

Patterns of HIV-AIDS Knowledge and Attitudes among Michigan Adults: Implications for Public Health Education

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Abstract:

Assessing the levels of knowledge and attitudes of HIV-AIDS in demographic groups is the first step in tailoring health education strategies. In this study, data from a state-wide sample of Michigan adults are analyzed to explore the interrelationships of demographic variables and knowledge of and attitudes towards HIV-AIDS. Bivariate and multivariate analyses reveal that most demographic variables show significant patterns of relationship with HIV-AIDS knowledge and attitudes. However, these patterns also reveal large inconsistencies between knowledge and attitudes with subgroup risk, based on known rates of infection in those subgroups. It appears that education of the public with regard to HIV-AIDS has favored the majority group. The study will conclude with the public health education implications of these findings.

Article:

Demographic factors such as racial and ethnic status, gender, and age are powerful predictors of many social phenomena, including illness and mortality. The extent to which knowledge and attitudes about HIV-AIDS is patterned along demographic variables is explored in this paper, using data collected from Michigan adults. Such patterning should have implications for public health education and should provide insights into the factors that shape public knowledge of and attitudes toward HIV-AIDS.

Assessing levels of knowledge and attitudes of HIV-AIDS by demographic groups is the first step in tailoring HIV-AIDS health education strategies for these groups. Issues such as the literacy of target populations and the readability of pamphlets and brochures (Wells and Sell 1991), and the format and design of print media (Longshore 1990) have been previously identified. Sociodemographic issues of concern are the sociopolitical issues of target groups, variation in sexual behavior and experience of different age groups, language differences by racial and ethnic groups (Longshore 1990), racial and ethnic attitudes and beliefs about sexual behavior and identity, and racial/ethnic group denial and paranoia (Boodman 1987a, 1987b). Identifying variations in patterns of knowledge and attitudes among demographic groups, and the reasons for these differences, is fundamental to creating HIV-AIDS education campaigns that are sensitive to these groups.

Reviews of health education models reveal that knowledge, attitudes, beliefs, and behaviors are all interrelated (Ross and Rosser 1989; Rugg 1990). But how these dimensions relate to each other with regard to HIV-AIDS is still uncertain. However, it does appear that knowledge of HIV-AIDS is unrelated to behavior without the modification of attitudes and beliefs such as

homophobia or the belief that a cure is imminent (Ross and Rosser 1989, p. 282). This paper will assess the relationship between demographic variables and two of these four components—knowledge and attitudes, the interaction between knowledge and attitudes, and the public health education implications of these relationships.

Existing Literature

As would be expected with a relatively new research topic, there is limited consistency across studies of HIV-AIDS knowledge in either selection of the major variables or in measurement. Even among demographic items, the most widely shared variables, many inconsistencies emerge. Some of these, with respect to the relationships between knowledge about HIV- AIDS and age, education, race, and sex, may represent actual variations among different subpopulations. Others, however, are most likely an artifact of the type of analysis presented. Most existing studies simply present bivariate relationships, while only a few have reported the existence of relationships that survive with controls for relevant variables. Additionally, some research analyzes the relationship between self-perceived knowledge, as compared to actual knowledge, and demographic and attitudinal variables.

The relationship between knowledge and attitudes is more certain. Research consistently shows a moderate to strong, positive relationship between knowledge and attitudes across demographic groups (Krupka and Vener 1988, Ross 1988, Temoshok, Sweet, and Zich 1987). That is, persons demonstrating either unrealistic fears and beliefs about HIV-AIDS, or negative sentiments towards stigmatized high-risk groups such as homosexuals and IV drug users, are less informed about the disease than persons not holding those fears and beliefs.

