

Use of a Population-Based Survey to Describe the Health of Boston Public Housing Residents

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Residents of public housing are more likely than the community at large to be poor and members of a racial or ethnic minority, factors frequently associated with poorer health. Despite a greater potential for disease burden in this population, there have been few descriptions of the overall health status of public housing residents.

The majority of studies on the health of public housing residents have been limited to single health outcomes, including breast cancer screening,^{1–5} mental health in elderly residents,^{6,7} HIV risk among women,^{8,9} and physical activity levels.^{10,11} Some studies have examined measures of health care access and utilization¹² or health outcomes associated with the physical conditions of public housing, including child blood lead levels,¹³ respiratory health,^{14,15} and child injury risk.¹⁵

The only report we found that addressed a range of health issues among public housing residents was an abbreviated article by Rivo and Gray, who reported on a demonstration project conducted in Washington, DC, that sought to reduce chronic disease risk among predominantly Black public housing residents.¹⁶ A second objective of their study was to assess whether public housing residents experienced greater chronic disease risk than did the general population. Data from a health questionnaire administered to public housing residents were compared with a District-wide sample of Black residents interviewed through the Behavioral Risk Factor Surveillance System (BRFSS). Questionnaire results suggested that Black public housing residents had a much higher prevalence of chronic disease risk factors than did the general population in the city. Both men and women in public housing reported twice the prevalence of hypertension and smoking compared with other city residents. Women living in public housing reported twice the prevalence of obesity and more than 3 times the prevalence of diabetes compared with Black women living in the city.

Objectives. We compared the health of public housing residents with other Boston residents through a random-digit-dial survey.

Methods. We used data from the Boston Behavioral Risk Factor Surveillance System collected in 2001 and 2003 to make crude and demographically adjusted comparisons between public housing residents and other city residents on measures of health status, access and utilization, and health behaviors.

Results. Public housing residents were more likely to report fair or poor overall health status, ever-diagnosed hypertension, current asthma, ever-diagnosed diabetes, obesity, disability, loss of 6 or more teeth, and feelings of depression for 15 days or more in the past month. Public housing residents were slightly more likely than others to be without health insurance or report financial barriers to medical care. Public housing residents reported more smoking and physical inactivity, less past-month binge drinking and past-year marijuana use, and similar levels of lifetime drug use.

Conclusions. Public housing residents reported substantially poorer health than did other city residents across a variety of conditions but similar levels of access to and utilization of health care. Public health departments may be able to use established surveys to measure health among public housing residents. (*Am J Public Health.* 2008;98:85–91. doi:10.2105/AJPH.2006.094912)

We found no previous description of a population-based health survey of persons whose housing was entirely or partially supported by public funding (including both residents of public housing developments and those who lived in private residences subsidized by voucher programs such as Section 8). We compared the overall health of residents living in publicly supported housing with the health of other city residents in the city of Boston with data from a local population-based health department survey based on the BRFSS, an established surveillance system that is conducted in every state in the United States.¹⁷

METHODS

Public housing in Boston is administered by the Boston Housing Authority (BHA), a public agency that provides subsidized housing to low- and moderate-income individuals and families, disabled individuals, and elderly individuals. BHA is the largest landlord in Boston, housing approximately 26 000 people in public housing developments and supporting

approximately 25 000 people with rental assistance vouchers in each of the last several years. In 2000, the Boston University School of Public Health, in collaboration with the Boston Public Health Commission, BHA, and public housing community representatives, established the Partners in Health and Housing Prevention Research Center to improve the health of public housing residents in the city.

Boston BRFSS Survey

Since 1999, the Boston Public Health Commission, the city's public health agency, has biennially administered the Boston BRFSS (a modified version of the Massachusetts BRFSS), a random-digit-dialed household telephone survey of health-related behaviors and conditions among adults 18 years and older.¹⁷

Beginning in 2001, the Boston BRFSS was selected by the Prevention Research Center as one vehicle to measure the health of public housing residents. To determine public housing residency status, all respondents were asked, "Are you (1) a public housing resident

TABLE 1—Comparison of Demographic Characteristics of Public Housing Residents and Other City Residents: Boston Behavioral Risk Factor Surveillance System, 2001 and 2003

