

The Oral Health Status of Adolescents in Northern Manhattan

Dennis A. Mitchell, DDS, MPH

Luisa N. Borrell, DDS, PhD

Shana L. Lassiter, MA

Allan J. Formicola, DDS, MS

Abstract: Objectives. This study was designed to describe the oral health status of adolescents residing in northern Manhattan. **Methods.** Clinical, demographic, and behavioral data were collected from 3,282 youths who ranged in age from 12 to 16 years. Clinical examinations were performed by two trained examiners. Demographic and behavioral data were self-reported. **Results.** The adolescents were predominantly Hispanic/Latino and Black/African American (94%), with 6% falling into other racial categories. Caries were discovered in a significant proportion of these youths (52% of Hispanics, 54% of Blacks and 54% of others). Despite similar caries experiences, the oral health disease burden was not evenly distributed across groups. In many cases, Hispanic youths demonstrated less disease and more frequent engagement in oral health promoting behaviors than their non-Hispanic peers. Gender differences were less consistent. **Conclusions.** Economically disadvantaged and minority youths, such as those residing in northern Manhattan, continue to be unduly burdened by untreated dental disease. Further, our data suggest that certain subpopulations may be particularly vulnerable to dental disease. This vulnerability underscores the need for accessible services addressing the oral health needs of these segments of the population. Finally, effective community-based oral disease prevention and health promotion programs are sorely needed to improve these youths' oral health.

Key words: Oral health, dental caries, adolescents, school-based dentistry.

Over the past 25 years, results from representative national surveys have outlined that even though the national mean dental caries rates have been declining, there remains an alarmingly high rate of dental caries in racial/ethnic minority populations and those residing in impoverished communities.¹⁻⁷ The year 2000 *United States (U.S.) Surgeon General's Report* calls for new efforts to eliminate disparities in oral health status and rates of oral disease. The report highlights the hidden epidemic of oral diseases that largely affects minority groups and the serious consequences that lack of access to

All four authors are affiliated with the College of Dental Medicine at Columbia University. Dr. Mitchell is also affiliated with the Harlem Hospital Center Department of Dentistry and Dr. Borrell with the Mailman School of Public Health at Columbia. Dr. Mitchell can be reached at Columbia University College of Dental Medicine, Office of Diversity and Multicultural Affairs, 630 W. 168th St., P&S Box #20, New York, NY 10032; DML48@columbia.edu.

oral health services has on overall health and well-being.¹ Minority and economically disadvantaged populations shoulder the burden of poor oral health throughout their lifespans. Recent research has demonstrated that minority and economically disadvantaged populations experience a higher incidence of early childhood caries,^{1,2,8-11} a greater need for treatment of caries and orthodontic problems as adolescents,^{1,2,10-13} as well as poor oral health in adulthood^{1,2,14} and in their senior years.^{1,2,15} These higher rates of disease, coupled with the limited access to quality oral health care and high levels of untreated disease associated with minority status and economic disadvantage,^{1,2,9,12,14-19} indicate that additional work is needed to eliminate oral health disparities in the U.S.

Data concerning the oral health of adolescents are needed, particularly for the most vulnerable adolescents living in low-income, predominantly minority communities. In 1994, the Columbia University College of Dental Medicine (CUCDM) and its affiliate, the Harlem Hospital Center Department of Dentistry (HHCDD), enlisted the participation of the Columbia University Joseph L. Mailman School of Public Health (CUSPH), the principals of public schools in northern Manhattan, local school and community boards, the Alianza Dominicana (the largest social service organization in northern Manhattan), and other community organizations to form the Community DentCare Network.²⁰⁻²³ In brief, the goal in establishing the network was to improve access to oral health care throughout the northern Manhattan communities of Central Harlem and Washington Heights/Inwood by offering convenient services at low cost in public schools. With the addition of the Elder Smiles program, launched in 2005, this network now provides vital oral health services to all northern Manhattan community residents, from preschoolers to the elderly. The scope of the Community DentCare Network can be envisioned by the number of patient visits it completes. The Community DentCare Network provided over 40,000 patient visits in the year 2004-2005 and over 50,000 patient visits in 2005-2006. The Community DentCare Network is projected to once again exceed 50,000 visits in 2006-2007.

