

# Knowledge, Attitudes, and Screening Practices Among Older Men Regarding Prostate Cancer

## ABSTRACT

**Objectives.** This study determined population-based rates of reported prostate cancer screening and assessed prostate cancer-related knowledge, attitudes, and screening practices among men in New York aged 50 years and older.

**Methods.** Two telephone surveys were conducted. One was included in the 1994 and 1995 statewide Behavioral Risk Factor Surveillance System interviews, and the other was a community-level survey that targeted Black men (African-American Men Survey). Prevalence estimates were computed for each survey, and prostate cancer screening practices were assessed with logistic regression models.

**Results.** Overall, fewer than 10% of the men in each survey perceived their prostate cancer risk to be high; almost 20% perceived no risk of developing the disease. Approximately 60% of the men in each survey reported ever having had a prostate-specific antigen (PSA) test. In both surveys, physician advice was significantly associated with screening with a PSA test or a digital rectal examination. Also, race was significantly associated with screening in the statewide survey.

**Conclusions.** Many New York men appear to be unaware of risk factors for prostate cancer. However, a substantial percentage reported having been screened for the disease; physician advice may have been a major determining factor in their decision to be tested. (*Am J Public Health.* 2000;90:1595-1600)

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In 1999, approximately 179 300 men in the United States were diagnosed with prostate cancer and 37 000 died of the disease.<sup>1</sup> Certain groups have been found to have elevated risk, including African American men,<sup>2</sup> men with a family history of prostate cancer,<sup>3,4</sup> and men older than 65 years.<sup>1</sup>

Screening for prostate cancer is controversial. The 2 major screening methods—the digital rectal examination (DRE) and the serum prostate-specific antigen (PSA) test—have limitations. Positive predictive values have ranged from only 21% to 55%<sup>5,6</sup> for the DRE and from 32% to 49% for the PSA test.<sup>5,7</sup> However, the positive predictive values for both the DRE and the PSA test improve when the tests are combined or if either test is performed in conjunction with transrectal ultrasound.<sup>5,9</sup> Sensitivities for the PSA test have ranged from 70% to 99%, and specificities have ranged from 54% to 91%.<sup>10-12</sup>

No randomized studies have yet been completed that demonstrate that screening for prostate cancer reduces morbidity or mortality from the disease.<sup>13</sup> There is also a lack of consensus among the agencies and organizations that develop screening guidelines. The American Cancer Society recommends that both the PSA test and DRE be offered annually to men 50 years and older who have at least a 10-year life expectancy and to younger men who are at high risk.<sup>14</sup> The society also suggests providing information to patients regarding the potential risks and benefits of screening. On the other hand, the National Cancer Institute has concluded that there is insufficient evidence to establish whether prostate cancer mortality can be reduced with DRE, transrectal ultrasound, or serum markers, including PSA.<sup>15</sup> The US Preventive Services Task Force does not recommend screening for prostate cancer.<sup>13</sup>

Even though the disease has received much media attention, studies of the public's knowledge, perceptions, or screening practices relative to prostate cancer have been scant. In a review of English language literature pub-

lished since 1992, a total of 10 such studies were found. One study was population based; it involved random-digit-dialed telephone interviews with women as well as men, more than half of whom were younger than 50.<sup>16</sup> Two other studies, including another telephone survey, also used random samples; one excluded men younger than 65,<sup>17</sup> however, and the other included men younger than 40.<sup>18</sup> Four studies used convenience samples from men who had recently been screened for prostate cancer or who were seeking prostate cancer screening.<sup>19-22</sup> Five studies limited participation to Black men.<sup>18,19,23-25</sup>

In this study, we assessed knowledge of and attitudes about prostate cancer-related issues and used self-reports to estimate population-based prostate cancer screening rates. We also sought to determine which of several possible factors contribute to ever having been screened for the disease.