Age. In their analysis of national data, the National Center for Health Statistics (NCHS) (Fitti 1989) reported a curvilinear relationship between age and knowledge about AIDS, with adults between 30 and 49 providing more accurate answers than those either younger or older. Kappel and his associates (1989), however, found that the most accurate answers to questions about AIDS were more often provided by those under 45 rather than by those in either the 45 to 64 or the 65 and over categories. For blacks, persons under 50 were found to hold the highest level of knowledge about AIDS (Seltzer and Smith 1988). Other data from NCHS (Dawson and Hardy 1989a) showed that 21% of blacks under 50 and 10% of blacks 50 years old and older felt that they knew a lot about AIDS. Hispanics demonstrated a similar pattern with 14% of those 50 and over feeling that they knew a lot about AIDS in contrast to 22% of those under 50 (Dawson and Hardy 1989b). Aruffo, Coverdale, and Valibona (1991), however, reported in their multivariate analysis of data from a Texas county, that age did not predict AIDS knowledge when controlling for race, sex, and education. As their analysis was conducted on a convenience sample, however, the extent to which their findings are generalizable is open to question.

Education. As would be expected, knowledge about AIDS tends to be positively associated with level of education. Nationwide, respondents with greater education provided more accurate answers to questions about AIDS and the transmission of the HIV virus (Fitti 1989). This relationship has also been reported in a state-wide sample (Kappel et al. 1989) and a convenience sample of low-income and minority persons (Aruffo, Coverdale, and Vallbona 1991).

The National Center for Health Statistics has reported that this association between education and knowledge about AIDS holds for blacks (Dawson and Hardy 1989a) and Hispanics (Dawson and Hardy 1989b). The same pattern for blacks was also found by Seltzer and Smith (1988) in their analysis of a 1987 national survey. Marin and Marin's (1990) survey of San Francisco area Hispanics also found a strong association between education and correct knowledge about HIV-AIDS.

Race and ethnicity. Patterns in perceived knowledge of AIDS show whites reporting higher knowledge than blacks (Seltzer and Smith 1988, Dawson and Hardy 1989a) and whites reporting higher knowledge than blacks and Hispanics (Dawson 1990). These differences, however, were insignificant when controls for age, sex, and education were introduced (Seltzer and Smith 1988). Differences in perceived risk of infection are reported to be a function of education and age (Dawson and Hardy 1989a, Dawson 1990), as well as of cultural differences (Seltzer and Smith 1988). Aruffo and colleagues (1991), however, found that ethnicity predicted AIDS knowledge independent of age, sex, and education. They report that "Hispanics knew significantly less than blacks who, in turn, knew less than whites" (Aruffo, Coverdale, and Vallbona 1991, p. 118). But again, because these results are based on a convenience sample, their generalizability is questionable.

The most comprehensive study of Hispanics to date indicated no consistent differences in actual knowledge of AIDS between Hispanics and non-Hispanics (Dawson and Hardy 1989b). The greatest differences that did exist, however, were at the lowest education level. In the most recent multiethnic comparison, whites are reported to have higher knowledge levels than either blacks or Hispanics, although levels of misinformation decreased with increased levels in education (Dawson 1990).

Some studies provide contradictory information on racial differences in actual knowledge. Blacks are reported more likely to be misinformed about the modes of transmission of HIV (Seltzer and Smith 1988), although differences between blacks and whites are reported to be minor within education categories (Dawson and Hardy 1990a). In a study that included Hispanics, blacks, and whites, Hispanics are reported more likely to take special steps to avoid AIDS than whites (Bausell et al. 1986). According to a second study, however, Hispanics are reportedly somewhat less likely to take precautionary measures (Dawson and Hardy 1989b).

Gender. The literature indicates no significant gender differences in patterns of knowledge about AIDS; differences that have been reported are for variables such as fear of AIDS or perceived risk. Bray (1990) reports that females are more likely to change their sexual behavior, to indicate possible exposure to HIV, and to be tested for AIDS, although Dawson (1990) found females less likely to be tested for HIV. Among blacks, males are more likely than females to express personal concern about AIDS and to report being at high risk (Seltzer and Smith 1988).

