

Scientific Article

Determinants of Early Childhood Caries in Low-income African American Young Children

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Abstract: ***Purpose:** The aim of this longitudinal study was to evaluate the association between early childhood caries (ECC) and severe ECC (S-ECC) and social, dietary, and behavioral risk factors. **Methods:** A representative sample of low-income 0- to 5-year-old children was selected from Detroit. Children and their caregivers were examined for the presence and severity of dental caries. Trained interviewers administered questionnaires assessing social, dietary, and behavioral factors. **Results:** A total of 1,021 child and caregiver dyads were examined in wave 1. Of these, 788 (77%) were re-examined in wave 2. ECC and S-ECC were highly prevalent in this cohort. By 2 years of age, 7% of the children had ECC without S-ECC (ECC-only) and 27% had S-ECC. The regression model found that age of the child and caregiver, child's gender, and caregivers' fatalistic oral health beliefs were significantly associated with higher odds ratios of developing ECC-only and S-ECC. Consumption of soda beverages was associated with developing S-ECC. Religiosity was pro-protective against ECC and S-ECC. **Conclusions:** Early childhood caries and severe early childhood caries are highly prevalent in low-income African American children. Intake of soda beverages by the children and the caregivers' fatalistic oral health beliefs and religiosity were significant determinants of ECC and S-ECC. (Pediatr Dent 2008;30:289-96) Received May 16, 2007 | Last Revision August 30, 2007 | Revision Accepted August 31, 2007*

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Although early childhood caries (ECC) is a major problem in low-income and minority populations in the United States,¹⁻⁵ research on its epidemiology and determinants has been limited to cross-sectional or small clinical studies.

The lack of consistent cases and an operational definition of ECC has plagued research on the epidemiology and determinants of ECC.⁶ Several years ago, the National Institute of Dental and Craniofacial Research (NIDCR)⁷ attempted to develop a consensus on defining ECC and introduced the label "severe early childhood caries" (S-ECC). The American Academy of Pediatric Dentistry (AAPD)⁸ followed NIDCR and defined ECC as "...the presence of 1 or more decayed (noncavitated or cavitated lesions) missing (due to caries), or filled tooth surfaces in any primary tooth in a child 71 months of age or younger." For S-ECC, the AAPD's⁸ case definition for children younger than 3 years old is the presence of "any sign of smooth-surface caries." For 3- to 5-year-old children, S-ECC is defined as "1 or more cavitated, missing (due to caries), or

filled smooth surfaces in primary maxillary anterior teeth, or a decayed, missing or filled score of ≥ 4 (age 3), ≥ 5 (age 4), or ≥ 6 (age 5) surfaces."

ECC is not just a dental disease—it is a social, cultural, and behavioral condition that represents the manifestation of practices and beliefs among caregivers.⁹⁻¹¹ While the dental community has focused on biological causes, the true underlying determinants are the behaviors and beliefs of the caregivers of infants and toddlers.^{5,12-14} For example, ECC is more frequent in children who fall asleep sipping a sugar containing fluid.¹² While it has a biological role in causing carious demineralization, the frequent exposure to sugary fluids is determined by attitudinal, cultural, behavioral, and social environments of the children and their caregivers.

This study's aim was to describe the incidence and determinants of ECC in low-income African American children in Detroit, Mich. A previous analysis of the baseline data of this longitudinal study found that maternal oral health fatalism and knowledge of children's hygiene needs were associated with ECC.^{15,16} ECC was higher among younger children who had past restorative care.¹⁵ The brushing habits of preschool children were significantly associated with the caregivers' knowledge about oral health, their own oral hygiene habits, and self-efficacy regarding tooth-brushing.¹⁶ Availability of transportation, dental insurance, and family income were also factors in reporting positive oral health behaviors.