Northern Manhattan, an area located North of 110th Street and primarily consisting of the neighborhoods of Harlem and Washington Heights/Inwood, has an overall population of more than 400,000 residents. This area is a major center of Latino and African American culture and is home to many immigrants. Income is much lower, and the need for social services higher, than in New York City (NYC) as a whole.⁶ According to the year 2000 Census, 36.6% of Central Harlem residents and 29.8% of Washington Heights/Inwood residents were living below the federal poverty level.²⁴ These numbers are particularly salient given that they exceed the 21.2% poverty rate for all of NYC,²⁵ a city known for its high cost of living. Further, both communities have been designated dental health professional shortage areas by the Department of Health and Human Services' Bureau of Primary Care.

A preliminary study of the dental caries experience of northern Manhattan adolescents¹² was conducted by a research group including the current study's first and fourth authors. That study was conducted at five school-based Community DentCare sites during the 1997-1998 school year. Results from the preliminary investigation indicated that northern Manhattan adolescents suffer from significantly poorer oral health than their peers around the nation. The northern Manhattan youths had significantly higher

levels of decay and untreated decay than their counterparts examined during the Third National Health and Nutrition Examination Survey (NHANES III).

The current study aims to expand the preliminary study's findings, by examining the baseline characteristics of children attending school-based dental clinics in northern Manhattan during the years 1997 to 2001; investigating whether high mean caries prevalence exists in only a small number of the adolescents; and investigating whether there are differences in behavioral characteristics between adolescents with and without caries.

Methods

The current study is the follow-up to a preliminary study¹² of students at five public school Community DentCare Network prevention sites during the 1997–1998 academic year. These sites, Intermediate School (IS) 52, IS 143, and IS 164 in Washington Heights/Inwood, and IS 136 and the School for Pregnant and Parenting Teens (SPPT) in Central Harlem, were also located within CUSPH school-based primary health care facilities.²³ Therefore, the evaluation data collected for the preliminary study and current study were obtained in conjunction with service delivery. Examiners were calibrated at the outset of the study, using the National Institute of Dental and Craniofacial Research's oral examination criteria.

The current study presents findings from four of the five Community DentCare school sites used for the preliminary study, collected during the academic school years from September 1997 through June 2001. Preliminary data from this cohort were published in 2003.¹² The current study details the expanded analyses that were subsequently conducted. Data from the SPPT were consistent outliers due to the school's exclusively female and significantly older population, and thus were excluded from these analyses. Prior to data collection, consent forms were sent to the caregivers of all students attending the four schools. Consent was received for over 90% ($n=3,282$) of the children; all children with consenting caregivers were seen by the Community DentCare Network staff. Children whose caregivers consented were offered a full range of primary care services, including dental preventive services. Less than 40% of the children in these communities had New York State–funded Medicaid; however, the children who were not eligible received the services from the Network free of charge. Patients requiring restorative and other services were referred to Network primary care practices situated throughout northern Manhattan or to local practitioners willing to accept Medicaid reimbursement or to give uncompensated care. Additional secondary and tertiary services were provided at CUCDM or HHCCD. All services were provided by licensed dentists, hygienists, or postdoctoral clinical dental fellows.^{20–23}

Consistent with previous studies, selected sociodemographic characteristics were included in the analyses. Due to the self-report nature of the sociodemographic questionnaire used, data were not available for all students. Gender, age, and race data were recorded for 3,079 of the students, 1,591 females (52%) and 1,488 males (48%). The ages ranged from 11.7 to 15.6 years across the four schools, with a mean age of 12.4 years for both males and females. The students were predominantly (94%) Black/African American and Hispanic/Latino. The remaining 6% of students were categorized

racially as *Other*. The *Other* category includes the small number of White, Asian, and Native American children examined.

At each school site, clinical oral examinations and referrals for restorative treatment were conducted by the supervising dentist, followed by oral prophylaxis, fluoride treatment, scaling, placement of pit and fissure sealants, and instruction in oral hygiene by the dental hygienist under the dentist's supervision. Children who required immediate referral for treatment received preventive services after their acute conditions were treated. For this analysis, data collected during the clinical oral assessment were recoded to create the following variables: percent who were caries free (in the permanent dentition), mean number of permanent teeth present, percent with mixed dentition, percent with at least one sealed permanent tooth, presence/quantity of plaque, presence/quantity of calculus, presence/number of soft tissue lesions and presence of oral pain. Data on caries, calculus, and plaque were collected by trained examiners using the National Institute of Dental and Craniofacial Research's oral examination criteria.²⁶