	Public Housing Residents ^a (n = 393)		Other City Residents (n = 2526)	
	No.	% (95% CI)	No.	% (95% CI)
Gender				
Women	292	64.7 (56.9, 72.5)	1453	49.2 (46.5, 52.0)
Men	101	35.3 (27.5, 43.1)	1073	50.8 (48.0, 53.5)
Age, y				
18–24	46	22.2 (14.7, 29.7)	231	18.6 (16.0, 21.3)
25–34	87	18.5 (12.9, 24.2)	720	27.8 (25.5, 30.2)
35–44	97	17.9 (13.2, 22.5)	531	19.1 (17.1, 21.1)
45–54	69	18.5 (12.8, 24.1)	421	13.4 (11.8, 15.0)
55–64	41	9.0 (5.2, 12.9)	265	8.6 (7.2, 10.0)
≥ 65	52	13.9 (9.0, 18.9)	315	12.4 (10.4, 14.5)
Race/ethnicity				
Non-Hispanic White	110	22.7 (17.1, 28.2)	1666	68.1 (65.5, 70.6)
Non-Hispanic Black	135	40.0 (32.4, 47.6)	456	14.0 (12.2, 15.7)
Hispanic	110	27.3 (20.8, 33.9)	209	10.7 (8.9, 12.5)
Other non-Hispanic	37	10.0 (5.8, 14.2)	165	7.3 (5.8, 8.7)
Place of birth				
United States	251	60.4 (52.9, 67.9)	1979	77.4 (74.9, 79.9)
Outside United States	141	39.6 (32.1, 47.1)	530	22.6 (20.1, 25.1)
Children in household ^b				
None	86	47.5 (36.4, 58.5)	798	74.6 (71.2, 78.0)
1	44	22.8 (13.7, 31.8)	152	12.1 (9.7, 14.5)
2	36	11.3 (6.4, 16.1)	108	9.1 (6.7, 11.4)
3	19	12.0 (3.5, 20.5)	48	2.9 (1.7, 4.0)
4–7	14	6.5 (0.8, 12.2)	20	1.4 (0.7, 2.1)
Education				
Less than high school	94	23.5 (17.7, 29.4)	144	5.2 (4.2, 6.3)
High school/GED	161	41.2 (33.8, 48.5)	477	18.5 (16.2, 20.8)
Some college	91	21.3 (14.7, 27.9)	525	22.3 (19.8, 24.8)
College graduate	47	14.0 (8.5, 19.4)	1374	54.0 (51.2, 56.7)
Employment				
Employed	165	44.1 (36.6, 51.7)	1782	69.7 (67.1, 72.4)
Unemployed	56	13.7 (8.4, 19.0)	175	5.9 (4.7, 7.0)
Homemaker	19	3.7 (2.1, 6.5)	63	2.4 (1.8, 3.2)
Student	23	8.8 (3.9, 13.8)	156	9.7 (7.8, 11.7)
Retired	45	11.0 (6.6, 15.4)	287	10.3 (8.4, 12.2)
Unable to work	83	18.6 (13.5, 23.7)	57	2.0 (1.4, 2.8)
Annual household income, \$				
< 10 000	97	25.9 (18.9, 33.0)	106	4.5 (3.3, 6.0)
10 000–14 999	64	19.0 (13.4, 24.7)	58	2.6 (1.8, 3.7)
15 000–19 999	62	14.8 (10.2, 19.4)	139	5.9 (4.4, 7.4)
20 000–24 999	49	13.8 (8.3, 19.2)	179	7.7 (6.2, 9.2)
25 000–34 999	55	16.2 (9.6, 22.8)	284	13.2 (10.8, 15.5)
35 000–49 999	24	7.4 (2.8, 12.0)	413	16.1 (14.0, 18.1)
≥ 50 000	10	2.8 (1.2, 6.5)	1179	50.1 (47.2, 53.0)

Note. CI = confidence interval; GED = general equivalency diploma. The 2001 data were collected from July 2001 to May 2002. The 2003 data were collected from July 2003 to July 2004.

^aIncludes public housing development residents and rental assistance recipients.

^bData from 2001 only.

living in a building owned by the Boston Housing Authority, (2) part of a household that receives rental assistance such as Section 8 or any other rental assistance program, or (3) neither of the above?"