## Methods

To assess the knowledge, attitudes, and screening practices of older men (≥50 years) regarding prostate cancer, the New York State Department of Health and the Centers for Disease Control and Prevention developed a 13-question survey instrument. Self-perceived risk

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This article was accepted January 3, 2000.

of developing prostate cancer, knowledge of existing prostate cancer screening tests, whether a physician's recommendation to be screened had been received, and screening practices were some of the areas examined in the questionnaire. Questions related to the PSA test were limited to men who had heard of that test. The health department included the questions in New York's Behavioral Risk Factor Surveillance System (BRFSS) in 1994 and 1995. The BRFSS<sup>26</sup> is a random-digit-dialed monthly statewide telephone survey that uses a complex multistage cluster design.<sup>27</sup> Two years of data were pooled for analysis. The sample responses were weighted to project to the 1995 New York intercensal population estimates and to adjust for the sampling design.

Because Black men are disproportionately affected by prostate cancer, the New York State Department of Health also conducted a survey of knowledge, attitudes, and screening practices (the African-American Men Survey) in December 1995 that targeted this population. Interviews were conducted in New York City with eligible men residing in Central Harlem, a predominantly Black area, and in other parts of the city. The survey consisted of random-digit-dialed interviews using a multistage cluster design. Interviewees who described themselves as Black or African American and were between 50 and 74 years old were eligible; information on ethnicity (e.g., Hispanic origin) was not obtained. The 40-question survey included the 13 prostate cancer questions from the BRFSS module. Analysis for this report was limited to the 13 prostate cancer questions common to both surveys. Final analysis weights for the African-American Men Survey were calculated by poststratification by age to 1995 population counts for eligible men in Central Harlem and the other selected areas of New York City.

We were unable to report response rates specifically for the BRFSS module on prostate cancer. However, overall BRFSS response rates for New York for the 2 survey years were determined. Generally, 2 response rates are reported for the BRFSS: (1) the upper-bound response rate (Centers for Disease Control and Prevention, unpublished data, 1994) and (2) that of the Council of American Survey Research Organizations (unpublished data, 1982). We computed these response rates for both the BRFSS and the African-American Men Survey. The upper-bound response rate is the number of completed interviews divided by the sum of completed interviews, refusals, and terminated calls; the council's definition is the number of completed interviews divided by the number of eligible reporting units.

We used SUDAAN<sup>28</sup> to compute prevalence estimates, odds ratios, and confidence intervals for each survey. Univariate analyses were performed with Pearson  $\chi^2$  tests to com-

pare differences between categorical variables; significance was set at  $P < .05$ . Separate  $\chi^2$  tests were performed for questions regarding perceived risk of developing prostate cancer. We categorized respondents in both surveys by age, educational level, and income. Age categories were 50 to 69 years and 70 years and older for the statewide survey and 50 to 69 years and 70 to 74 years for the African-American Men Survey. The age break points were just below the median age at diagnosis of prostate cancer (71 years) among US men in 1995.<sup>29</sup> For both surveys, educational level was dichotomized as a high school diploma or less or at least some college or technical school. Income categories were less than \$25 000 and \$25 000 or above per year. The racial categories for the statewide survey were non-Hispanic White, non-Hispanic Black, and "other." Health insurance status was included in the statewide survey only. To increase the precision of estimates and the power of the statistical tests for both the statewide survey and the African-American Men Survey, a category was created for missing data (i.e., "refuse," "don't know/not sure") for all of the explanatory variables and covariates. For the variable "self-perceived risk," the category contains only the "refuse" responses; the "don't know/not sure" responses were analyzed separately.

Using the results of the univariate analyses, we constructed logistic regression models for each survey to assess the associations of the categorical variables with ever being screened for prostate cancer by either a PSA test or a DRE. Because self-perceived risks<sup>30</sup> and physician recommendations<sup>30-36</sup> appear to be important predictors of the use of cancer screening tests, we also constructed logistic regression models that included these variables. Weighted percentages were used in the univariate and logistic regression analyses.

## Results

### Response Rates

Using the upper-bound formula, we found that response rates for the BRFSS surveys overall were 75% in 1994 and 72% in 1995; by the criteria of the Council of American Survey Research Organizations, the response rates were 61% and 60%, respectively. A total of 644 age-eligible men completed interviews for either the 1994 or the 1995 statewide module. We excluded 13 men from the analysis who reported personal histories of prostate cancer, which left a sample size of 631. Analysis of PSA-related questions was limited to the 354 men who said they had heard of the test.

