 (10.3)		22 (13.3)	44 (9.4)	
Missing	10 (1.6)	2 (0.9)	8 (1.9)		2 (1.2)	8 (1.7)	
Dental Insurance:				0.109			0.562
Hawk-I	12 (1.9)	6 (2.8)	6 (1.4)		1 (0.6)	11 (2.4)	
Medicaid	428 (67.5)	145 (66.8)	283 (67.9)		115 (69.3)	312 (66.8)	
No insurance	70 (11.0)	16 (7.4)	54 (12.9)		16 (9.6)	54 (11.6)	
Private	118 (18.6)	48 (22.1)	70 (16.8)		33 (19.9)	85 (18.2)	
Missing	6 (0.9)	2 (0.9)	4 (1.0)		1 (0.6)	5 (1.1)	

Fluoride Knowledge

- 28% were positive (strongly agree/agree), 54% were neutral, and 18% demonstrated a negative response (disagree/strongly disagree) to the incorrect statement that most bottled water contains ideal levels of fluoride.
- No significant associations were observed with any of the demographic variables.

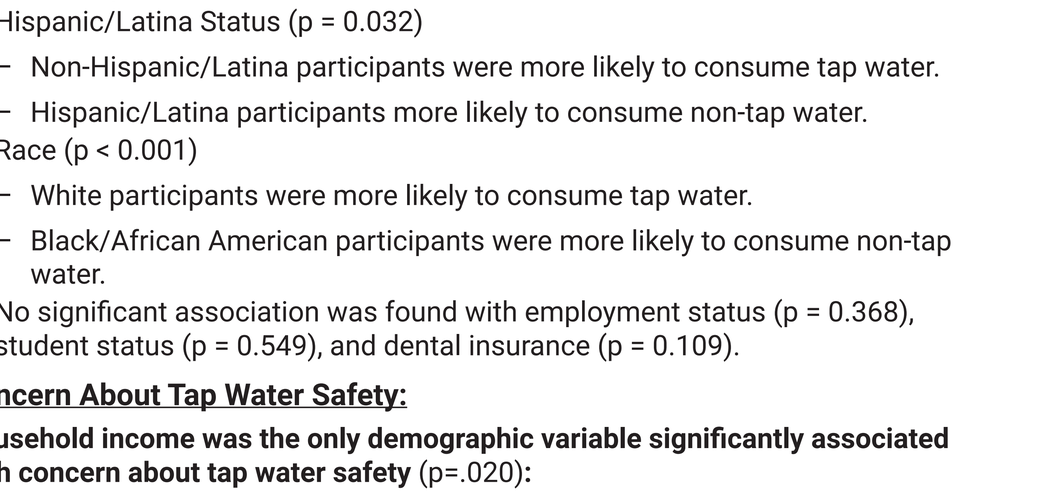

Figure 1. Most bottled water contains ideal levels of fluoride by Main drinking water source

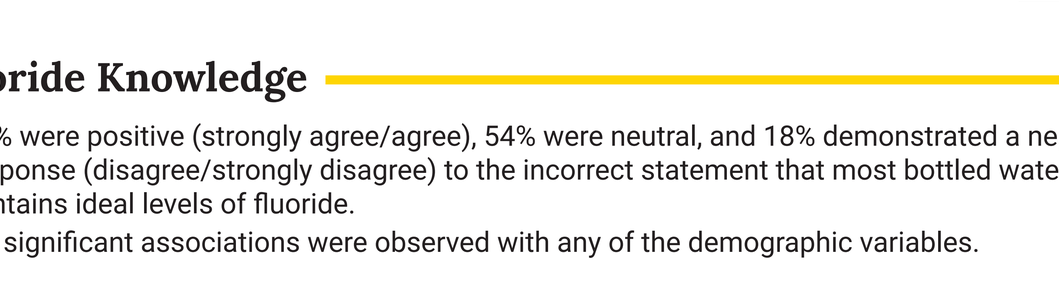

Figure 2. Most bottled water contains ideal levels of fluoride by Concern about tap water safety

Limitations

This study is limited by its cross-sectional design and reliance on self-reported data.