Boston is composed of more than a dozen sections that have strong neighborhood identities. Therefore, the Boston BRFSS sampling design grouped the city's neighborhoods into regions rather than 1 citywide geographic stratum, with the aim of completing approximately equal numbers of interviews across regions. The regional definitions were based on geographic proximity, demographic similarities, and population size.

Within regions, households were randomly sampled from a list generated to represent all possible Boston telephone numbers. Interviews were conducted with 1 randomly selected adult from each contacted household. Data were weighted to reflect probability of selection and differential response rates by gender and age. Additional details about the Boston BRFSS are available upon request from the authors.

Statistical Analysis

We first compared the demographics of public housing residents with those of other city residents among the survey respondents (Table 1). Our main goal was to compare the prevalence of a variety of measures of health status, health care access and utilization, and health-related behaviors (Table 2) between respondents who indicated receiving any public housing support (i.e., public housing development residents combined with rental assistance recipients) with those who did not receive any (i.e., those who answered "neither of the above"). For most variables we combined data from the 2001 and 2003 surveys; however, certain questions, also noted in Table 2, were included only in the 2001 survey. Data in both survey periods were collected by the same survey organization (Macro International, Burlington, Vt) with the same methods. For the combined 2001 and 2003 Boston BRFSS, the interview cooperation rate was 55.7%, and the end sample size was 2919.

We first calculated the crude prevalence and 95% confidence intervals (CIs) among public housing and other city residents for

TABLE 2—Comparison of Health Status, Access to Health Care, and Risk Behavior Indicators of Public Housing Residents and Other City Residents: Boston Behavioral Risk Factor Surveillance System, 2001 and 2003

	Public Housing Residents, ^a % (95% CI)	Other City Residents, ^b % (95% CI)	Crude POR (95% CI)	Model 1, POR	Model 2, POR	Model 3, POR (95% CI)
Health Status						
Fair or poor health status ^c	32.9 (26.0, 39.8)	9.3 (7.8, 10.7)	4.57 (2.46, 8.49)	4.47	3.37	1.81 (1.12, 2.93)
Hypertension (ever diagnosed)	36.0 (28.7, 43.3)	17.4 (15.5, 19.3)	2.57 (1.59, 4.15)	2.95	2.26	1.67 (1.01, 2.77)
High cholesterol (ever diagnosed)	27.8 (21.4, 34.2)	21.8 (19.4, 24.1)	1.34 (0.85, 2.13)	1.29	1.33	1.17 (0.65, 2.11)
Asthma (current)	19.2 (13.4, 24.9)	9.0 (6.9, 11.0)	2.46 (1.77, 3.42)	2.19	1.93	1.57 (0.92, 2.65)
Diabetes (ever diagnosed)	13.8 (8.3, 19.2)	5.3 (4.2, 6.5)	3.35 (1.40, 8.00)	3.49	2.38	1.77 (0.60, 5.17)
Obesity ^d	31.0 (24.1, 37.9)	18.0 (15.8, 20.1)	1.91 (1.30, 2.82)	1.37	1.02	1.24 (0.76, 2.02)
Disabled for ≥ 1 year ^{e,f}	33.9 (23.3, 44.5)	17.8 (13.9, 21.8)	2.38 (1.49, 3.82)	2.06	2.41	1.38 (0.66, 2.86)
Missing ≥ 6 teeth	24.9 (19.0, 30.7)	11.8 (10.2, 13.5)	2.60 (1.78, 3.78)	3.20	3.23	1.49 (0.85, 2.60)
Felt sad, blue, or depressed ≥ 15 days in past month	19.6 (13.4, 25.7)	6.5 (5.1, 7.9)	3.12 (1.86, 5.24)	2.88	2.17	1.24 (0.62, 2.50)
Access and Preventive Screenings						
No health insurance	9.6 (5.2, 14.1)	7.1 (5.6, 8.7)	0.94 (0.51, 1.73)	1.22	0.86	0.49 (0.21, 1.15)
Financial barrier to medical care ^g	11.5 (6.5, 16.5)	8.2 (6.7, 9.6)	1.36 (0.78, 2.36)	1.52	1.21	0.75 (0.41, 1.38)
No cholesterol screening in past 5 years ^d	12.0 (7.0, 17.0)	20.5 (16.7, 24.3)	0.51 (0.18, 1.47)	0.61	0.67	0.61 (0.23, 1.65)
No clinical breast examination in past 2 years (women only)	5.3 (2.3, 8.3)	6.6 (4.5, 8.6)	0.51 (0.31, 0.85)	0.54	0.49	0.41 (0.26, 0.65)
No Papanicolaou test in past 3 years (women only)	4.8 (2.9, 7.9)	8.1 (6.0, 10.2)	0.49 (0.20, 1.21)	0.50	0.53	0.51 (0.24, 1.09)
Teeth not cleaned in > 2 years ^e	28.0 (17.8, 38.3)	15.2 (12.1, 18.4)	2.18 (1.39, 3.42)	2.53	1.89	1.39 (0.77, 2.48)
Risk Behavior						
Smoker (current)	34.4 (27.2, 41.7)	20.6 (18.3, 22.9)	1.99 (1.34, 2.97)	2.12	2.85	2.29 (1.03, 5.08)
Binge drinking episode in past month ^h	15.5 (9.0, 21.9)	26.7 (24.1, 29.2)	0.52 (0.29, 0.95)	0.60	0.94	0.81 (0.55, 1.20)
Insufficient physical activity ⁱ	61.8 (54.2, 69.4)	53.1 (50.4, 55.9)	1.43 (1.07, 1.92)	1.42	1.07	0.86 (0.73, 1.02)
Marijuana use (past year) ^e	6.5 (2.4, 10.7)	15.0 (11.6, 18.4)	0.39 (0.15, 1.05)	0.44	0.53	0.52 (0.23, 1.17)
Illicit drug use (ever used) ^{e,j}	20.2 (9.2, 31.3)	21.7 (17.8, 25.6)	0.91 (0.70, 1.20)	1.11	2.28	2.57 (0.73, 9.09)