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Table 1. PROPORTION OF CHILDREN WITH NO CLINICAL CARIES (NC), EARLY CHILDHOOD CARIES (ECC-ONLY*), AND SEVERE EARLY CHILDHOOD CARIES (S-ECC) †

Wave 1: 2002-03 (N=1,021)				
Child's age	N	NC (%)	ECC-only (%)	S-ECC (%)
0	136	98	0	2
1	167	92	1	7
2	196	66	7	27
3	178	41	15	44
4	169	24	20	56
5	175	10	29	61
Total	1,021	53	13	34
Wave 2: 2004-05 (N=788)				
Child's age	N	NC (%)	ECC-only (%)	S-ECC (%)
2	109	63	7	30
3	136	25	16	59
4	152	17	16	67
5	135	13	40	47
6	131	7	35	58
7	125	6	25	69
Total	788	21	24	55
Children who participated in waves 1 and 2 (N=788)				
Child's age at wave 2	ECC-only		S-ECC	
	Wave 1 (%)	Wave 2 (%)	Wave 1 (%)	Wave 2 (%)
2	0	7	3	30
3	1	16	9	59
4	6	16	26	67
5	15	40	41	47
6	16	35	57	58
7	25	25	64	69
Total	11	24	34	55

* Excludes S-ECC children.

† Adjusted proportion after accounting for complex survey design.

Methods

Sample selection. From 2002 to 2003, this study followed a randomly selected sample of low-income African American children, all younger than 5 years old, and their primary caregivers. According to the third National Health and Nutrition Examination Survey (NHANES III), these children had a higher caries experience than the national average and lagged far behind the 2010 Oral Health Objectives.^{17,18} These children and their primary caregivers were selected using a

multi-stage sampling strategy from the 39 census tracts in the city of Detroit with a higher concentration of low-income residents. From these tracts, a total of 118 blocks groups (segments) were formed that had 14,391 housing units—from which we randomly selected 12,655 units with probability inversely proportional to the size of the segments. Each household was visited by a trained interviewer to screen for the presence of African American children whose overall family income status was not higher than 2.5 times the federal poverty income ratio. A total of 10,695 housing units were occupied. Among these units, 9,781 units were contacted and screened. There were 1,386 eligible children in the contacted households. From these, 1,021 child and caregiver dyads were interviewed and examined at the Dental Assessment Center, Detroit. The combined screening and interviewing response rate was 74% in wave 1 (2002-03).

From a total of 1,021 children who completed an interview and examination in wave 1, 77% (N=790) were interviewed and examined during wave 2. Two children could not be examined. Hence, the sample size included in this analysis is 788 children. There were no statistically significant differences in caries experiences between children who were examined in wave 1 and those examined in wave 2.

The Health Sciences Institutional Review Board (IRB-Health Sciences) at the University of Michigan granted approval for the study.

The dependent variable was an indicator of whether children had ECC or S-ECC, following the definition developed by a workshop organized by NIDCR in 1999.⁷ The NIDCR definition of ECC includes S-ECC children. For the purpose of this paper, the ECC definition was modified to include only those children who have any sign of dental caries but do not meet the definition of S-ECC. This paper refers these children as the ECC-only group.

The sampled children were examined by a team of 4 dentists in waves 1 and 2 using the International Caries Detection and Assessment System (ICDAS)—a new caries classification system that differentiates between early (noncavitated) and advanced (dentinal or cavitated) caries. Three of the dentists participated in both waves. Details of the examination procedure have been described in another publication.¹⁹ The reliability of 6 examiners to classify tooth surfaces by their ICDAS carious status ranged between good to excellent (kappa coefficients ranged between 0.59 and 0.82).¹⁹ Using the ICDAS criteria, each sampled child was classified as either: (1) “no clinical caries”(NC); (2) ECC-only; or (3) S-ECC, following the NIDCR definition. Proportions of children with NC, ECC-only, and S-ECC by wave 1, wave 2, and transition are presented in Table 2. By comparing the dental caries experiences in waves 1 and 2, the transitional status of dental caries (no change, regression, and progression)

was identified for each sampled child. Along with the transitional status, cumulative disease status was also created to combine children with the diseased status in wave 1 with those progressing to diseased status in wave 2. For example, NC children in both waves were classified as a comparison group, while those classified as ECC-only in either wave 1 or 2 were considered to have ECC-only.

