Regional Variations in Cancer Screening Rates Found in Women with Diabetes

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Abstract

A review of the literature gives conflicting findings regarding gender specific cancer screening rates found in women with chronic illness. Secondary analysis was utilized to determine if women with diabetes have different patterns of cancer screening than women of the general population; and, if so, identify the determinants of these screening patterns. The 12 states utilizing the optional women's health module for the 2003 Behavioral Risk Factor Surveillance System (BRFSS) was downloaded into STATA Software. Contingency tables were used to identify the prevalence of cancer screening in women who self-report that they have diabetes in comparison to women who report being non-diabetic. Logistic regression examined the association between the PRECEDE Model determinants and screening behaviors. No significant association was found between having a diagnosis of diabetes and mammography screening rates (F =1.5, p-value = .22). However, cervical cancer screening rates were statistically significantly different among the two groups of women (F=39.01, p-value= .00). This investigation identified a gap in cervical cancer screening rates among women with diabetes as compared to women without diabetes (78% versus 86% respectively). Regional exceptions were noted between the 12 states. Ten of the 11 PRECEDE variables demonstrated a significant association with Pap screening rates. The states demonstrating inadequate screening rates were the states with the most negative PRECEDE factors. Research has shown that the primary reason women seek cancer screening is when they are encouraged by a health care provider. If other care providers are focused on disease management, nurses who pride themselves with providing holistic care can capitalize on the advocacy role inherent in nursing and support utilization of screening in underserved areas of the country.

Introduction

The purpose of this study was to determine if women with diabetes have different patterns of screening for breast and cervical cancer than women of the general population and to identify the determinants that relate to this pattern. It was hypothesized that women with diabetes would be less likely to be screened for breast and cervical cancers and that the issues related to at-risk populations would compound this finding. For the purposes of this investigation, cancer screening was defined as receipt of mammography and Pap smears.

A review of the literature gives conflicting results regarding whether the cancer screening needs of women with diabetes are being met. Fontana, Baumann, Helberg, and Richard (1997) conducted one of the earliest identified studies investigating chronic disease status and its association with preventive services. Fontana et al.'s study found that the presence of a chronic illness resulted in fewer screenings for cancer. Specifically, as it relates to women, women with diabetes were less likely to have a mammogram and women with diabetes or heart disease were less likely to have a Pap test. This corresponds to the findings of Kiefe, Funkhouser, and Fouad (1998) that chronic illness is associated with decreased cancer screening. Likewise, Beckman, Cuddihy, Scheitel, Naessens, Killian, and Pankratz (2001) also found that women with diabetes are less likely to receive mammograms.

On the other hand, Heflin, Oddone, Peper, Burchett, and Cohen (2002) found no association between chronic illness and receipt of cancer screening in older adults. In fact, Heflin et al report "hypertension and the presence of a higher number of comorbid conditions are associated with a higher rate of receipt of cancer screening" (p. 1652). These authors explain this finding as the result of increased health care visits individuals with chronic illness require, which provides more opportunities to be offered preventive care.

Clearly, a review of the literature demonstrates conflicting findings and is limited in being generalized to only certain regions of the country. This study addresses this conflict by using national data from multiple regions of the country to determine if a disparity in cancer screening rates exists between women with diabetes and women of the general population.

Methods

Green and Kreuter's PRECEDE Model (1999) was chosen to guide this study. Determinants related to use of preventive care and early screening for the detection of cancer can be complex and multifactorial. Consequently, a complex model is needed to frame the variables related to the utilization of cancer screening in women with diabetes. Richard, Potvin, Prlic, and Green (1996) state, "At the heart of the model is the interaction of behavior and environment with their determinants" (p. 319). These determinants are identified as predisposing, enabling, and reinforcing factors.

Predisposing factors included specific quality of life issues based on responses to Behavioral Risk Factor Surveillance System (BFRSS) questions, such as, perception of general, physical and mental health. Enabling factors included whether the individual had health care coverage, a regular health care provider, educational attainment, employment and income, and whether the individual had a disability. The BRFSS does not address reinforcing determinants.

Data for this study was derived from the Behavioral Risk Factor Surveillance System Survey (BRFSS) conducted by the Centers of Disease Control and Prevention (CDC). Sample size varies by state based on cost, available resources, effect of sampling design on the estimates, and other factors (CDC, 1998). Because the CDC and BFRSS are federal programs, BFRSS is considered in the public domain and does not require permission for use. An expedited

approval for this project was obtained from the Rush University Institutional Review Board (IRB).