Note. CI = confidence interval; POR = prevalence odds ratio. The 2001 data were collected from July 2001 to May 2002. The 2003 data were collected from July 2003 to July 2004. For POR analyses, public housing residents, n = 360; other city residents, n = 2297. Model 1 adjusted for gender and age. Model 2 adjusted for gender, age, and race. Model 3 adjusted for gender, age, race, education, and income.

^aIncludes public housing development and rental assistance recipients. N = 393.

^bN = 2526.

^cRespondents were asked to describe their general health as excellent, very good, good, fair, or poor.

^dSelf-reported height and weight are used to calculate body mass index as defined by the Centers for Disease Control and Prevention.¹⁸ Individuals with values ≥ 30 kg/m² were considered obese.

^eData from July 2001 to May 2002 only.

^fDisability was defined as a condition of 1-year duration or longer in which respondents experienced any kind of disability or limitation, including physical, mental, or emotional problems, or difficulty with learning, concentration, or memory.

^gSurvey respondents were asked whether there was a time in the past 12 months when they needed to see a doctor, but could not because of cost.

^hBinge drinking was defined as an episode in which 5 or more alcoholic beverages were consumed on 1 occasion.

ⁱInsufficient physical activity was defined as less than 30 minutes of moderate or vigorous activity for fewer than 5 days per week.

^jIllicit drugs included powder or crack cocaine, heroin, and hallucinogens (for all respondents), and ecstasy (for respondents aged 18–35 years).

each health-related measure. In addition, because public housing residents differ from other city residents in demographic and other factors known to affect health, we also evaluated the extent to which differences in these health-related measures remained after adjusting for these factors. We conducted a series of logistic regression analyses to model prevalence odds ratios (PORs) comparing public housing residents with other city residents.

For each outcome, we began with a crude analysis and then constructed 3 additional models by sequentially and cumulatively adding the following variables to each preceding model: gender and age (model 1), race/ethnicity (model 2), and education and income (model 3). By observing the change in PORs with each succeeding model, we could identify which characteristics had the greatest effect on the estimate.

Because a portion of public housing units are allocated to disabled persons, we also tested the addition of having a disability to our models, defined as a current condition of 1-year duration or more in which respondents reported experiencing any kind of disability or limitation, including physical, mental, or emotional problems or difficulty with learning, concentration, or memory. We also added place of birth (United States vs all other) to

our models because a significantly higher percentage of public housing residents than others were born outside the United States.

