

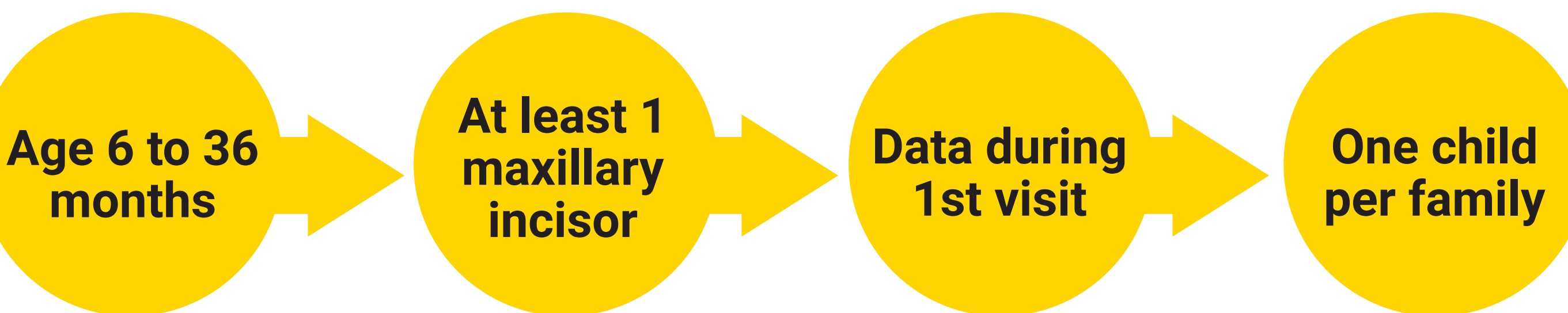


## Introduction

- The AAPD recognizes that drinking fluoridated water and brushing with fluoridated toothpaste are perhaps the most effective methods for reducing dental caries prevalence in children.<sup>1</sup>
- Fluoride has several caries-protective mechanisms of action including:<sup>2</sup>
  - Inhibition of demineralization of sound enamel
  - Enhancement of remineralization of demineralized enamel
  - Inhibition of metabolic activity of cariogenic bacteria
- Multiple studies demonstrate that lack of fluoride toothpaste use and less than optimal fluoride in drinking water are considered risk factors for early childhood caries.<sup>3,4</sup>
- Daily exposure to fluoridated drinking water and brushing with fluoridated toothpaste are readily accessible and cost-effective to communities.
- Over 55% of children below the federal poverty level experienced caries, compared to only 31% among children whose families were at 200% of the federal poverty level.<sup>5</sup>
- Children of minorities are also at an increased risk for dental caries.<sup>6</sup>
- Minority children face various barriers to access dental care and would benefit the most from fluoride exposure and consequently caries prevention.<sup>7</sup>

## Methods

Secondary data from Iowa' Infant Oral Health Program (IOHP) database were retrieved, and selected variables of interest were used in this study. Inclusion criteria for the study includes: 1) children from 6 to 36 months of age, 2) presence of at least one maxillary incisor; 3) data were obtained during the child's first visit, 4) one child per family. Descriptive statistics were applied for all variables. Univariate logistic regression analysis was performed using each demographic and clinically relevant variable to predict both fluoridated water exposure or the use of fluoridated toothpaste. A multivariable logistic regression was conducted to determine the contribution of the statistically significant variables from the bivariate analyses, and variables with P ≤ .10 in the bivariate analyses (i.e., univariate logistic regression analysis) were included in the multivariable logistic regression analysis. The final logistic regression model was developed whereby variables were selected with a stepwise method. All tests employed a significance level of 0.05, and statistical analysis was carried out using the statistical package SAS® System version 9.4 (SAS Institute Inc., Cary, NC, USA).



## Results

### General characteristics of participants

A total of 1,024 subjects (47.4% female and 69.1% non-white) who fulfilled the inclusion criteria were included in the study. Of the participants, 64.4% children lived with both parents and 44.6% of child's mothers had maternal previous awareness of early childhood caries (ECC). The majority of the children (90.9%) have never been to a dentist, and 86.3% of them had teeth brushed daily. Moreover, 58% of participants had non-fluoridated water exposure, and 62.8% used non-fluoride toothpaste.

