ORIGINAL COMMUNICATIONS

CANCER AWARENESS AMONG AFRICAN AMERICANS: A SURVEY ASSESSING RACE, SOCIAL STATUS, AND OCCUPATION

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Knowledge of cancer prevention and control was defined in terms of prevention, etiology, treatment, symptoms, cancer rates, screening, and detection examinations. A survey of 86 African Americans and 68 white Americans in Alameda County, California was completed in 1985. An index comprised of 69 knowledge items was assessed. A multivariate analysis of race, education, socioeconomic status, and occupation confirmed that these characteristics were independent predictors of knowledge. Blue collar work status was the most important predictor of low knowledge levels. African Americans were less knowledgeable than white Americans with regard to diet in preventing cancer and treatment modalities for cancer, and were most likely to perceive surgery as contributing to metastases. Low education and income status predicted low levels of knowledge. An important consideration in changing knowledge levels is the need to translate technical information about treatment and metastases in ways that are effective in reaching target populations at risk for low levels of knowledge. Cancer prevention and control programs need to develop materials and strategies that are responsive to communities whose members are predominantly African Americans or blue collar workers, or have low levels of education and income. (*J Natl Med Assoc.* 1991;83:491-497.)

Key words • cancer • prevention • awareness • education • African American

Cancer poses a serious threat to the health of African Americans despite continued improvement in overall mortality during the past decade.[1] Historically, cancer rates for African Americans were lower when compared to those for whites, but these rates are now reversed primarily as a result of a 63% increase in cancer mortality for African-American males between 1950 and 1977.[2-4] Site-specific incidence and mortality are higher among African Americans than whites for lung, colon-rectal, prostate, esophagus, cervix, larynx, multiple myeloma, pancreas, stomach, and breast cancer for individuals under the age of 40.[5-8] The 5-year survival rate of 37% for African Americans compared to 50% for whites reported in the National Cancer Institute's Surveillance, Epidemiology, and End-Results (SEER) Program (1979 to 1984) increases the cancer burden for African Americans, especially because the SEER-based rate for African Americans has decreased for the first time since 1974.[9]

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Increasing cancer knowledge is a fundamental objective of programs targeting cancer prevention and control needs.[10-12] In general, these programs would benefit from a knowledge base that identifies target populations at risk for lower levels of knowledge; describes with sufficient precision the areas of knowledge present and absent within these populations; provides conceptual models that clarify the relationship between knowledge, socioeconomic status, cancer prevention, and control behavior; and assesses the relative contribution of race, socioeconomic status, and occupation on cancer prevention and control knowledge.

African Americans are reported to have lower levels of cancer knowledge compared to whites.[6,12-25] Studies, including those sponsored by the American Cancer Society and the National Cancer Institute, highlight black-white knowledge differences. African Americans were found to have low levels of knowledge in regard to etiology,[6,14,18,19,21,22,24,26] examinations and symptoms,[6,14,18,21,22,24,25] susceptibility and prognosis,[6,14,18,22,24,25] preventive behaviors,[19,24,25] risk factors,[21,24] and treatment.[16,24] African Americans of high socioeconomic status were comparable in knowledge to the general white population, but low socioeconomic status African Americans demonstrated lower levels of knowledge.[18] This was not a multivariate assessment and therefore one cannot conclude that differences in knowledge are unaffected by race, independent of socioeconomic status.[15] When education was controlled, African Americans had less knowledge of treatment when compared to whites.[16] Also, education, although not controlled for race, was positively related to knowledge of tobacco, sunshine, bumps or bruises, and fiber.[14]

Michielutte and Diseker conducted a multivariate (ie, race, gender, age, and education) assessment of cancer prevention and control knowledge.[15] African Americans compared also were less knowledgeable regarding symptoms, benefits of early diagnosis, treatment modalities, and cancer's contribution to overall mortality than whites. Using a knowledge index, African Americans were found to have lower knowledge levels after controlling for education, gender, and age. Education was the strongest independent predictor of cancer knowledge.