Neither disability nor place of birth had an effect on the estimates after we controlled for gender, age, race/ethnicity, education, and income; we therefore only present results derived from models including this latter set of variables. Analyses were restricted to the 2680 (92%) respondents who had complete data on the variables used in our models.

We used PROC SURVEYMEANS in SAS version 8 (SAS Institute Inc, Cary, NC) to calculate prevalences and 95% CIs and a SAS-callable version of SUDAAN (Research Triangle Institute, Research Triangle Park, NC) to calculate PORs with 95% CIs that accounted for the sampling scheme and weighting.

RESULTS

Public housing residents accounted for 10.9% (n=393) of the combined-years sample; 4.8% (n=178) lived in public housing developments, and 6.1% (n=215) received rental assistance. Because our analyses combined these groups, we referred to them as public housing residents, as distinguished from all other city residents.

Demographic Characteristics and Health Status

The demographic characteristics of public housing residents differed from other city residents (Table 1). Although age distributions were similar, a much higher percentage of public housing residents were female, and a higher percentage were Hispanic or non-Hispanic Black. Although the majority of public housing residents were born in the United States, they were less likely than other city residents to be US born. Public housing residents were also much more likely to have children, less likely to have completed high school or college, and more likely to be unemployed or unable to work. The median income of public housing residents was less than \$20 000, compared with more than \$50 000 for other city residents.

Public housing residents had poorer health status by virtually all measures, indicating a higher burden of disease (Table 2). Public housing residents were more likely to report

having fair or poor overall health status, ever-diagnosed hypertension, current asthma, ever-diagnosed diabetes, obesity, disability, loss of 6 or more teeth, and feelings of depression for 15 days or more in the past month. Crude PORs for these measures ranged from 1.9 to 4.6.

We controlled for gender and age, race/ethnicity, and education and income, which substantially attenuated the PORs for all measures of health status (Table 2). For example, although the crude POR for fair or poor health status was 4.57, the elevation in risk was reduced by approximately 77% to 1.81 after adjustment. Reductions in PORs as a result of adjustment ranged from 50% to 89% across all measures of health status. For the majority of health status indicators examined, the effects after we controlled for gender and age were very modest or actually resulted in an increased risk relative to the crude estimate. The models that we additionally controlled for race/ethnicity and education and income accounted for the majority of the differences. However, even after we controlled for all these factors, the prevalence of fair or poor health status, hypertension, asthma, diabetes, and tooth loss were still elevated among public housing residents, with adjusted PORs in model 3 ranging from 1.5 to 1.8.

Access to Health Care

In contrast to health status, public housing residents fared as well as or better than other residents on most measures of access and utilization. In the crude analyses, they were only slightly more likely than others to be without health insurance (9.6% vs 7.1%, respectively) or report financial barriers to medical care (11.5% vs 8.2%, respectively). They were only half as likely to report not having been screened in a timely manner for cholesterol, not undergoing a clinical breast examination, or not having had a Papanicolaou test, but approximately twice as likely to not have had a preventive dental cleaning in the past 2 years.

After adjustment for gender and age, race/ethnicity, and education and income, public housing residents were much less likely than were other city residents to be uninsured (model 3 POR=0.49). Adjustment had little effect on most measures of screening but did explain 67% of the difference between public

housing and other city residents in receipt of a recent preventive dental cleaning (model 3 POR=1.39).

Risk Behaviors

Public housing residents reported more smoking and physical inactivity and less past-month binge drinking and past-year marijuana use than did other city residents, and similar levels of lifetime drug use (cocaine, heroin, hallucinogens, and ecstasy; Table 2).

Adjustment for gender and age, race/ethnicity, and education and income did not reduce the increased prevalence of smoking among public housing residents (model 3 POR=2.29). After adjustment, public housing residents were no more likely than other residents to be physically inactive. Conversely, after adjustment, prevalence of lifetime drug use was much higher among public housing residents (model 3 POR=2.57), although the 12-times greater difference between lower and upper confidence limits indicates the statistical instability of this estimate.