Table 1. Characteristics and Distribution of Participants According to Fluoridated Water Exposure

Characteristics	Total (N=1,024) (%)	Fluoridated Water Users (N=430) (%)	Non-Fluoridated Water Users (N=594) (%)	Unadjusted OR (CI)*	p-value
<b>Age (in months)</b>				0.98 (0.97-0.99)	<b>0.017**</b>
Mean (SD)	16.9 (7.9)	17.6 (7.8)	16.4 (7.9)		
<b>Sex</b>					0.328
Female	476 (47.4)	208 (43.7)	268 (56.3)	0.88 (0.69-1.13)	
Male	529 (52.6)	215 (40.6)	314 (59.4)	1.00	
<b>Race</b>					<b>&lt;0.001**</b>
Black/African American	364 (35.8)	120 (33.0)	244 (67.0)	3.26 (2.38-4.47)	(<0.001)
Other	339 (33.3)	114 (33.6)	225 (66.4)	3.16 (2.30-4.36)	(<0.001)
White/Caucasian	315 (30.9)	194 (61.6)	121 (38.4)	1.00	
<b>Whom the child lives with</b>					<b>&lt;0.001**</b>
Other	364 (35.6)	124 (34.1)	240 (65.9)	1.67 (1.28-2.17)	
Both parents	659 (64.4)	305 (46.3)	354 (53.7)	1.00	
<b>Number of children living in the house</b>					0.385
Mean (SD)	1.9 (1.1)	1.8 (1.0)	1.9 (1.1)	1.04 (0.93-1.17)	0.497
<b>The child's mother's highest education level completed††</b>					<b>0.010**</b>
Lower than high school	153 (15.5)	50 (32.7)	103 (67.3)	1.86 (1.25-2.78)	(0.002)
High School diploma	504 (51.0)	213 (42.3)	291 (57.7)	1.23 (0.93-1.63)	(0.142)
2-year college degree or higher	331 (33.5)	157 (47.4)	174 (52.6)	1.00	
<b>Maternal previous awareness of ECC</b>					<b>&lt;0.001**</b>
No/not sure	564 (55.4)	198 (35.1)	366 (64.9)	1.92 (1.49-2.47)	
Yes	454 (44.6)	231 (50.9)	223 (49.1)	1.00	
<b>Has the child ever been to a dentist?</b>					0.150
Yes	86 (9.1)	43 (50.0)	43 (50.0)	0.72 (0.46-1.13)	
No	861 (90.9)	361 (41.9)	500 (58.1)	1.00	
<b>Have inadequate fluoride</b>					0.124
Yes	202 (19.9)	75 (37.1)	244 (67.0)	1.28 (0.93-1.76)	
No	812 (80.1)	350 (43.1)	225 (66.4)	1.00	
<b>Are the child's teeth brushed daily?</b>					<b>0.032**</b>
No	140 (13.7)	47 (33.6)	93 (66.4)	1.51 (1.04-2.19)	
Yes (daily & once in a while)	881 (86.3)	381 (43.3)	500 (56.7)	1.00	
<b>The child has presence of caries</b>					0.729
Yes	87 (8.5)	35 (40.2)	52 (59.8)	1.08 (0.69-1.69)	
No	937 (91.5)	395 (42.2)	542 (57.8)	1.00	

\*\*p < 0.05 using the Wald Chi-square test.

## Conclusion

Education regarding the benefits of daily consumption of fluoridated water and use of fluoridated toothpaste should be targeted to caregivers of low-income young children.

## Limitations

The data collected and analyzed in this study relied on self-reported information for caregivers, which may be influenced by desirability bias, poor recollection, and a lack of comprehension. Language barriers may also contribute to misreported data. This data was collected from a particular clinic and may not be generalizable to other populations.

## Future Directions

Additional research regarding fluoride use amongst the high caries risk populations is crucial to identify, and eliminate, barriers to dental care. Identifying barriers will lead to an increase in effective educational and preventive programs for this population.