In all, 760 men who met the eligibility criteria participated in the African-American

Men Survey; this represents a response rate of 60% by the upper-bound formula and 38% with the Council of American Survey Research Organizations' methodology. We excluded 18 men who reported histories of prostate cancer, which left 742 men in the sample. Only 306 men had heard of and were asked questions about the PSA test.

### Demographic Profile

Nearly three quarters of the men in the statewide survey were aged 50 to 69 years (Table 1). Most respondents had no more than a high school education, earned at least \$25 000 annually, and had health insurance. Of the men in the African-American Men Survey, 85% were aged 50 to 69 years; subjects as a whole were less likely than men in the statewide survey to have a college education or to earn at least \$25 000 per year.

### Self-Perception of Risk for Prostate Cancer

Overall, 9% of the men in the statewide survey perceived themselves to have a "high" risk of developing prostate cancer, 42% a "medium-low" risk, and 18% "no" risk, while 31% gave the response "don't know/not sure" (data not shown). The perception of "high" risk did not vary significantly by age, race, education, income, or health insurance status. In contrast, men 70 years and older (24% vs 16%), men with less education (22% vs 12%), and men who earned less than \$25 000 annually (25% vs 15%) were significantly more likely to perceive that they were at "no" risk than their comparison groups.

In the African-American Men Survey, 7% of the men perceived themselves to have a "high" risk of developing prostate cancer, 43% a "medium-low" risk, and 16% "no" risk, while 34% answered "don't know/not sure." Again, the percentage of men who perceived their risk to be "high" did not vary significantly by age, education, or income status. This was also true for men who perceived they were at "no" risk.

### Knowledge of the PSA Test

Of the 605 men in the statewide survey who responded to the question regarding knowledge of the PSA test, 354 (58%, weighted percentage) had heard of the test (Table 2). Men were significantly more likely to have heard of the test if they were non-Hispanic White or had more education, a higher income, or health insurance. Of the 721 men in the African-American Men Survey who answered 1 of 2 questions regarding knowledge of the PSA test, 306 (43%, weighted percentage) reported that they had heard of the test;

**TABLE 1—Demographic Profiles for the New York State Behavioral Risk Factor Surveillance System (BRFSS) Prostate-Specific Survey (1994 and 1995) and the New York State Department of Health African-American Men Survey (1995) for New York City**

	BRFSS Prostate-Specific Survey (N=631) <sup>a</sup>		Weighted New York State Population Estimates, 1995		African-American Men Survey (N=742) <sup>a</sup>		Weighted New York City Population Estimates of Black Men, 1995	
	n	%	N	%	n	%	N	%
Age, y								
50-69	450	71	1 518 041	73	629	85	1 469 668	89
≥70	181	29	5 714 480	27				
70-74					113	15	17 566	11
Race/ethnicity								
White, non-Hispanic	529	84	1 741 985	83	...	...	...	...
Black, non-Hispanic	59	9	200 434	10	...	...	...	...
Other	43	7	147 101	7	...	...	...	...
Black					742	100	1 645 34	100
Education								
High school graduate or less	349	55	1 152 178	55	459	62	98 940	60
At least some college or technical school	280	44	9 278 35	44	259	35	58 193	35
Refused/DK/NS	2	0.3	9 507	0.5	24	3	7 401	5
Income, y								
<\$25 000	202	32	6 348 94	30	318	43	64 660	39
≥\$25 000	316	50	10 619 56	51	294	40	68 338	42
Refused/DK/NS	113	18	3 926 70	19	130	18	31 336	19
Health insurance								
Yes	597	95	1 982 958	95	...	...	...	...
No	34	5	106 563	5	...	...	...	...

Note. DK/NS = don't know/not sure. Ellipses (...) = not applicable. Population estimates are weighted. Estimates for New York State are from the US Census Bureau. Estimates for New York City are from Claritas, Inc, 53 Brown Rd, Ithaca, NY 14850.

<sup>a</sup>Of the 644 men interviewed for the BRFSS, 13 subjects with a history of prostate cancer were excluded from the analysis. Of the 760 men interviewed for the African-American Men Survey, 18 subjects with a history of prostate cancer were excluded from the analysis.