All children were required to complete a dental history form that included socio-demographic and behavioral questions. Oral hygiene behaviors were assessed by the questions, *How often do you brush your teeth?*, *How often do you use floss to clean your teeth?*, and *Do you share your toothbrush with someone else in your family?* Dental visit behaviors were assessed by the questions, *Not including today, have you ever been to the dentist or dental hygienist?*, *Not including today, have you been to the dentist or dental hygienist at any time during the last 12 months?*, *If yes, reason . . . emergency/pain, or routine care/a regular check-up (i.e., cleanings/fillings/x-rays/braces)?*, and *Do you feel that going to the dentist regularly is important?* Consumption behaviors were assessed by the questions, *Does your drinking water at home have a filter?* and the questions, *Do you . . . drink bottled water, eat sweets or candy, drink soda, drink diet soda, chew gum, and chew sugar-free gum?*

Statistical analysis. Demographic, behavioral, and clinical characteristics were described using means for continuous variables and proportions for categorical variables. These characteristics were compared by gender and race using the *t*-test and chi-square test for statistically significant differences. The crude association between caries status of the permanent dentition and selected covariates was also calculated. Logistic regression was used to estimate the odds ratios (ORs) and the 95% confidence interval (CI) before and after controlling for all other covariates in the model. In addition, for children with caries, linear regression was used to calculate means for decayed, missing or filled (permanent) teeth (DMFT), decayed or filled (permanent) surfaces (DFS), and for each of their components, adjusted for age, gender, race/ethnicity, and school. Further, comparison between those above the 75th and 95th percentile and those below were also performed after adjusting for age, gender, race/ethnicity, and school. All analyses were carried out using SAS.²⁷

Results

Demographic and behavioral characteristics of the population. Selected characteristics of the population are presented by gender and race/ethnicity in Table 1. When compared with females, males were less likely to brush their teeth daily (88.7% vs. 93.2%), were

Table 1.
DEMOGRAPHIC AND HEALTH-RELATED BEHAVIORAL CHARACTERISTICS, AGE 11-17 (N=3,079)

	Gender		Race/ethnicity				Characteristics P-value ^a
	Female (n=1,591)	Male (n=1,488)	P-value ^a	Black (n=586)	Hispanic (n=2,304)	Other (n=189)	
Age (SD)	12.4 (1.5)	12.4 (1.5)	n.s.	13.4 (1.8)	12.1 (1.3)	12.3 (1.4)	<.0001
School							
IS 52	16.0	15.9		3.9	19.0	15.9	
IS 136	21.0	18.7		65.5	8.2	20.6	
IS 143	31.1	29.6		3.6	36.7	36.5	
IS 164	31.9	35.8	n.s.	27.0	36.1	27.0	<.0001
Dental-related behaviors							
Frequency brushing							
Hardly ever	.6	.6		1.4	.4	1.1	
Some days	2.5	3.7		5.7	2.1	7.0	
Most days	3.6	7.0		10.1	3.9	6.5	
Every day	93.2	88.7	.0001	82.8	93.6	85.4	<.0001
Sharing tooth brush							
Never	95.3	96.3		97.1	95.7	92.9	
Sometimes	4.0	2.3		1.7	3.3	5.5	
Frequently	.7	1.4	.01	1.2	1.0	1.6	n.s.

(Continued on p. 819)

Table 1 (continued).

	Gender		Race/ethnicity			Characteristics P-value ^a
	Female (n = 1,591)	Male (n = 1,488)	P-value ^a	Black (n = 586)	Hispanic (n = 2,304)	
Frequency flossing						
Hardly ever	26.6	28.2		38.5	23.7	35.5
Some days	34.9	34.4		38.0	34.1	30.6
Most days	21.3	21.9		16.3	23.2	18.3
Every day	17.2	15.5	n.s.	7.2	18.9	15.6
Dental visit ever (yes)	90.4	90.0	n.s.	89.5	91.0	83.0
Reason for previous DDS visit within last 12 months						
Emergency	5.9	7.0		8.6	5.6	8.8
Check up	59.1	58.5		50.6	61.7	50.5
No	35.0	34.5	n.s.	40.8	32.6	40.7
DDS visit importance (yes)	96.2	95.6	n.s.	94.5	96.7	90.3
Diet-related behaviors						
Filter water (yes)	74.0	72.0	n.s.	47.9	80.2	67.6
Bottled water						
Never	9.1	12.4		6.4	11.6	13.7
Sometimes	75.7	71.8		74.2	73.6	75.3
Frequently	15.2	15.8	.01	19.4	14.8	11.0

(Continued on p. 820)

Table 1 (continued).