DISCUSSION

Comprehensive health assessments have infrequently been conducted among public housing residents, and comparisons to the general population are even more rare. We describe a simple method to broadly measure the health of public housing residents and describe similarities to and differences from other residents of the same community. The BRFSS is an accessible tool for public health departments, and we found it useful in measuring health in a group that may otherwise be difficult to assess. Public housing residents, distributed approximately equally between public housing development residents and rental assistance recipients, composed about 10% of our sample. These data are consistent with the BHA's description of the overall number and distribution of public housing residents in Boston.¹⁹

We present both crude and adjusted comparisons between public housing and other city residents. One typical reason for adjusting is to isolate the effect of an exposure from that of other related (confounding) factors. This is appropriate when the question is an etiologic one: does exposure cause the outcome? In our

analysis, however, our main concern was not an etiologic one but rather to describe the health of public housing residents in comparison with their non-public housing counterparts. We were not interested in whether residence in public housing caused differences in health-related measures but simply whether there were differences in these measures between public housing and other city residents. In answering this question, the crude POR was the most relevant measure. The adjusted POR in our analysis provided additional information regarding the extent to which differences between public housing residents and others could be explained by demographic and socioeconomic factors that are well known to affect health.

The most important finding to emerge from our analysis was that public housing residents consistently reported substantially poorer health status than did other city residents across a wide variety of conditions. A large proportion of this difference could be attributed to the fact that public housing residents were more likely to be members of racial/ethnic minorities and to be of lower socioeconomic status. Although a portion of public housing was set aside for persons with disabilities, disability itself did not explain the increased prevalence of adverse health conditions among public housing residents after accounting for demographic and socioeconomic factors.

The prevalence of poor health indicators among public housing residents in our study was similar to that reported by other researchers. Although the racial demographics of our group differed from the community Rivo and Gray reported on in Washington, DC,¹⁶ we similarly found that the prevalence of hypertension reported by public housing residents was twice that of other city residents. Another study of Black public housing residents in Washington, DC, found an obesity prevalence similar to ours (31% vs 30%, respectively).²⁰ We also found an asthma prevalence similar to that reported in an in-person cross-sectional survey in 2 Boston public housing developments²¹ (19% vs 21%, respectively).

Perhaps counter to expectation, public housing residents' access to and utilization of preventive services equaled or exceeded

those of other city residents. After adjustment, public housing residents were only half as likely to be uninsured as other city residents. Income level had the biggest effect on the estimate (data not shown), suggesting that public housing residents were much less likely to be uninsured than were other residents with low incomes. Crude analysis of households with annual incomes under \$35 000 showed that although 6% of public housing residents were uninsured, 11% of other city residents were without health insurance.

There are several possible explanations for the difference between public housing residents and other low-income residents in insurance coverage. Public housing residents were less likely to be employed and more likely to have children, both factors that help qualify low-income persons for health coverage from public sources, whereas other low-income city residents may have been more likely to be employed in jobs that did not provide health coverage.

Further, residual differences in income existed within the lower-income (<\$35 000/year) population, with a larger proportion of public housing residents than other residents having annual incomes below \$10 000. This difference and unmeasured differences in assets—as well as the fact that a significant number of public housing residents had a level of disability sufficient to qualify for public housing—may mean that public housing residents were more likely than were other low-income individuals to meet eligibility requirements. In addition, because their housing was administered by a government agency (BHA), public housing residents may have received more information and assistance regarding enrollment in Medicaid or other sources of coverage.

We found a similar dynamic regarding receipt of health screening services as for health insurance coverage: public housing residents were as likely as or more likely than others to have received screening for cholesterol, clinical breast exams, and Papanicolaou tests. In a sample of Black women residing in 2 Washington, DC, public housing communities, Green McDonald et al. found that 92% had ever received a Papanicolaou test and a clinical breast examination.⁴ Our analysis found slightly higher percentages, at

more time-appropriate intervals. Although the reasons for the better rates of preventive screening among public housing residents are not definitively known, the following may be contributing factors.

First, Boston has a strong network of community health centers, many located in proximity to major public housing developments, which may have eased access. Second, since the mid-1990s, the Boston Public Health Commission has implemented several initiatives that focus on breast and cervical cancer prevention and target minority women, who compose a larger proportion of public housing residents than of the community at large. Third, public housing residents are more likely to have chronic illnesses and may therefore have more contact with the medical system, increasing the opportunity for receipt of preventive services.