**TABLE 2—Univariate Analysis of Men Who Had Heard of the Prostate-Specific Antigen (PSA) Test in the New York State Behavioral Risk Factor Surveillance System (BRFSS) Prostate-Specific Survey (1994 and 1995) and the New York State Department of Health African-American Men Survey (1995) for New York City**

	BRFSS Prostate-Specific Survey				African-American Men Survey			
	N <sup>a</sup>	n	Weighted %	Unadjusted OR (95% CI)	N <sup>a</sup>	n	Weighted %	Unadjusted OR (95% CI)
No. of men who had heard of PSA test	605	354	58		721	306	43	
Age, y								
50-69	435	255	57	1.0 (Referent)	611	258	43	1.0 (Referent)
≥70	170	99	59	1.1 (0.7, 1.6)	110	48	45	1.1 (0.6, 1.8)
Race/ethnicity								
White, non-Hispanic	511	311	61	1.0 (Referent)	...	...	...	...
Black, non-Hispanic	55	27	40*	0.4 (0.2, 0.8)	...	...	...	...
Other	39	16	45	0.5 (0.3, 1.1)	...	...	...	...
Black					721	306	43	
Education								
High school graduate or less	329	171	50	1.0 (Referent)	443	165	38	1.0 (Referent)
At least some college or technical school	275	182	66*	2.0 (1.4, 2.9)	254	129	50*	1.6 (1.1, 2.4)
Refused/DK/NS	1	1	100		24	12	60	2.5 (0.9, 6.5)
Income, y								
<\$25 000	191	86	44	1.0 (Referent)	309	116	37	1.0 (Referent)
≥\$25 000	312	207	66*	2.5 (1.6, 3.7)	287	143	49*	1.7 (1.1, 2.5)
Refused/DK/NS	102	61	56	1.6 (0.9, 2.8)	125	47	44	1.4 (0.8, 2.3)
Health insurance								
Yes	573	346	59	1.0 (Referent)	...	...	...	...
No	32	8	25*	0.2 (0.09, 0.5)	...	...	...	...

Note. OR = odds ratio; CI = confidence interval; DK/NS = don't know/not sure. Ellipses (...) = not applicable.

<sup>a</sup>Of the 644 subjects interviewed for the BRFSS, 13 subjects with a history of prostate cancer were excluded and 26 men did not respond to the question. Of the 760 men interviewed for the African-American Men Survey, 18 subjects with a history of prostate cancer were excluded and 21 men did not respond to the question.

\*P < .05.

those who had at least some college education and those who earned \$25 000 or more per year were significantly more likely to have heard of the test.

#### *Physician Advice Regarding the PSA Test and Subject Screening Behavior*

Of the 354 men in the statewide survey who had heard of the PSA test, 64% reported that physicians had advised them to have the test. Sixty-four percent of respondents stated that they had had a PSA test in the past (data not shown). In a univariate analysis, there were no statistically significant associations between respondent age, race, education, income, or health insurance status and having been advised to get a PSA test. There also were no significant associations between age, race, education, or health plan status and ever having had a PSA test. However, men with missing income data (79%) were more likely to report having had a PSA test than men who earned less than \$25 000 annually (56%). In the African-American Men Survey, 51% of respondents reported that they had received advice from a physician to get a PSA test. Sixty percent stated that they had been tested. There were no significant associations between respondent age, education, or income and having had a physician recommend the PSA test or having been tested.

#### *Physician Advice Regarding the DRE and Subject Screening Behavior*

Sixty-two percent of respondents in the statewide survey said that their physicians had recommended a DRE (data not shown). Men with more education (68% vs 58%) and with health insurance (64% vs 35%) were significantly more likely than men in the comparison groups to report that physicians had advised them to get the test. Also, men with missing income data (72%) were more likely to report receiving physician recommendations than men who earned less than \$25 000 per year (53%). Seventy-seven percent of the men reported that they had ever had a DRE. Non-Hispanic White men (79%) were significantly more likely than non-Hispanic Black men (60%) to report having had a DRE, and men who earned \$25 000 or more per year (82%) were significantly more likely than men whose annual incomes were less than \$25 000 (67%) to give this response. In the African-American Men Survey, 56% of respondents reported that they had been advised by a physician to get a DRE, and 77% said they had had the procedure. There were no statistically significant associations between receiving a physician recommendation to get a DRE and age, education, or income. Age and education also were not

significantly associated with reporting a history of a DRE, but income was. Men who earned \$25 000 or more annually (83%) were significantly more likely than men who earned less than \$25 000 per year (75%) to report ever having had the test.