Five sets of independent variables in this analysis were identified as follows: (1) caregivers' sociodemographic characteristics; (2) children's demographic information; (3) caregivers' psychosocial factors potentially influencing oral health; (4) children's consumption of sugary foods; and (5) oral hygiene related factors. Note that all independent variables were based on the information collected at the baseline or wave 1 survey.

Caregivers' sociodemographic characteristics included age, annual household income (grouped as 1≤\$10,000, 2=\$10,000-\$19,999, 3≥\$20,000), the highest education level (1≤high school, 2=high school diploma, 3=some college or more), and caregivers' relationship to children (1=biological mother, 2=biological father, 3=grandmother, 4=someone else). Additional information included the frequencies of moving during the last 5 years, types of insurance (1=no insurance, 2=public dental insurance, 3=private insurance), Women, Infants, and Children program participation, and religiosity, which was measured by 4 response scales (1=not religious at all, 2=not too religious, 3=fairly religious, 4=very religious).

To measure children's consumption of sugary foods, we used the Block Kids Food Frequency Questionnaire, developed by Block Dietary Data Systems, Berkeley, Calif. Trained interviewers collected the frequency of consumption of food items and their amounts per serving. Data were processed by Block Dietary Systems. Based on the reported frequencies, a continuous variable was created to indicate the number of days when children had consumed sodas during the last week (1=none, 2=1 day, 3=2-6 days, 4=every day).

The variables of caregivers' psychosocial factors included depressive symptoms, parenting stress, and perceived discrimination. Depressive symptoms of caregivers were measured using the Center for Epidemiological Studies Depression Scale.^{20,21} These scores were dichotomized for analysis (<23 or ≥23), with a score of 23 or greater indicating the presence of depressive symptoms.²² Parenting stress score was constructed by averaging responses to 6 items. This score was examined and validated with an alpha reliability of 0.76 in a previous analysis.^{15,16} Routine experiences of discrimination were measured by asking caregivers 11 items from the "everyday discrimination scale."¹⁶ Combining the responses of the 11 items resulted in a perceived discriminations scale with an alpha reliability of 0.85. A dummy variable was created to identify caregivers in the 75th percentile or higher of this score.

Four dummy variables were created to assess dental behaviors. They indicated:

1. past dental care experience of the child;

2. caregivers' hygiene performance (measured using the patient hygiene performance index)¹⁹;
3. children's tooth-brushing frequency during the last week; and
4. belief in oral health fatalism (1=agree with the statement "most children eventually develop dental cavities").

Two continuous variables, dental service availability and the frequency of using a cloth to wipe the teeth or mouth of children, were also included in this analysis. In addition, to capture various aspects of caregivers' oral hygiene knowledge and self-efficacy, 3 belief scores were constructed as Finlayson et al indicated in their cross-sectional studies.¹⁵ The scales of knowledge about bottle use (**KBU**) and knowledge of children's oral hygiene needs (**KCOH**) were created as described by Finlayson et al.^{15,16} The scale of oral health self-efficacy (**OHSE**) was assessed by averaging responses of 9 items measuring levels of confidence about getting children's teeth brushed before bedtime under various situations. The Cronbach alphas of KBU, KCOH, and OHSE were 0.76, 0.77, and 0.91, respectively.¹⁶

Statistical analysis. All collected data were entered in duplicate by 2 different research staffs. Discrepancies between the first and second entries were checked and resolved by a third research staffer. Statistical analyses of data were conducted using STATA v. 9.1 software (Stata Corp, College Station, Tex) to account for a clustering effect due to the complex sample design. All analyses were adjusted using sampling weights that were developed to account for unequal selection probabilities and differential nonresponse. A small number of missing values (<4% for any individual item) were found in the independent variables and were imputed using IVEware software, a SAS-callable software application, (Survey Research Center, Institute for Social Research, University of Michigan) before modification to create scores or dummy variables.²³