Methods

The data analyzed in this paper were collected during 1990 through telephone surveys utilizing computer-assisted telephone interviewing (CATI) as part of Michigan's Behavioral Risk Factor Survey (BRFS). Questions on knowledge about HIV-AIDS were added by the Michigan

Department of Public Health to core questions provided by the U.S. Centers for Disease Control to surveys conducted in states participating in the Behavioral Risk Factor Surveys.

Each month during 1990 a sample of 200 Michigan adults were obtained using a Waksberg three-stage cluster design. In this process, primary sampling units (PSUs) consisting of eight-digit telephone number combinations (the area code, the prefix, and the first two digits of the number) were randomly selected from those prefixes actually in use in Michigan. The final two digits needed to complete the telephone number were also randomly generated and a screening call was made. If the first number for each PSU was a business, institution or a nonworking number, the entire PSU was discarded. Otherwise, randomly generated residential numbers were called to obtain two interviews from each PSU. The person to be interviewed at a residence was determined by the use of a matrix that gave each adult an equal chance of being selected.

The total data set was composed of 2,395 cases, including 2,019 whites, 287 blacks, and 65 Hispanics. These data were then weighted to adjust for the probability of reaching a respondent and to increase the generalizability of the data. The 1989 intercensal Michigan population estimates for age, sex, and race were used to weight interviews.

Respondent knowledge and attitudes of HIV-AIDS were measured by six knowledge questions and two attitude questions. For each respondent a summated score for knowledge was created by adding up the responses to the individual questions. For this sample the knowledge scale has an acceptable level of internal reliability (Cronbach's alpha = .60). Appendix A provides the individual questions and the response categories for those questions.

Findings

HIV-AIDS knowledge. Table 1 presents the percentages of whites, blacks, and Hispanics who gave correct answers to each of the six knowledge items. Whites, generally, provided the highest percentage of correct answers. Blacks showed the highest percentage of persons who had heard the AIDS virus called HIV, and Hispanics gave the highest percentage of correct answers to the question about the availability of drugs to lengthen the life of a person infected with AIDS. However, the differences between subgroups with regard to knowledge about the availability drugs to lengthen the life of an HIV positive person were not significant. From a public health perspective, one of the more striking findings is that fewer than one half of the respondents from all three groups provided the correct answer to that item. Also of concern are the large differences between group responses to the questions asking about the possibility of contracting HIV from donating blood or from mosquitos or other insects.

In order to consider overall knowledge, we created a scale of HIV-AIDS knowledge by computing a summed score. Since there were six knowledge measures, with correct responses given a value of 1, respondents' scaled scores ranged from 0 to 6. Table 2 shows the average scaled knowledge scores for categories of race, sex, education, age, income, marital status, and employment status. ANOVA was computed on categories within demographic variables, and the Scheffé method was used to compute the critical Fs for comparisons on marginal means. With the exception of no significant difference between males and females on knowledge, significant differences exist between groups within each of the other demographic variables.

The ANOVA results indicate that highest knowledge levels are among whites, the college educated, young adults, and those with higher incomes. Marital status is also significantly related to knowledge. But this relationship is partly a reflection of age differences. Those never married are younger as a group than those who are married, who in turn are younger as a group than those either divorced, widowed or separated. Although age accounts for much of the association between marital status and knowledge, there still remains a significant effect of marital status on knowledge. The relationship between employment status and knowledge is also consistent. Lowest knowledge is among the oldest group (retired), and those possessing the least formal education (out of work).

Table 3 presents the zero-order correlation matrix for all variables. Knowledge of HIV-AIDS is most strongly correlated with education ($r = .36$), followed by "Would you be willing to work with a person who is infected with the AIDS virus?" ($r = .31$), age ($r = -.30$), "Would you eat in a restaurant where the cook is infected with the AIDS virus?" ($r = .28$), income ($r = .28$), and race ($r = -.11$). Of specific interest is that the magnitudes of the relationships of education and age with the two attitude measures, "Would you eat in the restaurant where the cook is infected with the AIDS virus?" and "Would you be willing to work with a person who is infected with the AIDS virus?", are no more than half of the magnitudes of the relationships between those same demographic measures and knowledge. Overall, it appears that demographic characteristics are better predictors of knowledge than of attitudes.