	Gender			Race/ethnicity				Characteristics P-value ^a
	Female (n=1,591)	Male (n=1,488)	P-value ^a	Black (n=586)	Hispanic (n=2,304)	Other (n=189)		
Sweets or candy								
Never	1.1	2.6		2.1	1.8	2.2		
Sometimes	53.2	67.7		54.8	61.4	63.2		
Frequently	45.7	29.7	<.0001	43.1	36.8	34.6	.049	
Soda								
Never	1.9	2.0		2.2	1.6	4.4		
Sometimes	59.6	61.5		48.3	64.0	58.8		
Frequently	38.5	36.5	n.s.	49.5	34.4	36.8	<.0001	
Diet soda								
Never	65.8	69.4		65.8	67.8	69.8		
Sometimes	29.7	27.0		29.7	28.2	26.4		
Frequently	4.5	3.7	n.s.	4.5	4.0	3.8	n.s.	
Gum								
Never	3.0	4.5		3.8	3.4	6.0		
Sometimes	48.6	62.0		44.8	57.3	62.1		
Frequently	48.6	33.5	<.0001	51.4	39.3	31.9	<.0001	
Sugar-free gum								
Never	54.8	57.3		52.4	56.7	59.3		
Sometimes	39.8	36.3		40.8	37.5	36.8		
Frequently	5.4	6.4	n.s.	6.7	5.8	3.8	n.s.	

^aP-values correspond to t-test and ANOVA means and chi-square for comparisons between males and females and across racial/ethnic groups.

more likely to frequently share their toothbrush (1.4% vs. .7%), and were less likely to consume bottled water (87.6% vs. 90.9%), consume sweets or candy (29.7% vs. 45.7%) and chew gum (33.5% vs. 48.6% of the females).

Racial/ethnic differences were found for the majority of dental-related behaviors surveyed, with Hispanic youths consistently reporting more oral health-promoting behaviors than their non-Hispanic peers. Although the vast majority of youths brush daily, a significantly higher proportion of the Hispanic youths (93.6%) reported daily brushing than their peers who identified as Other (85.4%) or Black (82.8%). Similarly, Hispanic youths were more likely to report flossing on at least some days than youths identified as Other or as Black. Of those who floss, Hispanic youths were the most likely to floss daily.

Many of the youths interviewed have attended at least one dental visit in the past year. In general, more than 80% of the youths reported having a dental visit in their lifetime, with more than 59% reporting an emergency or check-up visit in the preceding year regardless of their race/ethnicity. Significantly more Hispanic youths reported having a dental visit in their lifetime (91.0% vs. 89.5% of Blacks and 83.0% of the Other group) and in the previous year (67.3% vs. 59.3% of the Other group and 59.2% of Blacks) than their peers from the other racial/ethnic groups. Hispanic youths were also more likely to view dental visits as important (96.7%), although more than 90% of their Black peers and peers in the Other group agreed.

Racial differences were also found among several of the children's diet-related behaviors. Hispanic youths were more likely to report using a water filter than their peers and Blacks were more likely to report unhealthy behaviors in several of the other diet-related categories. Although the majority of the youths only drink bottled water sometimes, a significantly higher percentage of Blacks (19.4% vs. 14.8% of Hispanics and 11.0% of the Other group) reported frequent consumption.

Clinical characteristics of the population. Selected clinical characteristics of the population are presented by gender and race/ethnicity in Table 2. When compared with females, males were significantly more likely to be caries free (52.9% vs. 43.2%), and more likely to have a mixed dentition (29.1% vs. 20.7%). Males, however, had statistically significantly fewer permanent teeth on average (25.1) than their female peers (26.1). Additionally, males were more likely to exhibit moderate to abundant plaque (32.7% vs. 25.4%) and calculus (8.2% vs. 4.9%). The need for orthodontic care, although not significantly different between the genders ($p=.06$), was more common in males.