Acknowledgments

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- 34% agreed, 46% were neutral, and 20% disagreed to the correct statement that "fluoride in tap water strengthens teeth".
  - Household income was significantly associated with fluoride knowledge ($p = 0.026$). Positive responses increased with income, from 23% among participants earning $0–$5,000 to 41% among those earning $45,001–$50,000, and 42% among those earning >$55,000 annually.
  - Educational attainment was significantly associated with fluoride knowledge ($p = 0.002$). Positive responses were lowest among participants with ≤8th-grade education (14%) and highest among those with a four-year college degree (43%) and graduate/professional degrees (38%).
- No significant associations were observed with any of the other demographic variables.

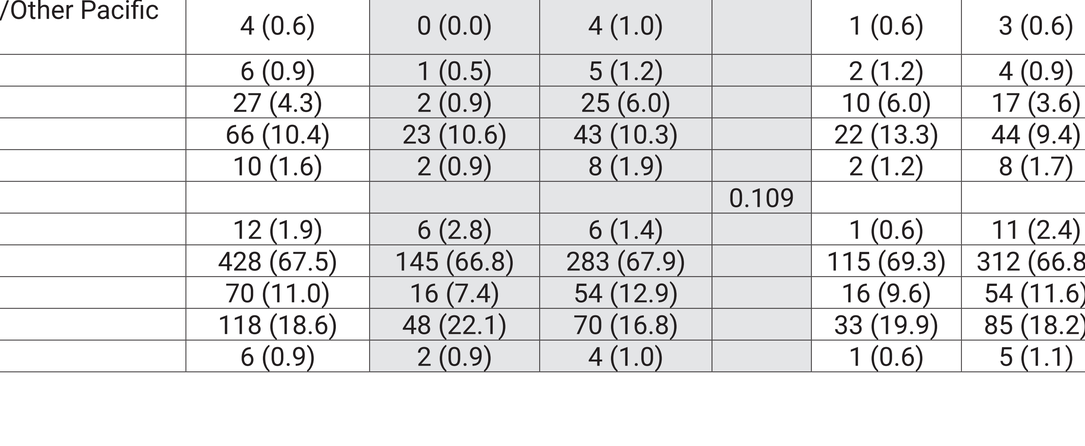

Figure 3. Fluoride in tap water strengthens teeth by Main drinking water source

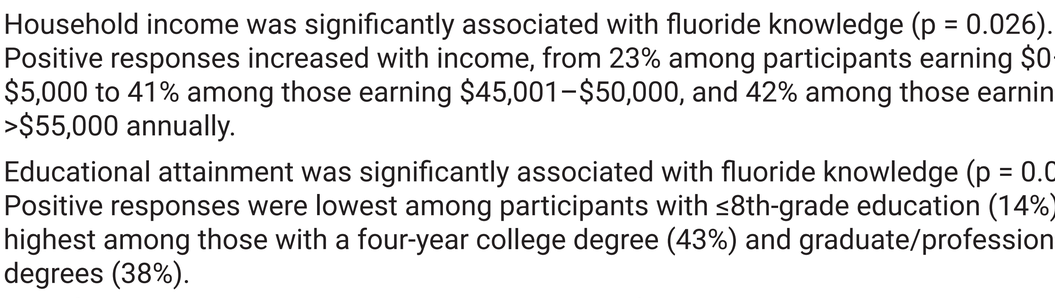

Figure 4. Fluoride in tap water strengthens teeth by Concern about tap water safety

Conclusion

Among pregnant women, avoidance of fluoridated tap water and limited fluoride knowledge are common and patterned by socioeconomic factors. Educational interventions addressing tap water safety concerns and fluoride misconceptions during pregnancy may enhance the effectiveness of CWF and support improved oral health outcomes for mothers and children.