Sample

Subsets of the 2003 BRFSS were utilized. Participants for inclusion were women who responded positively to the core question that they have been told by a doctor that they have diabetes and compared with women who do not have diabetes. Those responding positively to having diabetes but only during pregnancy were excluded. In addition, for receipt of mammography, those selected must be 40 years of age and older. This is in keeping with the American Cancer Society (2004) guidelines those women 40 years of age and older should have yearly mammograms as long as they are healthy. The sample analyzing cervical cancer screening rates included women 21 to 70 years of age. The American Cancer Society recommends women to have a Pap smear starting within three years of intercourse or age 21; whichever comes first. The results of these two samples were correlated with responses to the optional Women's Health Module in regards to screening for breast and cervical cancer. In 2003, thirteen states used this optional module (CDC, 2003). Consequently, this study evaluated data from the following states: Arkansas, Georgia, Hawaii, Iowa, Mississippi, Missouri, New Jersey, Oklahoma, South Dakota, Tennessee, Vermont, and Wyoming (CDC). Guam was not included in this study.

Data Analysis

Appropriate 2003 BFRSS Data Files were downloaded into STATA statistical software for analysis. The sampling weights that correspond to each data record were applied prior to analysis. Sampling weights are used for complex sampling designs to adjust for non-sampling bias. Examples of non-sampling bias are those that can occur due to non-responders having

differing views than responders or due to an inability to sample sub-populations that are considered to be in the target population (individuals not having phone coverage or not having the ability to accept a phone call).

The primary hypothesis, that women with diabetes have lower rates of breast and cervical cancer screening than women who do not have diabetes, was tested using a 2 X 2 contingency table displaying the categorical variables. The categorical variables being women with or without diabetes (explanatory variable) and women who have or have not had cancer screening (response variable). A separate table was developed for each type of cancer screening (breast and cervical). The question "Is cancer screening associated with the diagnosis of diabetes?" was answered by determining if the two variables are independent or dependent. The variables are statistically dependent if the conditional distributions are not identical. However, because sampling variability may result in percentages that differ in the population, the chi-squared statistic was used to test for independence between the variables. A p-value =.05 or less signified that cancer screening was associated with having diabetes. Residual analysis further provided information regarding the nature of the association. The strength of the statistical dependence between the variables was determined using the odds ratio.

Prior to utilizing logistic regression to determine the relationship between the PRECEDE factors to cancer screening in women with diabetes, a correlation matrix was analyzed to determine if any of the explanatory variables in the regression model demonstrated multicollinearity. Independent variables were correlated to determine if there was any redundancy of one variable with another. Since no multicollinearity was demonstrated, no variables were deleted from the initial regression equation except for the number of days in the past 30 viewed as poor health due to physical or mental issues. This variable was omitted due to

its similarity to included quality of life variables. Since the explanatory variables were theory-based using the PRECEDE Model, no further changes were made to the initial regression equation.

Logistic regression modeling was used to answer the second question regarding what determinants relate to receipt of cancer screening in women with diabetes. Logistic regression models are used when the response variable has only two possible outcomes (Agresti & Finley, 1997) rather than response variables that are quantitative. In addition, logistic regression models allow the use of dummy variables to include qualitative explanatory variables such as will be necessary when incorporating predisposing and enabling determinants related to undergoing cancer screening. Because the PRECEDE Model determines which variables will be included in the regression model, automated selection procedures provided by statistical packages were not appropriate.

Results

The total weighted population size for mammography screening was 9,017,661 women 40 years of age or older in the included states. The population size for Pap screening was 13,025,863 women 21 years of age or older in the included states. The percentage of women of any age who report being told they have diabetes varied from a low of five percent in Vermont to a high of 11.5% in Mississippi. The average diabetes rate was 6.9% for the 12 selected states. The nationwide percentage of women who report a diagnosis of diabetes is seven percent based on analysis of 2003 BRFSS data (CDC, 2005). This includes women of all ages and races.

Mammography Screening Rates for Diabetic Versus Non-diabetic Women

Analysis revealed that there was no significant association between having a diagnosis of diabetes and mammography screening rates with an F score of 1.5, CI (1.87, 41537.70), and a *p*-

value of .22. Overall, thirty-two percent of the non-diabetic women had not had a mammogram in the previous two years as compared to 34% of the women who did have diabetes.