As the independent variable most strongly correlated with HIV-AIDS knowledge and the variable often cited as explaining apparent differences in knowledge among ethnic groups, education was used as a control variable when examining the relationships of race/ethnicity with knowledge about HIV-AIDS (Table 4). ANOVA reveals that significant differences between whites and non-whites exist at all but the college graduate level.

These analyses show two findings. First, the greatest gains in knowledge for all three racial/ethnic groups occur between those who have not graduated from high school and

Table 1.
Percent Giving Correct Answers by Racial/Ethnic Group^a

Question	white	black	Hispanic	
Have you ever heard the AIDS virus called HIV?	79.3 (1597)	80.7 (232)	65.8 (43)	$p \leq .05$
To your knowledge, are there drugs available which can lengthen the life of a person infected with the AIDS virus?	47.9 (967)	43.6 (125)	49.6 (32)	N.S.
Do you think a person who is infected with the AIDS virus can look and feel well and healthy?	72.5 (1461)	63.4 (182)	68.5 (45)	$p \leq .01$
There has been a lot of talk about how you can and cannot get infected with the AIDS virus. Do you think you can get infected from giving blood?	74.7 (1506)	66.1 (190)	59.1 (39)	$p \leq .01$
Do you think you can get infected with AIDS from mosquitos or other insects?	64.8 (1306)	47.2 (136)	49.6 (32)	$p \leq .01$
Some people use condoms to keep from getting the AIDS virus through sexual activity. How effective do you think using a condom is in preventing getting the AIDS virus through sexual activity?	87.2 (1745)	83.1 (237)	80.3 (50)	N.S.
Total Number of Cases	(2019)	(287)	(65)	

^a Significance values based on Chi-square tests.

Table 2.

ANOVA for Knowledge Within Demographic Variables

<i>Race:</i>			
white	4.275	(1998)	white by black*
black	3.862	(284)	white by Hispanic*
Hispanic	3.725	(62)	
<i>Sex:</i>			
Male	4.182	(1133)	N.S.
Female	4.231	(1235)	
<i>Education:</i>			
Less than high school grad	3.132	(393)	All Pairs*
High school graduate	4.117	(879)	
At least some college	4.497	(652)	
College graduate	4.931	(441)	
<i>Age:</i>			
18 to 35	4.518	(955)	All Pairs Except
30 to 50	4.452	(629)	18-35 by 35-50*
51 to 65	4.021	(427)	
66 to 99	3.155	(348)	
<i>Income:</i>			
< \$10,000	3.570	(289)	All Pairs*
\$10,000-19,999	3.900	(416)	
\$20,000-35,000	4.300	(591)	
> \$35,000	4.745	(774)	
<i>Marital Status:</i>			
Married (M)	4.301	(1454)	M by DWS*
Divorced, Widowed, Separated (DWS)	3.739	(419)	NM by DWS*
Never Married (NM)	4.329	(493)	
<i>Employment Status:</i>			
Employed for wages (EW)	4.443	(1278)	R by All*
Self employed (SE)	4.389	(179)	OW by EW, S*
Out of work (OW)	3.996	(148)	
Homemaker (H)	4.253	(239)	
Student (S)	4.720	(89)	
Retired (R)	3.385	(429)	

* $p \leq .05$.

those whose highest educational achievement is a high school diploma. The average knowledge level increases by close to one full point for all three groups. Gains in knowledge are less dramatic between high school graduates and those with some college, and even less so between the latter group and college graduates.

Secondly, the significant differences between whites and non-whites in three of the four categories indicate that among the oldest group (66 to 99). Although significant, income, race and sex contribute marginally to explained variance. Altogether, 28% of the variance in HIV-AIDS knowledge is explained by the seven variables in Table 5.