Two sets of logistic regression models were developed to investigate the relationship between the independent variables and ECC-only or S-ECC status. Then, a cumulative logit multinomial model was developed to predict the ordered categorical variable (nonclinical caries, ECC-only, S-ECC) from the 5 sets of independent variables. Another cumulative logit model was used to identify significant risk factors that explain why children with no clinical caries in wave 1 developed ECC-only and S-ECC by wave 2. Each model was carried out assuming a type I error rate of 5%. In addition, a pseudo-R squared coefficient was computed for each of the models to summarize their predictive power. Known as the likelihood-ratio index, it compared the maximized log likelihood of a null model to the one of a given model.²⁴ This measure describes the power of the explanatory variables to predict the dependent variable (ECC-only or S-ECC, in this case).²⁵

Table 2. MEAN (±SD) OF DECAYED, MISSING, AND FILLED TOOTH SURFACES BY THE SEVERITY OF DENTAL CARIES IN WAVE 1 (2002-03), WAVE 2 (2004-05), AND NEWLY DEVELOPED DECAYED, FILLED, AND MISSING TOOTH SURFACES BETWEEN WAVES 1 AND 2

Wave 1: 2002-03							
	Age 0 (N=136)	Age 1 (N=167)	Age 2 (N=196)	Age 3 (N=178)	Age 4 (N=169)	Age 5 (N=175)	Total (N=1,021)
d1 only*	0.02±0.01	0.26±0.16	1.23±0.17	2.24±0.25	3.72±0.32	4.21±0.30	2.06±0.11
d2 only†	0.01±0.01	0.41±0.23	1.14±0.45	2.22±0.53	3.79±0.56	4.01±0.97	2.04±0.22
Total filled	0±0	0±0	0.06±0.06	0.25±0.13	0.58±0.14	1.33±0.37	0.40±0.07
Missing due to caries	0±0	0±0	0±0	0.22±0.19	0.63±0.30	1.49±0.43	0.43±0.11
<i>P</i> -value of <i>t</i> test (d1-d2)	.68	.58	.88	.97	.91	.81	.93
Ratio (d1/d2)	1.64±2.00	0.63±0.51	1.07±0.49	1.01±0.22	0.98±0.15	1.05±0.22	1.01±0.10

Wave 2: 2004-05							
(No. examined)	Age 2 (N=109)	Age 3 (N=136)	Age 4 (N=152)	Age 5 (N=135)	Age 6 (N=131)	Age 7 (N=125)	Total (N=788)
All surfaces (100 surfaces)							
d1 only	1.75±0.37	3.45±0.37	4.97±0.37	3.98±0.37	4.25±0.31	4.22±0.28	3.79±0.11
d2 only	1.31±0.55	2.12±0.40	3.37±0.53	2.51±0.42	3.56±0.54	4.18±0.77	2.87±0.22
Total filled	0±0	0.46±0.23	0.78±0.26	1.18±0.42	1.66±0.41	2.28±0.59	1.08±0.16
Missing due to caries	0.29±0.19	0.88±0.39	0.79±0.34	0.62±0.37	1.21±0.38	2.20±0.57	1.01±0.12
<i>P</i> -value of <i>t</i> test (d1-d2)	.38	<.001	.01	.006	.30	.96	<.001
Ratio (d1/d2)	1.34±0.49	1.62±0.24	1.47±0.24	1.58±0.27	1.19±0.21	1.01±0.22	1.32±0.10

New carious lesions between waves 1 and 2							
(No. examined)	Age 2 (N=109)	Age 3 (N=136)	Age 4 (N=152)	Age 5 (N=135)	Age 6 (N=131)	Age 7 (N=125)	Total (N=788)
All surfaces (100 surfaces)							
d1 only	1.75±0.37	3.43±0.37	4.53±0.35	2.95±0.32	2.24±0.22	1.90±0.17	2.79±0.11
d2 only	1.29±0.54	1.95±0.32	3.02±0.46	1.73±0.25	2.07±0.31	2.11±0.34	2.03±0.16
Total filled	0±0	0.46±0.23	0.68±0.25	1.16±0.42	1.44±0.38	1.53±0.47	0.90±0.15
Missing due to caries	0.29±0.19	0.88±0.39	0.79±0.34	0.62±0.37	0.45±0.11	0.78±0.19	0.63±0.14
<i>P</i> -value of <i>t</i> test (d1-d2)	.35	<.001	.005	.002	.67	.61	<.001
Ratio (d1/d2)	1.35±0.49	1.77±0.22	1.50±0.22	1.71±0.28	1.08±0.20	0.90±0.18	1.37±0.11