When calculated on state level, significant differences were found for Mississippi and South Dakota. Diabetic women in Mississippi (p-value=. 04) were less likely to receive mammography while diabetic women in South Dakota (p-value = .01) were more likely to be screened. Table 1 reports state mammography-screening rates.

Pap Screening Rates for Diabetic Versus Non-diabetic Women

Analysis revealed that there was a significant association between having a diagnosis of diabetes and cervical screening rates with an F score of 39.01, CI (1.84, 49995.98), and a *p*-value of .00. Overall, 13.5 percent of the women who did not have diabetes had not had Pap screening in the previous two years as compared to 22% of the women who did have diabetes. All states show a significant association except Hawaii and Missouri. Table 2 presents rounded Pap screening rates for individual states.

As noted, Hawaii and Missouri were the only states that did not show a statistically significant association. Screening rates were the same for both diabetic and non-diabetic women in Hawaii and Pap screening was lower in diabetic women in Missouri but not at a statistically significant level. Hawaii demonstrated the highest screening rates for both diabetic and non-diabetic women at 91% respectively. Lowest Pap screening rate for non-diabetic women was found in Arkansas at 78% and the lowest for diabetic women was 66% in Wyoming.

Factors Associated with Cervical Cancer Screening Rates in Diabetic Women

The second aim of this study was to explore the association between selected predisposing and enabling factors and cancer screening rates of women with diabetes if the first hypothesis was found to be true. Between the two types of screenings, Pap screening was

reduced in the diabetic population. Therefore, further analysis was limited to determinants of cervical cancer screening.

A total of eleven factors were entered into a logistic regression model with cervical cancer screening rates of diabetic women. Ratings of general health in categories of excellent, very good, good, fair, or poor were significant (p=. 00) as women with better ratings of general health demonstrating improved Pap screening rates. The number of days during the past 30 days when physical health was viewed as not good was not significant but the number of days that mental health was not good was significant (p=.00) and demonstrated an inverse relationship with screening. Specifically, screening rates increased as the number of days identified as being poor in mental health decreased. However, it should be noted that even though the p-values for mental health was statistically significant, the odds ratio was .99 indicating little difference in Pap screening rates based on women's response to poor mental health. The number of days defined as poor health in the past 30 days in which physical or mental health kept the participant from doing usual activities was subsequently not entered into the regression model due to overlap with previous factors.

Enabling factors such as whether the participant had health care coverage was significant at a p-value of .00 as well as being able to identify at least one personal health care provider (p=.00). Women that report they have health care coverage or at least one personal physician were more likely to receive Pap screening. Education categorically ranged from never attended school to four years of college or more and was significant (p=.00). As expected, screening rates increased as levels of education increased. Employment status and income was significantly associated (p-value of .00 respectively). Those reporting being employed or self-employed were more likely to be screened than those who were not employed as did those with higher income

levels. Health problems requiring the use of special equipment or resulting in limitation of activity levels were significant (p-value of .00) and was associated with reduced Pap screening rates. Race was found to be significant (p=.00). Interestingly, non-Hispanic whites were less likely to receive cervical cancer screening than Hispanics or other races. Table 3 summarizes the results of regression modeling on Pap screening rates using these determinants.

Discussion

This investigation identified a gap in cervical cancer screening rates among women with diabetes as compared to women without diabetes (78% versus 86% respectively). However, Outliers for mammography screening were identified. For example, diabetic women in Mississippi were less likely to receive breast cancer screening in contrast to other states. Other studies confirm this is not an isolated finding. Hall, Jamison, Coughlin, and Uhler (2004) noted lower screening rates for both black and white women in the Mississippi Delta than among similar women in other parts of the country. Coughlin, Thompson, Seeff, Richards, and Stallings (2002) found that screening rates varied by region with a deficit especially noted in the nonmetropolitan South. Like Coughlin et al., the findings of this study indicated screening rates varied more by region than ethnicity.

The reason for the deficit in mammography screening in Mississippi can be speculated based on the theoretical framework of this study. A literature review for this investigation identified enabling factors associated with screening deficits. These factors include lack of insurance coverage (Danigelis, Roberson, Worden, Flynn, Dorwaldt, Ashley, & et al, 1995; Friedman, Ahmed, Franks, Weatherup, Manning, Vance, & Thompson, 2002; Katz, & Hofer, 1994; & Michielutte, Dignan, Blinson, & Wells, 1999), low education level (Cornelius, Smith, & Simpson, 2002; Danigelis et al, 1995; Katz et al, 1994; & Michielutte et al, 1999), low income

level (Danigelis et al., 1999, Katz et al, 1994; Michielutte et al, 1999), and increased unemployment (Danigelis, 1995; Katz, 1994; Zapka, 1989). Interestingly, Mississippi demonstrated the highest unemployment, the highest number of women who report being unable to work, the highest percentage reporting an annual income that was less than $25,000, and tied with New Jersey for the highest number of women who report having less than a high school education when compared to 11 other states used in this study based on the BRFSS (CDC, 2003). Mississippi clearly is at risk for inadequate screening for all women, diabetic and nondiabetic, in light of multiple enabling factors that inhibit access to adequate preventive care.