When compared with their Black counterparts (mean 26.6), the Hispanic and Other youths had fewer permanent teeth (25.4 for both groups) and were more likely to have a mixed dentition. Moderate-to-abundant plaque was found in 26.5% of the Hispanic youths, compared with 36% of their Black and Other peers. Similarly, 5.6% of Hispanics presented with moderate-to-abundant calculus, compared with 9.2% and 9.5% of their Other and Black peers, respectively. Hispanics were also the least likely to report oral pain and to require a referral for orthodontic care. Black youths were most likely to report pain and require orthodontic care. Lastly, although soft tissue lesions were rare (seen in less than 4% of each racial group), Black youths were the most likely to have at least one.

Table 2.

CLINICAL CHARACTERISTICS, AGE 11-17 (N=3,079)

	Gender		Race/ethnicity				Characteristics P-value ^a
	Female (n=1,591)	Male (n=1,488)	P-value ^a	Black (n=586)	Hispanic (n=2,304)	Other (n=189)	
% Caries free	43.2	52.9	<.0001	46.3	48.4	46.2	n.s.
Mean number of permanent teeth (SD)	26.1 (3.3)	25.1 (4.4)	<.0001	26.6 (3.1)	25.4 (4.0)	25.4 (4.0)	<.0001
% with mixed dentition	20.7	29.1	<.0001	14.9	27.4	24.2	<.0001
% of children with at least one sealed tooth	34.9	34.1	n.s.	33.5	34.9	31.7	n.s.
Presence of plaque							
None	2.8	1.9		1.0	2.7	1.1	
Minimal	71.8	65.4		63.0	70.7	63.4	
Moderate	23.6	30.2		32.4	24.9	31.7	
Abundant	1.8	2.5	<.0001	3.6	1.6	3.8	<.0001
Presence of calculus							
None	76.1	67.8		68.7	73.6	66.7	
Minimal	19.1	23.9		21.9	20.9	24.2	
Moderate	4.5	7.3		8.6	5.0	8.1	
Abundant	.4	.9	<.0001	.9	.6	1.1	.01
Presence of soft tissue lesions							
None	97.9	98.3		96.4	98.4	99.5	
One	2.1	1.5		3.6	1.5	.5	
More than one	.1	.1	n.s.	0	.2	0	.001
Presence of pain (yes)	3.0	1.9	n.s.	5.2	2.1	2.7	.006
Referral for ortho (yes)	24.6	27.6	n.s.	30.3	25.1	25.8	.04

^aP-values correspond to t-test and ANOVA means and chi-square for comparisons between males and females and across racial/ethnic groups.

Selected demographic, behavioral and clinical covariates associated with caries status. Tables 3 and 4 show unadjusted and adjusted associations between caries status and selected covariates. Approximately 48% of the children in our sample were caries-free. When examining the unadjusted relationships, there were statistically significant differences between caries-free children and those with caries in all covariates (all p -values $< .05$) except race/ethnicity, the perceived importance of regular dental visits, and the use of a water filter. Children who were caries-free were more likely to be male, to have never had a dental visit in their lifetime, to never consume sweets or candy, and to sometimes drink soda. Children with caries were more likely to be female, to have had a dental visit, to consume sweets and candy frequently, and to never drink soda. With respect to sealants, among those with at least one sealed tooth, 51% were caries-free, a significantly higher proportion than the 48.9% of children with caries. Fewer caries-free children reported experiencing oral pain (23.1%) than their peers with caries (76.9%). Lastly, the association between caries status and the presence of plaque approached statistical significance ($p = .05$), with children having more plaque being more likely to have caries.

The associations for age, gender, reason for a dental visit, proportion of children with mixed dentition and presence of pain with caries status remain significant after adjusting for selected covariates.

Clinical characteristics and caries status. Table 5 shows clinical characteristics by caries status adjusted for age, gender, race, and school for all students with caries, and children above the 75th and 95th percentile of caries status. Remarkably, every clinical characteristic was significantly associated with caries status for those above the 75th and 95th percentile of caries status (all except number of teeth were significant at a p -level of .01). Children above the 75th and 95th percentiles of caries status exhibited significantly poorer dental health than their counterparts below the 75th and 95th percentiles, respectively.