* Noncavitated carious lesions (codes 1 and 2) according to the International Caries Detection and Assessment System (ICDAS).¹⁹

† Cavitated or dentinal carious lesions (codes 3-6) according to the International Caries Detection and Assessment System (ICDAS).¹⁹

Results

The prevalence of ECC-only and S-ECC in the examined children in waves 1 (N=1,021) and 2 (N=788) and among those who participated in both waves (N=788) is presented in Table 1. In wave 1, the prevalence of ECC-only and S-ECC in 1-year-old children was 1% and 7%, respectively. By 5 years of age, 29% of the children had ECC-only and 61% had S-ECC.

Overall, in wave 1, 13% of the children had ECC-only and 34% had S-ECC. In wave 1, the absolute difference in the prevalence of ECC-only and S-ECC increased with age. This finding indicates that, in early life, dental caries developed on smooth surfaces (S-ECC definition) and, in later childhood years, caries started to develop in pits and fissures. This observation was confirmed by analysis of ECC-only and S-ECC in children who participated in both waves (Table 1).

The difference in the prevalence of ECC-only and S-ECC between waves 1 and 2 was larger in the early childhood years (ages 0-3 in wave 1 or 2-5 in wave 2) compared with the late childhood years (ages 4-5 in wave 1 or 6-7 in wave 2).

The mean numbers of noncavitated carious lesions (ICDAS codes 1-2) and cavitated or dentinal lesions (ICDAS Codes 3-6) are presented in Table 2. In wave 1, 1-year-old children had a higher mean number of cavitated or dentinal carious lesions than noncavitated lesions. The difference, however, was not statistically significant. In wave 2 (2004-05), the mean number of noncavitated lesions was significantly higher than the mean number of cavitated lesions in 3- to 5-year-old children ($P < .001$, $P = .01$, $P = .006$, respectively). Among children who participated in both waves, the mean number of new noncavitated carious tooth surfaces was significantly higher than the mean number of cavitated tooth surfaces among 3- to 5-year-old children ($P < .001$, $P = .005$, $P = .002$, respectively).

Table 3 presents the transition in the proportion of ECC-only or S-ECC children between waves 1 and 2. Using caries status based on the ECC-only and S-ECC definition in waves 1 and 2, 3 groups of children were defined (NC, ECC-only, and S-ECC) with a progression or regression status of ECC-only or S-ECC. Regression of status resulted from the natural exfoliation of primary teeth. Approximately one fifth (21%) of the children had no signs of clinical caries in waves 1 and 2, while 14% and 21% of all children developed ECC-only or S-ECC, respectively, between waves 1 and 2 but had no caries in wave 1.

The risk factors associated with ECC-only and S-ECC are presented in Table 4. The older age of the child and caregiver and the number of times the family had moved during the last 5 years were significantly associated with increased odds of developing ECC-only. The odds of developing S-ECC significantly increased with the age of the child and caregiver as well as the frequencies of soda consumption. Religiosity was consistently and significantly associated with lower odds ratios of ECC-only and S-ECC. Caregivers with fatalistic oral health beliefs (“most children will eventually develop cavities”) had children with higher odds of developing new S-ECC between waves 1 and 2 in the multinomial model. The 3 models explained between 9% and 35% of the variation of the prevalence of ECC-only and S-ECC.