Cancer prevention and control programs might benefit by specifying knowledge deficits and subgroups of the African-American population at particular risk for lower levels of knowledge. Occupation is not addressed in the literature. In addition, further work is needed to explore multivariate relationships. It is also necessary, as recommended in one study,[15] to increase the areas of knowledge assessed and to gain a broader perspective of knowledge differences between African Americans and whites.

We attempted to address this concern for a broader presentation of knowledge and the role of occupation by analyzing a survey completed in 1985 of African Americans and whites on cancer prevention and control. Occupation is included in the multivariate assessment of race, socioeconomic status, and knowledge. A variety of items represent cancer prevention and control knowledge.

METHODS

A sample of 154 African Americans and whites were interviewed in 1984 to assess knowledge, attitudes, and practices regarding cancer prevention and control. This sample was drawn from a list of 539 individuals randomly selected in a 1982 survey by the Alameda County Hypertension Project (Bloom JR, Syme LS, Selvin S. Unpublished data). The decision to draw from a preexisting sample was based on time and funding constraints. The response rate for the 1982 survey was 75%.

The 1982 sample consisted of 302 African Americans, 130 whites, and 107 others. The 154 respondents for this survey were drawn only from the 1982 respondents who were African American or white ($N=432$). Questions related to cancer were based in part on the instrument used in a survey of African Americans by the American Cancer Society.[27] Other questions related to health knowledge and attitudes were based on items from the 1976 and 1981 Alameda County Hypertension Project survey instruments (Bloom JR, Syme LS. Unpublished data).

The respondents to the original survey were contacted by phone or in person. Those who agreed to participate were reinterviewed. Potential respondents with no phone or who could not be reached but appeared to still be in the area were contacted in person. A total of 234 persons were contacted. Two respondents preferred being interviewed over the phone. The response rate for the overall sample of African Americans and whites is 35.6%. There were 86 (28.5%) African Americans and 68 (52.3%) whites. The response rate based only on those contacted ($N=234$) was 65.8%.

The response rate for the total sample severely limits the ability to generalize to African Americans and other demographic strata. Nonrespondents ($N=278$) and

respondents ($N = 154$) were compared by race for education, income, work status, and gender. This demographic information, including age, was collected in the original 1982 survey.

Education and income categories were recoded to three levels reflecting low to high achievement. Work status, using the US Census occupation listings, was coded for white and blue collar status. Missing values for work status[2] and income[7] were imputed by matching to other respondents using geographic, race, sex, education, work status, and income data when available.

Items pertaining to knowledge of cancer prevention and control encompassed multiple areas—prevention,[14] etiology,[13] treatment,[13] symptoms[13] rates, and cancer sites,[8] and whether specific early detection examinations could detect cancer.[9] Answers to the knowledge items were coded as either correct or incorrect. Open-ended items were used to ascertain knowledge about prevention and available treatment modalities for cancer. Respondents were asked what recommendations they would make in regard to diet, drinking, and smoking to reduce a person's chances of developing cancer, and what medical and nonmedical treatments were available for persons who did develop cancer. A response was coded incorrect if no information was provided for current prevention (ie, decrease smoking or increase fiber) or treatment (eg, surgery or radiation) options.

Relationships between individual knowledge items and race, education, income, and work status were assessed with missing values included and excluded. A summary index of cancer prevention and control knowledge was created. Missing values were coded as correct responses. The assumption of a correct response increases the face validity of observed knowledge differences present in a small sample. Analysis of the bivariate relationships were done with missing values included and excluded. The bivariate relationship of each knowledge variable with the index was assessed. Also, the index was evaluated by race-specific t tests for nine items. Responses to these items were consistent with scores on the index. In assessing the individual knowledge items with the total index trichotomized, one variable had a negative association and was eliminated. The final index is based on 69 knowledge items.