The relationship between knowledge and attitudes is also consistent with the literature in that demonstrating correct knowledge of HIV/AIDS is positively associated with a realistic assessment of the risk of infection (Krupka and Vener 1988; Ross 1988; Temoshok, Sweet, and Zich 1987). When controlling for demographic variables, attitudes explain 9% of the variance in knowledge. This finding suggests that knowledge and attitudes have a relationship independent of demographic characteristics.

Table 3.

Zero-Order Correlation Matrix

	Know	Educ	Age	Inc	Sex	Race	COOK
Educ	.36**						
Age	-.30**	-.20**					
Inc	.28**	.40**	-.17**				
Sex	.02	-.05	.06*	-.14**			
Race	-.11**	-.02	-.06*	-.15**	.00		
COOK	.28**	.14*	-.15**	.07**	.07**	-.08**	
WORK	.31**	.15**	-.16**	.12**	.04	-.02	.39**

* $p \leq .01$.** $p \leq .001$.

Sex—male=0, female=1.

Race—white=0, black=1.

COOK—"Would you eat in a restaurant where the cook is infected with the AIDS virus?"

WORK—"Would you be willing to work with a person who is infected with the AIDS virus?"

Table 4.

ANOVA For Knowledge Between Racial/Ethnic Groups Controlling for Education

Less Than High School Graduate:

white	3.226	(317)	
black	2.620	(55)	white by black*
Hispanic	2.731	(12)	

High School Graduates:

white	4.185	(762)	
black	3.685	(97)	white by black*
Hispanic	3.709	(13)	

At Least Some College:

white	4.552	(532)	
black	4.386	(89)	white by Hispanic*
Hispanic	3.867	(26)	

College Graduates:

white	4.955	(383)	
black	4.796	(40)	N.S.
Hispanic	3.681	(9)	

* $p \leq .05$.

Table 5.

Multiple Regression Solution for HIV-AIDS Knowledge

	<i>R</i>	<i>R</i> ²	<i>Beta</i>
1. Education	.37	.13	.23
2. Would you be willing to work with a person who is infected with the AIDS virus?	.45	.20	.18
3. Age	.49	.24	-.19
4. Would you eat in a restaurant where the cook is infected with the AIDS virus?	.51	.26	.13
5. Income	.52	.27	.12
6. Race ^a	.53	.28	-.08
7. Sex ^b	.53	.28	.05

F (1, 1954) = 114.91, p ≤ .0000.

^a white = 0, black = 1.

^b male = 0, female = 1.

Discussion and Conclusion

So what are the public health education implications of the current study? First, both demographic groups with low risk of contracting HIV (the most educated) and high risk of contracting HIV (young adults) showed the highest knowledge levels and most positive attitudes. Yet, those racial/ethnic groups (blacks and Hispanics) experiencing the highest rates of testing positive for HIV demonstrate less knowledge and more negative attitudes as measured by the expression of an unrealistic fear of being infected. Elder-Tabrizy and colleagues (1991) report similar inconsistencies between prevalence of infection and level of concern about AIDS for Hispanics.

The differences reported in the current study suggest that attempts to educate the public with regard to knowledge and attitudes have in part failed to reach those groups with the highest infection rates. The highest levels of knowledge and the most positive attitudes are found among whites, those with college degrees, the youngest adults, and those with at least middle class incomes. It appears that education of the public with regard to HIV-AIDS has favored the majority group.

Health education policy must address these discrepancies in knowledge and attitudes. Successful public education is one that is tailored to the needs of specific groups, especially those groups experiencing high rates of infection. The argument for tailored education is based on the fact that "Not only do different groups change at different rates, but social and cultural heterogeneity require quite different messages for different subpopulations" (Cleary 1988, p. 270). As described earlier in this paper, education strategies designed with target group needs in mind can be seen in Wells and Sells' (1991) emphasis on writing pamphlets and brochures that reflect the literacy of target groups, and Longshore's (1990) emphasis on formatting and designing print media that reflect racial/ethnic group values and beliefs.