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Table 2. Characteristics and Distribution of Participants According to Use of Fluoride Toothpaste

Characteristics	Total (N=1,007) (%)	Fluoride Toothpaste Users (N=374) (%)	Non-Fluoride Toothpaste Users (N=633) (%)	Unadjusted OR (CI)*	p-value
<b>Age (in months)</b>					<b>&lt;0.001**</b>
Mean (SD)	16.9 (7.9)	20.8 (7.7)	14.6 (7.0)	<b>0.90 (0.88-0.92)</b>	
<b>Sex</b>					0.547
Female	466 (47.2)	169 (36.3)	297 (63.7)	1.08 (0.84-1.40)	
Male	522 (52.8)	199 (38.1)	323 (61.9)	1.00	
<b>Race</b>					<b>&lt;0.001**</b>
Black/African American	311 (31.1)	91 (29.3)	220 (70.7)	2.18 (1.58-3.00)	(<0.001)
Other	329 (32.9)	110 (33.4)	219 (66.6)	1.79 (1.32-2.44)	(<0.001)
White/Caucasian	361 (36.0)	171 (47.4)	190 (52.6)	1.00	
<b>Number of children living in the house</b>					<b>&lt;0.001**</b>
Mean (SD)	1.9 (1.1)	2.1 (1.1)	1.7 (1.0)	0.72 (0.64-0.81)	
<b>The child's mother's highest education level completed††</b>					0.504
Lower than high school	324 (33.4)	114 (35.2)	210 (64.8)	0.90 (0.60-1.36)	(0.625)
High School diploma	498 (51.2)	188 (37.7)	310 (62.3)	0.81 (0.55-1.19)	(0.280)
2-year college degree or higher	149 (15.4)	49 (32.9)	100 (67.1)	1.00	
<b>The child's mother's marital status</b>					<b>0.002**</b>
Other	116 (48.7)	51 (44.0)	65 (56.0)	2.26 (1.34-3.80)	
Married	122 (51.3)	78 (63.9)	44 (36.1)	1.00	
<b>Maternal previous awareness of ECC</b>					0.578
No/not sure	564 (55.4)	198 (35.1)	366 (64.9)	1.92 (1.49-2.47)	
Yes	454 (44.6)	231 (50.9)	223 (49.1)	1.00	
<b>Has the child ever been to a dentist?</b>					<b>0.037**</b>
Yes	846 (91.0)	295 (34.9)	551 (65.1)	1.62 (1.03-2.54)	
No	84 (9.0)	39 (46.4)	45 (53.6)	1.00	
<b>Parent or caregiver has low dental health literacy</b>					<b>0.004**</b>
No	648 (66.7)	218 (33.6)	430 (66.4)	1.49 (1.13-1.96)	
Yes	323 (33.3)	139 (43.0)	184 (57.0)	1.00	
<b>Have inadequate fluoride</b>					<b>&lt;0.001**</b>
Yes	201 (20.2)	47 (23.4)	154 (76.6)	2.25 (1.58-3.21)	
No	796 (79.8)	324 (40.7)	472 (59.3)	1.00	
<b>Are the child's teeth brushed?</b>					<b>&lt;0.001**</b>
No	397 (39.5)	81 (20.4)	316 (79.6)	3.64 (2.72-4.87)	
Yes (daily & once in a while)	607 (60.5)	293 (48.3)	314 (51.7)	1.00	
<b>The child has presence of caries</b>					<b>&lt;0.001**</b>
Yes	921 (91.5)	326 (35.4)	595 (64.6)	2.31 (1.48-3.60)	
No	86 (8.5)	48 (55.8)	38 (44.2)	1.00	
<b>IOHP Clinician's Impression</b>					<b>&lt;0.001**</b>
Low risk	684 (68.1)	213 (31.1)	471 (68.9)	2.20 (1.67-2.89)	
High risk	321 (31.9)	160 (49.8)	161 (50.2)	1.00	

\*\*p < 0.05 using the Wald Chi-square test.

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