The index was plotted in relation to race, education, income, and work status to determine the presence of interactions. Education and income interacted, and an interaction term was inserted in the model and used in the multivariate analysis. The SAS general linear models procedure was used to evaluate the independent effects of race, education, income, and work status on the cancer prevention and control knowledge index.[28] Income was converted to the midpoints between each of 12 income categories. Similarly, the original 15 data points (ie, 3 to 17 years completed) for education were used. Race and work status were treated as dummy variables. The procedure tested whether the expected lower levels of knowledge for African Americans compared to whites would remain when controlling for education, income, and the potential effect of work status.

RESULTS

The comparison of respondents to nonrespondents shows that African-American and white respondents have higher levels of education and income. African American respondents compared to African-American nonrespondents were more likely to have an education higher than high school level (50% vs 39%) and an income level greater than $15 000 (44% vs 29%). Similarly, white respondents compared to white nonrespondents were more likely to have an education higher than high school level (73% vs 63%), an income level greater than $15 000 (55% vs 45%), a white collar occupation (82% vs 57%), and be female (57% vs 50%). In general, the respondents had a higher socioeconomic status and a lower percentage of African Americans compared to the nonrespondents.

Table 1 describes the percentage of correct responses for selected cancer prevention and control knowledge items. High education is higher than high school, and high income is greater than $15 000. When comparing results of the bivariate relationships with missing values included or excluded, with the exception of two variables (Table 1), there were neither large differences nor direction change in the percentages of correct responses. Table 1 presents data with missing values included.

Higher levels of knowledge were found in knowledge of tobacco and alcohol risks than of dietary risks for cancer. Higher levels of education, income, and white collar work status are associated with knowledge of dietary preventive behaviors. African Americans are more knowledgeable in regard to alcohol but are less knowledgeable in regard to meat and particularly fiber.

We found greater level of knowledge about environmental etiologic factors (eg, cigarettes) compared to factors that illustrate a person's level of fear and belief in cancer myths (eg, blow to breast). Higher levels of

TABLE 1. PERCENTAGE OF CORRECT RESPONSES FOR SELECTED KNOWLEDGE ITEMS FOR THE TOTAL SAMPLE, AND BY RACE, EDUCATION, INCOME, AND WORK STATUS

	Sample	Race		Education		Income		Work Status	
Area of Knowledge*	S (154)† %	B (86) %	W (68) %	Low (61) %	High (93) %	Low (78) %	High (76) %	BC (59) %	WC (95) %
Prevention									
<Smoking	90	56	44	39	61	48	52	37	63
<Alcohol	65	60	40	40	60	54	46	41	59
<Fat	30	50	50	33	67	44	56	30	70
<Meat	28	47	53	19	81	42	58	26	74
>Fiber	18	41	59	15	85	26	74	22	78
Etiology									
Cigarettes	83	52	48	34	66	48	52	36	64
Sunlight	82	54	46	38	62	50	50	35	65
Radiation	93	55	45	37	63	51	49	36	64
Blow to breast‡	35	52	48	30	70	43	57	33	67
Surgery spreads	59	41	59	25	75	45	55	29	71
Treatment									
Early detection	92	55	45	38	62	50	50	37	63
Chemotherapy	67	43	57	29	71	45	55	25	75
Radiation	62	49	51	29	71	45	55	28	72
Surgery	53	37	63	24	76	41	59	22	78
Medical advances (less surgery)	17	27	73	33	77	27	73	15	85
Symptoms									
Sore does not heal	72	51	49	44	56	52	48	34	66
Lump	90	53	47	41	59	53	47	38	62
Unusual bleeding	70	56	44	44	56	50	50	37	63
Change in wart	77	50	50	38	62	47	53	36	64
Persistent cough	63	54	46	40	60	49	51	33	67
Change in bowel/bladder	59	54	46	45	55	53	47	38	62
Persistent indigestion	54	53	47	42	58	49	51	37	63
Cancer Rates									
>African-American incidence	21	64	36	30	70	52	48	36	64
<African-American survival	51	55	45	33	67	41	59	37	63
Lung frequent site	66	50	50	34	66	44	56	27	73
Breast frequent site	55	52	48	35	65	50	50	35	65
Screening/Detection Examinations									
Biopsy	91	56	44	39	61	48	52	37	63
Mammogram	92	55	45	38	62	49	51	35	65
Proctoscopic**	87	54	45	38	62	49	51	35	65
PAP	90	53	47	38	62	49	51	37	63
Chest x-ray (not useful)	81	50	50	35	65	47	53	35	65