Discussion

Our study shows that although untreated dental disease is a serious problem among northern Manhattan adolescents,¹² a significant proportion of children in this community were caries-free. There were some significant differences in oral health indicators and behaviors among children in our study. Hispanics exhibited better overall oral health than Blacks and youths included in the Other racial/ethnic category, as demonstrated by their more favorable results on several of our clinical and behavioral measures. Despite these differences, all three racial/ethnic groups were similar in their percentages of caries-free individuals. Gender was related to fewer outcomes than race/ethnicity, and the gender differences found were less consistent. When compared with females, males exhibited more favorable behaviors and clinical outcomes in some cases (e.g., they were more likely to be caries-free and consumed sweets less frequently) and less favorable behaviors/clinical outcomes in other instances (e.g., they were less likely to brush daily and had more plaque and calculus). The presence of any differences was somewhat unexpected, given the identical mean ages for the male and female samples.

Our findings are sobering when compared with those from the National Health and

Table 3.

SELECTED DEMOGRAPHIC AND HEALTH-RELATED BEHAVIORAL COVARIATES ASSOCIATED WITH CARIES STATUS

Characteristics	Caries status				P-value ^a	Crude odds ratio (95% CI)	Adjusted odds ratio ^b (95% CI)
	Caries free (n=1,468) Mean (SD)	%	Caries (n=1,599) Mean (SD)	%			
Age (SD)	12.2 (1.3)		12.6 (1.6)		<.0001	1.3 (1.2-1.4)	1.3 (1.3-1.4)
Gender							
Male		52.9		47.1		.7 (6-.8)	.7 (6-.8)
Female		43.2		56.8	<.0001	1.0	1.0
Race/ethnicity							
Hispanic		48.4		51.6		1.0	1.0
African-American		46.3		53.7		1.1 (.9-1.0)	.8 (.7-1.1)
Other		46.2		53.8	n.s.	1.1 (.8-1.5)	1.0 (.8-1.4)
School							
IS 52		53.7		46.3		1.0	1.0
IS 136		38.9		61.1		1.8 (1.4-2.3)	.9 (6-1.3)
IS 143		44.5		55.4		1.4 (1.1-1.8)	1.3 (1.0-1.6)
IS 164		53.3		46.7	<.0001	1.0 (.8-1.2)	1.0 (.8-1.3)
Dental-related behaviors							
Dental visit ever (yes)		47.0		53.0	.01	.7 (6-.9)	.8 (6-1.1)

(Continued on p. 825)

Table 3 (continued).

Characteristics	Caries status				P-value ^a	Crude odds ratio (95% CI)	Adjusted odds ratio ^b (95% CI)
	Caries free (n = 1,468) Mean (SD)	%	Caries (n = 1,599) Mean (SD)	%			
Reason for previous DDS visit within last 12 months							
Emergency	39.4		60.6			1.3 (.9-1.8)	1.2 (.9-1.7)
Check up	45.8		54.2			.8 (.7-.9)	.7 (.6-.9)
No	52.5		47.5		.0002	1.0	1.0
DDS visit importance (yes)	47.8		52.2		n.s.	1.2 (.8-1.8)	1.3 (.9-1.9)
Diet-related behaviors							
Filter water (yes)	48.4		51.6		n.s.	1.1 (.9-1.3)	1.0 (.9-1.2)
Sweets or candy							
Never	51.8		48.2			1.0	1.0
Sometimes	49.9		50.1			1.1 (.6-1.9)	1.1 (.6-2.0)
Frequently	44.2		55.8		.01	1.4 (.8-2.3)	1.2 (.7-2.2)
Soda							
Never	41.1		58.9			1.0	1.0
Sometimes	49.7		50.3			.7 (.4-1.2)	.8 (.4-1.3)
Frequently	45.0		55.0		.03	.8 (.5-1.5)	.8 (.5-1.5)

^aP-values correspond to t-test (means) and chi-square for comparisons between those with and without caries.

^bOdds ratios adjusted for all other covariates in the model.

Table 4.