The question that needs to be asked is why is South Dakota more likely to perform screening for breast cancer in diabetic women than those who do not have diabetes. Again, when comparing enabling determinants in the BRFSS (CDC, 2003), South Dakota reports the fewest percentage of women reporting an inability to work (1.8%) and over 90% of all women have health care coverage. Only Vermont, Wyoming, Iowa, and Hawaii report fewer percentages of women with less than a high school education. Additionally, South Dakota has the lowest unemployment rate. The percentage reporting an annual income less than $25,000 is slightly less than the average of 29% in all 12 states with 28% in South Dakota. With fewer factors reflecting risk and vulnerability for inadequate health care in general, diabetic women are more likely to have increased visits to a health care provider for care than nondiabetic women. Consequently, this increased exposure to health care may provide more opportunity to receive health promotion and early detection screenings as suggested by Heflin, Oddone, Peper, Burchett, and Cohen (2002). However, it must be noted that South Dakota's Pap screening rate for non-diabetics at 88% and diabetics at 89% is a long way from the Healthy People 2010 objective of 97%. It

should also be noted that the BRFSS data did not distinguish the impact the Native American population found in South Dakota has on these results.

Cervical Cancer Screening

It is not surprising that Hawaii's diabetic women do not reflect the norm in regards to cervical cancer screening. Hawaii has the lowest percentage of women with less than a high school education than the other 11 states (CDC, 2003). The unemployment rate is a low 2.8 percent and Hawaii has the lowest number of women reporting an inability to work (1.9%). It is second only to Tennessee at having the greatest percentage of women having health care coverage at greater than 90%.

Missouri does not stand outside the norm in regards to enabling determinants. In fact, all factors are rather average in rankings, including screening rates. So, why does Missouri have higher pap screening rates than the other remaining 10 states do in regards Pap screening in diabetic women? Like so many issues related to health promotion and illness prevention, the reason is likely multifactorial. However, one reason may relate to the priority this state gives to cancer screening. A visit to the Missouri Department of Health and Human Services (Missouri Department of Health and Human Services, 2005) demonstrates an active legislative, state, and financial focus on cancer screening.

In 1990, the United States Congress passed the Breast and Cervical Cancer Mortality Prevention Act that lead to the formation of the CDC directed National Breast and Cervical Cancer Early Detection Program (CDC, 2005). While this is a national program, the CDC (2005) reports state programs vary in funding, management, service delivery, population demographics, and other factors to the extent that comparison across states is discouraged. States are allowed some independence in determining the women who are most in need of

screening services. Some states, such as Missouri, appear to give greater priority, financial and otherwise, to the management and delivery of preventive health services in collaboration with established national programs.

It must be questioned why these issues impact cervical cancer screening more than breast cancer screening. Reasons for this finding can only be speculated. Often mammography can be arranged by referral or prescription. It takes little out of the provider's time and effort to write a note or ask the office staff to make a referral for mammography. However, when it comes to Pap screening, this is not true. If the woman does not have a personal obstetrician or gynecologist to provide this service, a specialist or other type of provider is often reluctant to offer this service due to the need to see a certain number of clients in a relative short amount of time (Fontana, Baumann, Helberg, & Richard, 1997). Time restraints in a disease and symptom focused health care delivery system not surprisingly limits focus on health screenings that require additional office staff, equipment, and time to complete.

Determinants of Cervical Cancer Screening

The second aim of this study was to explore the association between selected predisposing and enabling factors and cancer screening rates of women with diabetes. Women who perceive that they have control of their diabetes report higher perceptions of quality of life (Watkins et al., 2000). In fact, with mastery of self-management of their illness, they very well may avoid the complications associated with uncontrolled diabetes. It then becomes cyclic as increased perception of control results in better self-management of their illness and resulting increased positive quality of life due to improved health. It then seems logical to deduce that a greater perceived sense of control carries over to other areas that protect health, including cancer screening. Adopting preventive care may increase a perception of control as signified by women

who had completed a mammogram and/or Pap smear describing feelings of empowerment and accomplishment (Marshall, 2004). Likewise, women who perceive they have poor general health including physical and mental health are more likely to have difficulty managing their chronic illness resulting in little priority given to preventive care. This study found that diabetic women with positive ratings of general health were more likely to be screened. Additionally, those with increasing number of days with poor mental health were less likely to be screening although this finding demonstrated a minor impact based on an odds ratio of .99. The same measure of physical health was not statistically significant.