* The range for missing values is 0 to 4, except for sunlight (8), radiation (9), blow to breast (23), biopsy (18), mammogram (23), proctoscopic (38), PAP (28), and chest x-ray (21).

† The numbers in parentheses represent the total number of persons in the sample for the respective categories of race, education, income, and work status.

‡ If missing values were excluded, S = 23%, B = 48%, and W = 52%.

** If missing values were excluded, S = 83%, B = 45%, and W = 55%.

education and white collar work status predict higher levels of knowledge regarding etiologic, especially environmental, phenomena.

The treatment items represent belief in the efficacy of treatment, knowledge of the types of treatment, and awareness of advances in cancer treatment over the past 10 years. Awareness of early detection benefits is evident in all social groups. Race, education, income, and work status are associated with higher levels of knowledge in regard to available medical treatments and changes in treatment practices over time.

The symptom items are the traditional seven warning signals advocated by the American Cancer Society. Knowledge is highest for lump in the breast or other growth in the body and lowest for persistent indigestion or difficulty in swallowing. High education, white collar work status, and to a lesser degree race (ie, African Americans) are associated with higher levels of knowledge in regard to symptoms. The items for cancer rates concern race-specific incidence, relative survival, and knowledge of the most frequently occurring cancer sites in the general population. We found 20.7% were aware that African Americans have a higher cancer incidence compared to whites. There was more awareness of the lower relative survival rates for African Americans (50.6%). Money, education, quality of care, access to care, and poor health behavior were the most common explanations given for the lower survival rate of African Americans. High education and white collar work status were associated with knowledge of all categories of cancer rates, whereas African Americans were more knowledgeable regarding incidence and survival.

The knowledge items regarding medical examinations for screening and early detection had the highest percentage of missing values (footnote, Table 1). Most respondents are aware of the purpose of examinations to detect the presence of cancer.

The results of the multivariate regression analysis are based on the analysis of the independent variables of race, education, income, and work status as predictors of the cancer prevention and control knowledge index. Interaction terms for income and education were included in the model. However, they proved to be nonsignificant and were dropped. Gender and age also were dropped from the model because they were nonsignificant and had no effect on the magnitude of the regression coefficients. Residual plots were examined from the final parsimonious model, and no unusual deviations from the normal error assumption appeared.

This model was compared to one with income and education categorized in three levels. There was relatively little difference in the results. The model reported in this analysis includes race and work status as dichotomous variables, 15 levels of education, and the midpoints of income.

TABLE 2. UNSTANDARDIZED COEFFICIENTS FOR THE RELATIONSHIP OF RACE, EDUCATION, INCOME, AND WORK STATUS ON THE CANCER PREVENTION AND CONTROL KNOWLEDGE INDEX

Variable	Beta	F
Work status*	−2.75 (1.1)	6.26
Race†	2.26 (.99)	5.15
Education	0.57 (.17)	11.50
Income	0.12 (.05)	4.82

* Blue collar = 1; white collar = 0.
† Black = 0; white = 1.
R^2 = .346.
F = 19.72 (df 4150) significance F = .0001.

The results of the regression analysis of knowledge on race, education, income, and work status are listed in Table 2.

All four independent variables were predictors of knowledge in the multivariate analysis. Work status emerges as the most important predictor in this model of cancer prevention and control knowledge. Race is the second strongest predictor, followed by education and income. The model explains (R^2) 34.6% of the variance of the cancer prevention and control knowledge index. The F ratio for the overall model is 19.72 (P = .0001).