When only children who had NC in wave 1 were included in the model (the result of the model, not shown), being female was positively

associated with higher odds of progressing to ECC-only and S-ECC. Religiosity was associated with lower odds of progressing to ECC-only and S-ECC. This model only explained 5% of the variation in developing ECC-only or S-ECC among children with no clinical caries at the baseline.

The caregivers who reported that they were “very religious” were older and more likely to have higher education and income status compared with those who reported that they were “not religious at all.” A significantly higher proportion of the “very religious group” were relatives or grandmothers of the children compared with those in the “not religious group.” The “very religious” group had significantly lower reported daily discrimination experiences, and was significantly less likely to change their residence within the last 5 years prior to the baseline interview, compared with the “not at all religious group.”

Discussion

This study presented data on ECC and S-ECC in low-income African American children. The sampling design ensured that a representative sample was selected, and the response and follow-up rates were relatively high. The 3 important findings in this study are the: 1) progression of noncavitated and cavitated carious lesions by age; 2) determinants of ECC and S-ECC; and 3) percent of explained variation.

Noncavitated carious lesions were more prevalent in very young children. The same observation was reported by Autio and Tomar in Head Start children in Florida.³ The ratio of noncavitated to cavitated lesions decreased with age, indicating that the first carious attack in young children started early, and that more cavitated lesions developed later. From a clinical perspective, this finding points to the need to detect caries early in young children and also implies that caries can be prevented by using nonrestorative interventions. The question is, who

Table 3. PROPORTION * OF CHILDREN WITH TRANSITIONS OF EARLY CHILDHOOD CARIES ONLY (ECC-ONLY) † AND SEVERE EARLY CHILDHOOD CARIES (S-ECC) BETWEEN WAVES 1 AND 2

Wave 1	Wave 2	Wave 2 cumulative	Status	N	Proportion (%)
ECC-only	ECC-only	ECC-only	No change	43	6
S-ECC	ECC-only	S-ECC	Regression‡	34	4
ECC-only	S-ECC	S-ECC	Progression	38	4
S-ECC	S-ECC	S-ECC	No change	239	30
ECC-only	NC§	ECC-only	Regression‡	2	0
S-ECC	NC	S-ECC	Regression‡	5	0
NC	NC	Comparison group	No change	160	21
NC	ECC-only	ECC-only	Progression	105	14
NC	S-ECC	S-ECC	Progression	162	21

* Adjusted proportion after accounting for complex survey design.

† Excludes S-ECC children.

‡ Regression occurs in most cases due to natural loss of primary teeth.

§ NC=no caries.

Table 4. ESTIMATED ODDS RATIOS* (OR) AND STANDARD ERRORS (±SD) FROM REGRESSION MODELS FOR CHILDREN'S TRANSITION STATUS OF EARLY CHILDHOOD CARIES ONLY (ECC-ONLY)† AND SEVERE EARLY CHILDHOOD CARIES (S-ECC)*—ONLY PREDICTORS THAT WERE STATISTICALLY SIGNIFICANT ARE PRESENTED‡

	ECC-only‡ vs control		S-ECC vs control		Multinomial (control -ECC-only ‡-S-ECC)	
	OR±(SD)	P-value	OR±(SD)	P-value	OR±(SD)	P-value
Children's demographic information						
Gender: female vs male	1.75±0.67	.15	1.74±0.42	.03	1.53±0.26	.01
Age	2.15±0.35	.00	1.72±0.20	.00	1.28±0.08	.00
Children's consumption of sugary foods						
Soda consumption during last week	1.27±0.20	.14	1.25±0.13	.04	1.11±0.08	.16
Caregiver's background information						
Caregiver's age	1.06±0.03	.05	1.06±0.02	.01	1.04±0.01	.00
Frequencies of moving during the last 5 years	1.29±0.13	.01	1.07±0.08	.35	1.04±0.05	.36
Religiosity score §	0.59±0.10	.00	0.63±0.08	.00	0.80±0.07	.02
Fatalistic belief (most children eventually develop dental cavities): agree vs disagree	0.56±0.19	.10	1.38±0.38	.24	1.63±0.32	.01

* Four cases in the first model and 13 cases in the other models were excluded because the patient hygiene performance index was not collected due to lack of index or replacement teeth.