Finally, because part of their housing is supported by public subsidies, public housing households may have a greater portion of their income available for health-related expenses than do other low-income residents. In an analysis of nutritional status among children in low-income families, Meyers et al. found that residence in subsidized housing was protective against hunger; children in families who received subsidized housing were less likely to have a food shortage than were children whose families had a similar income level but did not have housing support, because a greater portion of the family income was available for food purchases.²² A similar dynamic may be at work for health care access.

A different picture emerged for dental health care. We found that public housing residents were more than twice as likely as other city residents not to have had a preventive dental visit in the past 2 years. Low-income people are much less likely to have dental insurance,²³ and financial barriers likely played an important role in limiting utilization. Consistent with the inverse association between income and dental care utilization, controlling for socioeconomic factors substantially reduced the disparity between public housing residents and other city residents in the likelihood of having seen a dentist in the past 2 years. This lack of access likely was a major cause of poor dental health, which

was reflected in the greatly increased prevalence of substantial tooth loss among public housing residents in our survey and could also increase the risk of other systemic diseases, such as heart disease^{24,25} and respiratory disease.²⁶

Across the spectrum of risk behaviors that affect health, we found varied results. Current cigarette smoking was almost twice as high among public housing residents as among other residents, and this difference remained even after adjustment. This finding was similar to Rivo and Gray's, who also found that the prevalence of smoking was almost twice as high among public housing residents as other residents.¹⁶ In contrast to smoking, the rate of binge drinking was lower among public housing residents than among others. This finding is consistent with other reports that binge drinking is generally lower among households with lower socioeconomic status.²⁷

Limitations

The BRFSS was a landline telephone survey, and households without such phone service were not included. Although Boston has high phone coverage (98.5% of households),²⁸ it is not known if there are different rates by residency type or what portion of households may be exclusive cell phone users. A household survey conducted by the Partners in Health and Housing Prevention Research Center of 114 randomly selected residents at 1 Boston housing development found that 90% of residents had current landline telephone service, although 14% had had a service interruption of 2 weeks' duration or longer in the preceding 12 months.

Some behaviors asked about in the survey, such as drug use, were a violation of the public housing lease and may have been underreported by residents. Because of limited sample size, we were unable to stratify analyses by public housing type or demographic factors. The response rate (55%) was lower than we desired; however, the demographic profile of the non-public housing group was similar to the Boston 2000 Census (data not shown).

Despite demographic similarities of the sample to census data, we do not know if nonresponders differed in health from the survey respondents. In addition, all behaviors—including public housing residency status—were

self-reported and subject to typical survey reporting biases, such as underreporting of socially less desirable behaviors, overreporting of more desirable behaviors, and inaccurate recall.

Conclusions

Despite its limitations, we believe that the approach used in this study is a useful and cost-effective method for obtaining a wide range of health information on public housing residents. Survey findings such as these are a good starting point for discussion of health concerns with public housing community members. This information can also inform the design of health services for residents of public housing and is useful in following trends over time.

We also encourage health departments in other cities with substantial populations of public housing residents to incorporate these questions into health surveys. In addition to learning more about their own population, surveys in other cities would help officials assess the extent to which health patterns are similar or vary according to local factors. Certainly, the excess chronic disease burden we found in our study is an indication that the health of public housing residents warrants intervention to address these disparities. ■

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This article was accepted February 25, 2007.

Contributors

E.C. Digenis-Bury and D.R. Brooks designed the study, supervised analysis of the data, and wrote the article. L. Chen conducted the data analysis. C.R. Horsburgh and M. Ostrem originated the study. All of the authors interpreted results and reviewed the article.

Acknowledgments

This work was conducted as a project of the Partners in Health and Housing Prevention Research Center, which is supported by the Centers for Disease Control and Prevention (grant 5 U48 DP000058-03).

We thank the residents of the city of Boston for their participation in the Boston Behavioral Risk Factor Surveillance System.

Human Participant Protection

Protocol approval was not required because the study was a secondary analysis of existing data obtained as part of routine surveillance activities of the local public health department. Individual human participants were anonymous and could not be identified in the data set.

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