#### *Predictors of Screening Behavior*

In the statewide survey, a logistic regression analysis of the demographic variables demonstrated that race, education, and income were significantly associated with reporting a past PSA test or a DRE (data not shown). In the African-American Men Survey, only income was significantly associated with reported screening.

In separate multivariate logistic regression models for the 2 surveys that assessed each demographic variable while controlling for all other demographic factors, only income significantly predicted reporting having had either a PSA test or a DRE. In both surveys, men who earned \$25 000 or more annually were more likely than men who earned less than \$25 000 per year to report ever having been screened (data not shown). There were no statistically significant interactions in either survey between the sociodemographic variables.

To assess the effects of perceived risk of prostate cancer and reported physician advice to have a PSA test or DRE on participants' reporting having had such a test, we simultaneously added the risk and advice variables to logistic regression models for each survey while controlling for demographic characteristics. In the statewide survey, physician recommendation as well as race emerged as significant predictors of reporting a PSA test or DRE (Table 3). Men who reported that they were advised by their physicians to get 1 of the tests were 68.1 times as likely to report having been screened as men who reported that they had not been given advice, and non-Hispanic Black men were 0.3 times as likely as non-Hispanic White men to report having been tested. In addition, men who refused to say or did not know whether their doctors had recommended prostate cancer screening were 67.7 times as likely to report having been screened as men who reported that they had not received advice. In the African-American Men Survey, physician advice also was a significant determinant of screening behavior, and income approached significance. Men who reported that physicians had advised them to get a PSA test or a DRE were 28.5 times as likely to report having been screened as men who stated that they had not received recommendations. The odds ratio of reported screening for men earning \$25 000 or more per year (vs the under-\$25 000 referent group) was 1.9.

## *Discussion*

Our analysis suggests that many men 50 years and older who live in New York State are misinformed about their risk of prostate cancer. Indeed, we found that about 20% of the men in our analysis thought they were at no risk of the disease. Furthermore, from our analysis of the African-American Men Survey, it appears that Black men are frequently unaware that their race puts them at higher risk for prostate cancer. We found also that most men in our analysis thought that their risks were "medium to low"; however, the clinical significance of "medium-low" risk is difficult to interpret or validate at this time.

On the other hand, about half the men in our analysis had heard of the serum PSA test. This result could reflect the influence of medical providers, as physician advice for screening and reported screening were highly correlated. Still, we could not tell from this study whether men are being appropriately counseled about the potential risks and benefits of prostate cancer screening.

In 1992, Denmark-Wahnefried et al.<sup>21</sup> surveyed Black and White men reporting for prostate cancer screening events during Prostate Cancer Awareness Week in North Carolina. These researchers found that knowledge regarding risk factors for prostate cancer was limited. Only 53% of Black men and 33% of White men knew that race was a risk factor, and just 41% of Black men and 56% of White men knew that heredity could increase prostate cancer risk.

In our study, a substantial majority of men older than 50 years who had heard of the PSA test reported that they had ever been screened—with their decision to be screened clearly heavily influenced by the recommendations of their physicians—even though a professional consensus that prostate cancer screening and treatment are efficacious has not been reached. The authors of the North Carolina study,<sup>21</sup> in contrast, found that only 20% of Black men and 27% of White men reported ever having had a PSA test. In that study, however, 72% of the men said that their health care provider had not discussed tests for prostate cancer with them. Furthermore, the results of convenience samples might not be comparable to those from population-based screening studies.