In this study, predisposing factors related to quality of life and perceptions of health demonstrated an impact on cancer screening behaviors. Since predisposing factors according to the PRECEDE Model relates to attitude, emotions, and values, it is not surprising ratings of general health and mental health have an impact but physical health does not. The two previous factors relate to perceptions while physical health is more of a barrier to overcome. In fact, women with poor physical health may still feel they have the power to overcome limitations and give priority to preventing further illness through preventive care. Matters related to mental health and attitude may be much harder to overcome than the physical.

Studies identifying enabling determinants to cancer screening in women in the general non-diabetic population are numerous. The findings in this study were not dissimilar. Demographic factors such as low income, low education level, and increased unemployment served as factors that were statistically associated with decreased cancer screening rates in this study and others.

The risk factors associated with diabetes; such as obesity and a sedentary lifestyle, are also more likely to be found in women of poverty and lower socioeconomic levels (Beckles &

Thompson-Reid, 2001). Consequently, diabetic women are more likely to be disproporately represented in lower socioeconomic groups that are less likely to seek or receive cancer screening. It is not surprising that states with greater poverty and lower socioeconomic status in their populations demonstrated poorer screening rates for both mammography and Pap smear screenings.

For reasons discussed, diabetic women are more likely to be uninsured and to not have a regular health care provider. All these factors are associated with decreased utilization of cancer screening. In this study the finding remained true. Women who could not report having at least one personal physician or health care coverage (insurance) were also less likely to be screened.

Studies have demonstrated that women with disabilities were less likely to be screened for cancer (Becker, Stuifbergen, & Tinkle, 1997; Nosek, Howland, Rintala, Young, & Champong, 2001). Women with diabetes who report having a disability that limits their ability to perform activities and/or women who have a disability that requires the use of special equipment demonstrated decreased rates of screening than diabetic women without disabilities. The nature of uncontrolled diabetes promotes neurovascular changes that result in increasing neuropathies, blindness, and amputations. It is expected that greater disabilities would be found in this population. These disabilities may present barriers of access to preventive care that is both physical and emotional. Greater effort is needed to see that screening is not neglected in this population.

Finally, the finding that whites were less likely to be screened than Hispanics or nonwhites was surprising given the preponderance of poverty in minority populations. However, according to the American Cancer Society (2003), 84% of black (non-Hispanic) women who were 18 years of age are older have received a Pap test in the United States in the year 2000 as

compared to white (non-Hispanic) women at 82%. These statistics are based on CDC National Interview Survey results in 2000. This may partly relate to the success of national, state, and local programs, such as the National Breast and Cervical Cancer Early Detection Program (NBCCEDP) that target low income and minority women to promote cancer screening. These finding also increasingly seem to point to more regional and socioeconomic disparities than factors that relate to race independently (Coughlin, Thompson, Seeff, Richards, & Stallings, 2002).

Implications for Further Research

Clearly, a greater gap in cervical cancer screening exists in diabetic women. Speculation points to the health care delivery system as a possible reason for this neglect in preventive care. Models of health care delivery can choose to promote preventive care by increasing access or impose barriers to preventive care. Further investigation is needed to explore access to preventive care, provider perceptions of the need for such care, and interventions to promote cancer screening, especially among diabetic women of poor socioeconomic status found in certain regions of the country.

The National Breast and Cervical Cancer Early Detection Program has been implemented in every state in the United States (CDC, 2001). Programs such as this have achieved success as indicated by a decrease in racial and ethnic disparity found in screening rates. However, regional differences remain. Issues of vulnerability seem to be a factor but further investigation is needed to explore why these regional differences continue when national programs for each state exists. Social policy and political research is needed to explore this finding.

Limitations

Data from the BRFSS is based on self-report. It is known that self-reported cancer screening rates tend to be overestimated (CDC, 2001). If anything, the results from this study probably underestimate the scope of the problem. Rates are likely to be a bigger concern than noted here. Whether cancer screening rates of diabetics and non-diabetics differ in this underestimation is unknown. Further research is needed to determine the scope of this concern.