DISCUSSION

The findings on race and socioeconomic status are consistent with previous studies. African Americans and persons with lower education and income levels need to be targeted for cancer prevention and control education. The multivariate analysis confirms that these groups and blue collar workers in particular are likely to have lower levels of knowledge even when other demographic factors are statistically controlled. The finding for race, in view of the mixed pattern observed in the bivariate relationships for African Americans, underscores the importance of multivariate analyses.

What is not addressed is the linkage between education, knowledge, and specific behaviors that impact on cancer incidence, mortality, and survival. This assessment would require prospective studies focusing on knowledge, attitudes, and practices.[13] Such studies would need to consider experience and perceived barriers in the health care system because of their potential to override the effect of knowledge and beliefs

in care-seeking behavior. Effective interventions will have to concentrate on structural issues of availability and access.[24]

Low levels of knowledge by African Americans because of lower levels of education or income are not supported by this study. Education and income do play a role, but race continues to be important independent of these other factors. Also, the importance of work status emphasizes the need to target worksites and perhaps integrate organized labor where possible into cancer prevention and control efforts.

Reviewing the distinct areas of cancer prevention and control items (Table 1) illustrates both progress made and the direction of future efforts. Respondents were very aware of the dangers of smoking and the benefits of not smoking. There was less awareness that the lung was a frequent cancer organ site and that a persistent cough or hoarseness were possible symptoms. Low levels of knowledge regarding hoarseness were confirmed in a study of church members.[24] Perhaps educational and media efforts could more clearly associate smoking with lung cancer *and* its symptoms.

The lack of knowledge regarding the effects of injury and surgery may reflect a misunderstanding of biomedical processes. Also, the very low percentage of persons answering correctly that a blow to the breast does not lead to cancer may indicate the strength with which all social groups retain this concern.

This survey preceded the recent media campaign regarding the role of dietary fat and fiber in cancer prevention, and as a result these findings may underestimate current dietary knowledge. The recent report that knowledge of diet continues to be low among African Americans[24] suggests that the media has not been effective in reaching the African American community. The role of fiber is still somewhat controversial, but remains an important part of the health promotion activity of the National Cancer Institute.[29]

Potentially critical findings are the relationships of all variables to knowledge of etiology and treatment. The survey results do support the need for more work to be done on the fears regarding injury as a cause of cancer and the effects of surgery on metastases. The suggestion that African Americans are more likely than whites to be treated nonsurgically when presenting with cancer may be a factor in explaining these complex patterns.[30,31] These associations do confirm the commonsense notion that the more technical aspects of medical practice are less easily diffused to groups disadvantaged in the general population. Prevention and control strategies will have to be prioritized, specific population groups will have to be targeted, and the difficulties of transmitting scientific information will have to be mastered. It will be necessary not to stereotype target populations as being unable to comprehend technical information. Strategies also must respond to the continued presence of myths and fears regarding the development of cancer. This is especially critical if, given more comprehensive assessment, these areas of knowledge are shown to be important in the process of adopting preventive behaviors, seeking early detection examinations, recognizing symptoms, and assuring prompt receipt of medical treatments.

CONCLUSION

Low levels of cancer prevention and control knowledge, and the barriers imposed by race, low education, low income, and blue collar work status may be important for reducing the disparity in cancer incidence, mortality, and survival between African Americans and whites. The findings in this study clarify the independent relationships of social status (ie, education, income, and work status) and race to cancer prevention and control knowledge. The findings also guide cancer prevention and control programs, research applications that target special population groups, and further the understanding of cancer prevention and control knowledge by including a broad range of items. The small sample size and lack of randomization limits the generalizability of this study. However, the consistency of the findings with other studies provides credibility. The knowledge index offers a breadth of cancer prevention and control phenomena and is presented as one method in which the dynamics of race and socioeconomic characteristics can be evaluated. The application of these findings will additionally be enhanced if evaluations purposely include a public health focus of cancer prevention and control activities by assessing impacts for individuals as well as the community.

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