In their review of the relevant literature, however, Becker and Joseph (1988) conclude that "there is little actual evidence that an individual's knowledge and attitudes toward AIDS significantly shape his or her behavior" (p. 408). If this is true it should certainly concern us since, ultimately, the goal of HIV-AIDS education is to reduce high risk sexual and drug-using behavior. Becker and Joseph do not discount the probability, however, of a link between knowledge and education alone is insufficient in explaining differences in knowledge between racial/ethnic groups. To help determine how education, race, other demographic variables and attitudes are interrelated with each other in explaining knowledge, a multiple regression was conducted (Table 5). All partial slopes are significant at least the .05 level.

Of the demographic variables, education remains the best predictor of knowledge of HIV-AIDS. This relationship is certainly not surprising and is well supported in the literature (Biddlecom and Hardy 1991; Hardy and Biddlecom 1991). The next best demographic predictor of knowledge is age. We found levels of knowledge highest among the youngest group (18 to 35), declining steadily until we find the lowest levels attitudes and behavior, and suggest that the relationship may be mediated through some third factor. It is quite likely that the mediating factor may be what Schutt and colleagues (1992) refer to as "prevention activities." In Schutt, Gunston, and O'Brien's study, exposure to prevention activities, such as the availability of condoms and bleach vials as well as AIDS meetings, was weakly associated to AIDS knowledge but substantially associated with self-reported behavior change in residents of three homeless shelters in the Boston area.

Rugg (1990) has constructed a hypothetical continuum of the potential of various AIDS education strategies for affecting behavior change. This continuum is based on the tenet that persons have to be attending to, and actively engaged in, an intervention in order for the intervention to mean anything to the individual, as measured by behavior change. Education techniques with highest potential for affecting behavior are one-to-one communication and small group communication. Those with the lowest potential are newspaper articles and written educational material. The prevention activities demonstrated by Schutt, Gunston, and O'Brien (1992) to have a strong effect on self-reported behavior change would be categorized in Rugg's hypothetical model as having high potential for affecting behavior.

The results of the current study, together with prior research on the relationship between AIDS education and knowledge, attitudes, and behavior change, indicate a need for target group sensitive education that includes active involvement by participants. This need is especially evident among high risk populations. Rugg's model has practical as well as heuristic value in this regard. It very well may be that the mediating variable between knowledge, attitudes, beliefs, and behavior is an educational strategy that emphasizes such things as actual contact with prevention activities, participation in HIV-AIDS awareness workshops, or actual contact with persons with HIV-AIDS.

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Appendix A

Knowledge Questions

1. Have you ever heard the AIDS virus called HIV?*
2. To your knowledge, are there drugs available which can lengthen the life of a person infected with the AIDS virus?*
3. Do you think a person who is infected with the AIDS virus can look and feel well and healthy?*
4. Do you think you can get infected from giving blood?*
5. Do you think you can get infected with AIDS from mosquitos or other insects?*
6. How effective do you think using a condom is in preventing getting the AIDS virus through sexual activity?***

The following responses were considered to indicate knowledge of HIV-AIDS: Q1, Q2, and Q3 "Yes"; Q4 and Q5 "No"; Q6 "very effective," "somewhat effective." Because a value of 1 was given for each correct response, and a value of 0 given for each incorrect response, values on this scale ranged from 0 to 6.

Attitude Questions

1. Would you eat in a restaurant where the cook is infected with the AIDS virus?*
2. Would you be willing to work with a person who is infected with the AIDS virus?*

The ranking of respondent attitudes was done in the following way: "Yes" = 2 (positive); "don't know/not sure" = 1 (neither positive nor negative); "No" = 0 (negative). Thus, values for these two questions ranged from 0 to 2.

*Response categories: "yes" "no" "don't know/not sure" "refused" **Response categories: "very effective" "somewhat effective" "not at all effective" "don't know how effective" "don't know method" "refused"

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