This study has several limitations. First, to maximize sample sizes in the multivariate and logistic regression analyses, we created categories for all reported responses, including "refused" and "don't know/not sure." However, the interpretation of "refused" and "don't know/not sure" responses is very subjective; other than reporting and describing these results, few inferences can be made. Second, self-reports of PSA or DRE testing and of physician rec-

**TABLE 3—Multivariate Analysis of Selected Variables as Predictors of Ever Having Had a Prostate-Specific Antigen Test or a Digital Rectal Examination in the New York State Behavioral Risk Factor Surveillance System (BRFSS) Prostate-Specific Survey (1994 and 1995) and the New York State Department of Health African-American Men Survey (1995) for New York City**

	BRFSS Prostate-Specific Survey (N=620) <sup>a</sup>		African-American Men Survey (N=741) <sup>a</sup>	
	OR	95% CI	OR	95% CI
Age, y				
50–69	1.0	(Referent)	1.0	(Referent)
≥70	1.0	0.5, 2.1	1.3	0.5, 3.0
Race/ethnicity				
White, non-Hispanic	1.0	(Referent)	...	...
Black, non-Hispanic	0.3*	0.1, 0.6	...	...
Other	1.6	0.5, 5.3	...	...
Education				
High school graduate or less	1.0	(Referent)	1.0	(Referent)
At least some college or technical school	1.4	0.7, 2.9	1.1	0.6, 2.0
Refused/DK/NS	0.4	0.1, 2.5	0.4	0.1, 1.2
Income, y				
<\$25 000	1.0	(Referent)	1.0	(Referent)
≥\$25 000	1.7	0.8, 3.8	1.9	1.0, 3.5
Refused/DK/NS	1.5	0.6, 3.9	0.7	0.3, 1.3
Self-perceived risk				
High	1.0	(Referent)	1.0	(Referent)
Medium-low	1.0	0.3, 2.9	2.0	0.6, 6.5
None	0.8	0.2, 2.7	1.4	0.4, 5.1
Refused/DK/NS	0.7	0.2, 2.1	1.0	0.3, 3.4
Physician advised PSA test or DRE				
No	1.0	(Referent)	1.0	(Referent)
Yes	68.1*	31.2, 148.9	28.5*	14.4, 57.0
Refused/DK/NS	67.7*	20.7, 221.2	1.7	0.4, 7.7

Note. OR = odds ratio; CI = confidence interval; DK/NS = don't know/not sure; PSA = prostate-specific antigen; DRE = digital rectal examination. Ellipses (...) = not applicable.

<sup>a</sup>Of 644 men interviewed for the BRFSS, 13 subjects were excluded because of a personal history of prostate cancer, and 11 subjects were excluded because they did not report having had either a PSA test or a DRE. Of 760 men interviewed for the African-American Men Survey, 18 subjects were excluded because of a personal history of prostate cancer, and 1 was excluded because he did not report having had either a PSA test or a DRE.

\* $P < .05$ .

ommendations were not externally validated. Third, DREs are also performed to screen for colon cancer; some men might have been screened for that disease and not prostate cancer. Finally, households without telephones were excluded. In 1990, according to the US census, 8% of occupied housing units in New York City did not have telephones, but in Central Harlem, 20% of such units lacked telephones.<sup>37</sup> The low response rates for both survey groups might also be considered a limitation, but 5 of the 6 response rates we calculated were 60% or higher. By way of comparison, the median response rate reported by Massey et al. in their analysis of 39 random-digit-dialed telephone surveys was 62%.<sup>38</sup>

In conclusion, increased use of the PSA test as an early detection method for prostate cancer has been documented by others.<sup>39,40</sup> This trend will probably continue even though the results of randomized controlled trials to assess the efficacy of prostate cancer screening will not be available for at least another decade.<sup>41</sup> In the interim, health care providers, in concert with their patients who seek screen-

ing for the disease, should carefully weigh 3 issues before tests are performed: (1) the presence of established risk factors (age, race, heredity), (2) the limitations of existing screening methods, and (3) current treatment options and their limitations. □

## Contributors

C. B. Steele contributed to the planning of the study, assisted in data analysis and interpretation, and wrote the paper. D. S. Miller helped design and implement the study, analyze data, and prepare the paper. C. Maylahn contributed to the development and oversaw the design and implementation of the instruments and helped collaborate on data analysis. R. J. Uhler supervised and conducted data analysis and assisted in the interpretation of the data. C. T. Baker helped design the instruments and cleaned and provided weights for the raw data.

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