The CDC (2001) reports that over 30 methodological studies suggest most measures in the BRFSS are both reliable and valid. However, the measures in this study are used as a proxy for PRECEDE determinants which may not have been the intent of the original variables. Since the variables for enabling determinants consisted mainly of concrete demographic information, these measures are likely to be most reliable and valid. However, predisposing variables as reflected in perceptions of health and quality of life are more suspect. It is suspected that these variables offer a somewhat crude estimate of intended measures. Conclusions from this evaluation should consider this limitation. In addition, the measure of race as reflected as white/non-Hispanic and nonwhite/Hispanic is also a crude distribution of racial and ethnic subpopulations. It was also found the BRFSS underrepresented certain population groups such as Hispanics and Native Americans. Further research with clear categorization of racial and ethnic groups is needed.

Finally, methods of coding of missing observations can present vastly different results. After numerous explorations of coding methods for observations used in logistic regression, a final method was selected. Ordinal data was coded at the average measure of the variable and missing observations of categorical variables was coded as 0. Other researchers may have different approaches that impact final results.

Conclusion

One of the most important findings is this study relates to health disparities in preventive care found in certain regions. National programs to promote cancer screening in underserved women are finding success as demonstrated by improved screening rates in minorities. Regional exceptions continue to exist. Not surprising, the states demonstrating inadequate screening rates are the states with the more negative predisposing and enabling factors. It appears greater communication, resources, and focuses are needed between all local, state, and national levels to address health care delivery and access to the underserved. It is true that local and state departments of health should know the needs of their population best. However, greater monitoring at the national level when gaps in health care are observed may be needed to provide resources and expertise to the regions most at risk.

The relationship of the PRCEDE determinants to cervical cancer screening was not surprising. These factors are the same factors documented many times in numerous other studies involving women who are non-diabetic. It just further substantiates that socioeconomic factors and perceptions of quality of life factors impact screening rates.

The findings of this study are not isolated to cancer screening. It likely points to many issues of health care disparities across the country. As Green and Kreuter (1999) indicated with their PRECEDE Model, these issues are complex and multifactorial. However, regions at risk can be identified. Health care providers underestimate the impact they have by informing and encouraging those they serve to perform preventive care. If other care providers are focused on disease management, nurses who pride themselves with providing holistic care can capitalize on the advocacy role inherent in nursing and support utilization of screening in underserved women.

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Table 1

Mammography Screening Rates by State Reported in Contingency Tables

State	Had Mammogram (Non-diabetics) (%)	Had Mammogram (Diabetics)(%)
Arkansas	62	54
Georgia	67	69
Hawaii	72	75
Iowa	70	64
Mississippi	62	53
Missouri	64	70
New Jersey	70	70
Oklahoma	67	63
South Dakota	70	79
Tennessee	75	67
Vermont	67	69
Wyoming	58	53

Table 2

Pap Screening Rates by State Reported in Contingency Tables in Row Proportion

State	Had Pap (Non-DM)	Had Pap (DM)
Arkansas	78	69
Georgia	89	81
Hawaii	91	91
Iowa	86	76
Mississippi	83	71
Missouri	84	77
New Jersey	87	80
Oklahoma	81	70
South Dakota	88	89
Tennessee	91	82
Vermont	88	73
Wyoming	79	66

Table 3

Regression Results of Pap Screening Rates of Diabetics and their PRECEDE Determinants

Last Pap	Odds Ratio	Std. Error	t	p	95% CI
General Health	.81	.02	-7.97	.00	.77 - .85
Physical Health	.99	.00	-1.19	.23	1.00 - 1.00
Mental Health	.99	.00	-2.18	.03	1.00 - 1.00
Health Plan	1.47	.10	5.82	.00	1.30 – 1.67
Personal Doctor	1.78	.13	8.25	.00	1.56 - 2.06
Education	1.23	.03	8.02	.00	1.17 - 1.30
Employment	1.23	.07	3.81	.00	1.10 – 1.36
Income	1.05	.02	3.57	.00	1.02 - 1.08
Disability	.80	.05	-3.55	.00	.71 - .90
Use Special Equipment	.71	.07	-3.39	.00	.58 - .87
Race not specified *	.39	.03	-11.90	.00	.34- .46
White	.45	.04	-10.31	.00	.39 - .52

N=13, 025,863 (weighted pop. size), 30,141 observations
** Compared to non-white and non-Hispanics*