SELECTED CLINICAL COVARIATES ASSOCIATED WITH CARIES STATUS

Characteristics	Caries status				P-value ^a	Crude odds ratio (95% CI)	Adjusted odds ratio ^b (95% CI)
	Caries free (n = 1,468) Mean (SD) %	Caries (n = 1,599) Mean (SD) %					
Mean number of permanent teeth	25.2 (4.1)	26.1 (3.2)			<.0001	1.1 (1.0-1.1)	1.0 (.9-1.1)
% with mixed dentition (yes)	58.6	41.4			<.0001	.6 (.5-.7)	.6 (.5-.9)
% of children with at least one sealed tooth (yes)	51.0	48.9			.01	.8 (.7-.9)	.8 (.7-1.0)
Presence of plaque							
None	51.4	48.6				1.0	1.0
Minimal	48.6	51.4					
Moderate	47.0	53.0				1.1 (.9-1.3)	1.2 (.9-1.5)
Abundant	31.8	68.2			.05		
Presence of calculus							
None	47.7	52.3					
Minimal	48.5	51.5				1.0	1.0
Moderate	46.4	53.6					
Abundant	60.0	40.0			n.s.	.9 (.8-1.1)	.9 (.7-1.1)
Presence of pain (yes)	23.1	76.9			.001	3.6 (1.7-7.7)	3.5 (1.6-7.5)

^aP-values correspond to t-test (means) and chi-square for comparisons between those with and without caries.

^bOdds ratios adjusted for all other covariates in the model.

Table 5.
MEANS (SE) FOR SELECTED CHARACTERISTICS AMONG CHILDREN WITH CARIES,
ADJUSTED FOR AGE, GENDER, RACE AND SCHOOL (N=1,599)

Characteristics	Mean (SE)	%	All caries			
			<75%	≥75%	All caries	
					<95%	≥95%
Number of teeth	26.1 (.08)	25.9 (.08)		26.7 (.16)*	26.1 (.08)	25.8 (.39)
Number of decayed teeth	1.16 (.03)	.38 (.01)	.8 (.04)	2.32 (.08)*	1.09 (.04)	2.92 (.20)*
Number of filled teeth	2.04 (.05)	.59 (.01)	1.44 (.05)	4.08 (.09)*	1.86 (.05)	6.66 (.24)*
Number of missing teeth	.09 (.01)	.02 (0)	.06 (.01)	.24 (.02)*	.08 (.01)	.61 (.06)*
DMFT	3.30 (.06)		2.32 (.04)	6.64 (.07)*	3.03 (.04)	10.20 (.23)*
Number of decayed surfaces	1.52 (.06)	.38 (.01)	1.04 (.06)	3.15 (.12)*	1.41 (.06)	4.31 (.30)*
Number of filled surfaces	2.94 (.09)	.60 (.01)	2.04 (.08)	6.13 (.16)*	2.66 (.08)	10.21 (.41)*
DFS	4.45 (.10)		3.04 (.08)	9.28 (.16)*	4.06 (.08)	14.52 (.44)*

*p<.01

Nutrition Examination Survey (NHANES). The NHANES III data indicate that 18% of Black 6–14-year-olds and 36.1% of Black 15–18-year olds had at least one decayed tooth. Similarly, 16.9% of Mexican American 6–14-year-olds and 35.8% of Mexican American 5–18-year-olds had at least one decayed tooth.¹¹ Beltrán-Agilar et al.,²⁸ in an analysis of oral health data from NHANES III, NHANES 1999–2000, and NHANES 2001–2002, reported that 48.8% of 6–19 year old Mexican Americans and 38.8% of 6–19 year old Blacks have at least one carious tooth. Although telling, these data represent minority youths of all socioeconomic classes and may not accurately reflect the caries experience of low-income, minority youths.

Vargas and colleagues¹¹ detailed the caries experience of NHANES III youths of differing races/ethnicities and socioeconomic statuses. These researchers report that approximately 20% of Black and Hispanic 6–14 year olds living at or below 200% of the federal poverty line (FPL) had untreated caries. Approximately 40% of Black and Hispanic 15–18 year olds living at or below 200% FPL also had untreated decay. More than half of our sample, including 53.7% of the Black youths and 51.6% of the Hispanic youths, had at least one carious tooth. The elevated caries levels found in our study are striking when compared with the national figures.