† The full model included: caregivers' relation to child; education and income of the caregiver; children's visits to a dentist; insurance status; psychosocial factors; bottle use; oral hygiene practices; and participation in Women, Infants, and Children programs.

‡ Excludes S-ECC children.

§ Religiosity score was defined based on the response to the following question:

How often do you usually attend religious services? Would you say

- 1: Less than once year or A few times a year --> Not religious at all
- 2: A few times a month (1 to 3 times) --> Not too religious
- 3: At least once a week (1 to 3 times) --> Fairly religious
- 4: Nearly everyday (4 or more times a week) --> Very religious

should be responsible for early detection of dental caries in children younger than 3 years old? Members of the dental team, including dentists, hygienists, and dental assistants as well as parents/caregivers, community health workers, social workers, and health care providers should all be involved in preventing ECC in young children.

While this study evaluated over 20 predictors of ECC-only and S-ECC, the major finding is the consistent association between developing ECC-only and S-ECC and the ages of children and caregivers as well as the reported religiosity. Religiosity, while not a direct factor associated with ECC-only, could serve as a modifying factor. For example, there is evidence that religiosity is negatively associated with depression, anxiety, and stress in African American women.²⁶ Religiosity seems to be associated with better response to stress and better cardiovascular outcomes.²⁷ Religiosity was also found to be positively associated with good mental health.²⁸ In this study, religiosity was a characteristic associated with being a caregiver with a higher income, education, and more stable residence.

Another important factor was the frequency of consumption of sugary drinks, which was positively associated with S-ECC but not ECC-only. This indicated that, in this population, soft drinks were associated with the development of smooth surface decay. In this population, approximately 16% of the 0- to 2-year-old children reportedly consumed soft drinks once a day and approximately 7% consumed soft drinks at least 2 times per day. In a previous longitudinal study of 1- to 2½-year-old Swedish children who were followed until the age of 3½ years, consumption of soft drinks twice a day was found to increase the odds of developed caries at least 2.6 times. This longitudinal study adds to the body of knowledge that exists on the association between dental caries and consumption of soft drinks.

This longitudinal study found that, at most, 25% and 35% of the variation in S-ECC or ECC-only can be explained by the factors included in the model (Table 4). While some important risk factors, such as cariogenic bacteria, were not measured in the study and almost all predictors were

measured using questionnaires, this level of explanation may not be definitive to develop causal models for interventions. The dental community, however, needs to move forward and develop interventions to reduce the burden of ECC. There is a need to consider social and behavioral factors in interventions, and it is our opinion that a reliance on preventive strategies alone, such as fluoride varnish, will not produce sustainable change in ECC patterns.

Low-income African-American children in Detroit have a high prevalence of ECC and S-ECC. There are several measures that can be taken to manage this problem. The current system that relies on the weak delivery system for the delivery of dental care through Medicaid is evidently not working. There is a need for moving upstream to propose and implement policies and programs that focus on developing communities, employment, education, and delivery of integrated and community-based, evidence-based management programs.²⁹ Preventing ECC using a comprehensive approach that relies on multiple intervention approaches was recently endorsed by the Maternal and Child Health Bureau of the Health Resources and Services Administration.³⁰ The conference participants endorsed that there is a need to: 1) include ECC prevention with other child health and development systems; 2) use a chronic disease management model; and 3) employ comprehensive approaches at multiple levels involving families, clinicians, and child service providers.³¹

Conclusions

Based on this study's results, the following conclusions can be made:

1. Low-income African American children in Detroit had a high prevalence and incidence of early childhood caries (ECC) and severe ECC (S-ECC).
2. The regression analyses found that age of the child and caregiver, gender of the child, and fatalistic belief and religiosity of the caregivers were significant predictors of ECC and S-ECC.
3. Consumption of soft drinks was associated with development of S-ECC.
4. The regression models explained less than one third of the variability in development of ECC over the 2 years.

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