Our study also provides data concerning the characteristics associated with caries status. Interestingly, children without caries were more likely to report drinking soda at times, while those with caries were more likely to report no soda consumption. Although not measured in our sample, anecdotal experience indicates that children not drinking soda are drinking fruit juices with high sugar content, which may contribute to our findings. This is commensurate with recent research indicating that sugar and soda consumption may be less predictive of youths' caries experience than they were now that children are heavily exposed to fluoride.^{29,30} However, a recent re-analysis of NHANES III data³¹ indicates that the deleterious effects of soda consumption may be concealed by the statistical approaches used in previous reports. The re-analysis found that children whose beverage consumption included the highest percentage of soda were significantly more likely to have caries than their peers who consumed primarily juice, milk, or water. In an urban public school environment where vending machines offering candy and soda are common, attention to youths' consumption behaviors appears still to be warranted. The current study's results also indicate that the presence of plaque and calculus are contributing factors to caries status. Therefore, the proper demonstration of dental home care behaviors could play an important role in avoiding future disease and eventual oral pain.

Our findings of high oral disease burden among northern Manhattan adolescents provide additional data commensurate with recent national reports detailing our nation's oral health.^{1,3} Our data indicate that the oral health disparities highlighted in the *2000 Surgeon General's Report* and *Healthy People 2010* are ongoing. Oral disease, including caries, continues to disproportionately afflict minority and economically disadvantaged communities. Further, along with the National Institute of Dental and Craniofacial Research's (NIDCR) 2002 plan,³² the *Surgeon General's Report* and *Healthy People 2010* place the utmost importance on the elimination of oral health disparities. The results of the current study indicate that the oral health needs of low-income, minority children, are not being adequately met.

Our study has several strengths and weaknesses that are worth noting. One strength is the study's focus on the oral health experience of low-income urban youths, a vulnerable and understudied population. The large overall sample, exceeding 3,000 students and including greater than 90% of the available population, is an additional strength. A large, representative sample such as this provides confidence in the validity of the study's results. Lastly, a wide array of characteristics were assessed for the current study. The inclusion of demographic characteristics, dental and diet-related behaviors, and clinical assessments provided a fairly comprehensive picture of the youths' clinical status and the factors influencing their oral health. The study's most significant clinical weakness was the lack of calibration, needed to determine inter-examiner and intra-examiner reliability. Fortunately, any detrimental effect was decreased by the fact that only two examiners were used, including one who performed 70% of the examinations. Also, data collected in the course of service delivery, as opposed to data collected for epidemiological purposes, may overestimate disease prevalence. The size and representativeness of the sample indicate that the data provide valid estimates of disease prevalence among northern Manhattan adolescents.

With respect to the behavioral variables studied, it is important to note that self-report data were used. Self-report data are, by nature, susceptible to bias and social desirability effects. Sample size irregularities, particularly the differences among the three race/ethnicity categories, are another potential limitation of the study. By virtue of its size ($n=2,304$), the Hispanic sample may be more representative than the Black and Other samples. It should be noted, however, that although smaller than the Hispanic sample, the Black ($n=586$) and Other ($n=189$) samples were respectable in size, providing confidence in the results obtained. Although we are confident in the representativeness of our results, we are aware that regional differences may affect the national generalizability of these results. Lastly, the study's cross-sectional design and use of a convenience sample should be considered when interpreting its results.

Conclusion

Adolescents in northern Manhattan bear an unnecessarily heavy burden when it comes to poor oral health. This burden represents an important health care problem warranting exploration of new approaches to the delivery of oral health care services in these communities. There are many areas where work should be started and/or sustained to ensure that these youths receive the necessary care. First, it is important for institutions and communities to continue supporting programs such as the CUCDM Community DentCare Network. Such programs are critical because they may provide the only easily accessible and comfortable oral health treatment facilities for economically disadvantaged minority youths. To increase the impact of these facilities, it will be important to ensure the incorporation of scientifically sound health promotion and disease prevention programs. Such programs can help urban youths make lifelong positive changes in their oral health-related behaviors. The success of these programs is likely to stave off future oral health problems, which may in turn positively affect these youths' overall health.¹ It is also important to note that, while low-income, minority children are at higher risk for poor oral health, a select group of these youths appears

to be particularly vulnerable. To ensure the effectiveness of any proposed oral health intervention, researchers must attempt to identify the segments of the population that have the high rates of disease and use that knowledge to develop sorely needed oral health risk assessment tools. These measures will bring our nation closer to its stated public health agenda, as detailed in *Healthy People 2010*, to eliminate existing health disparities and improve quality of life for all. It is, therefore, imperative that all health professionals work to improve the oral health of our most vulnerable populations and eliminate existing oral health disparities.^{33–35}

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Notes

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