

Mammography and Breast Self-Exam Utilization by Older Rural Women

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INTRODUCTION

Breast cancer has the highest incidence rate of all cancers in women. The risk of developing breast cancer increases markedly as a woman ages. Women over the age of 70 have almost twice the risk of developing breast cancer as women who are under 50 (Baker, 1982; Love, 1989). Indeed, while women over the age of 65 represent 14 percent of the female population, they account for over 43 percent of all invasive breast cancers (Costanza, Annas, Brown, Cassel, Champion, Cohen, & Frame, 1992). And along with increased incidence of breast cancer with age, survival for these older women is lower than for younger women (Yancik et al., 1989). It is estimated that breast cancer mortality could be decreased by approximately 30 percent if clinical breast examinations and mammography screening were widely used (Shapiro, et al., 1982; Taber, et al., 1985).

Research indicates mammography screening is underutilized by women of all ages (Fox, Murata, & Stein, 1991). The 1987 National Health Interview Survey revealed that 47.4 percent of women between the ages of 50 and 75 had never had a mammogram. The older the woman, the less likely she was to ever had a screening mammogram (Center for Disease Control, 1988).

Previous research (e.g., Champion, 1992; Costanza, Stoddard, Gaw, & Zapka, 1992; Funkhouser, Waterbor, Cole, & Rubin, 1993; Mor, Pacal, Rakowski, 1992) has examined various factors as predictors of mammography utilization and breast self-examination in urban settings. These have included age, education, general health, medical services utilization, and reproductive history. Little is known about patterns of usage or predictors of usage in rural, elderly women. The present investigation examines recency of mammogram, the interval

ABSTRACT

The present investigation examines recency of mammogram, the interval between mammograms, and use of breast self-examinations in a sample of older, rural women. A total of 355 women completed a health behavior survey (mean age = 77.8 and education = 11.6 years). The predictors of recency of mammography examination are regular pap smears and clinical breast examinations, greater variety of medical checkups/procedures, and younger age. The predictors of repeating mammograms within recommended guidelines are regular pap smears, lower/normal blood pressure, greater variety of medical checkups, and younger age. The predictors of monthly breast self-examination include regular clinical breast examinations, younger age, more positive health maintenance activities, and more positive health perceptions.

between mammograms, and use of breast self-examinations in a sample of older, rural women.

SAMPLE

The subjects were female participants in the ongoing Adult Development and Enrichment Project (ADEPT) in rural Pennsylvania. Subjects completed a Health Behaviors Questionnaire in the summer of 1993. A total of 355 women completed the survey. They had a mean age of 77.8 years ($sd = 6.40$, range = 62-98). Subjects reported having 11.6 years of education ($sd = 2.57$, range = 0-22), and self-reported themselves to be in moderately good to good health ($\bar{x} = 2.3$, $sd = 0.89$, range = 1-7).

PROCEDURE

The Penn State Health Behavior Questionnaire (HBQ) is a new instrument developed to assess health behaviors and health-related issues in adults. The HBQ was mailed to participants and completed in their homes. The response rate for this survey was 75.5%. The HBQ is comprised of 86 items. Seven health factors were determined via confirmatory factor analysis to comprise the HBQ (Maier, McGuire, & Willis, 1994): Substance Use, Positive Nutrition Behaviors, Medical Check-ups, Positive Health Maintenance Activities, Positive Health Perception, Positive Health Status, and High Blood Pressure. A brief description of the HBQ items by factor are found in Table 1 with their corresponding orthonormalized factor loadings. All factor loadings were significantly ($p \leq 0.01$) different from zero. A substantive interpretation of the seven health factors is given in Table 2.

Insert Tables 1 and 2 about here.

Gynecological items were also included in the survey. Of interest to this paper were items focusing on mammography usage, breast self-exam, medical breast exams, mastectomy history, pap smears, and OB/GYN examinations.

RESULTS

Breast Cancer prevention has focused on two modes of preventative behavior. One mode is physician initiated--this includes mammography screening and clinical breast examinations--and the other is self-initiated--breast self-examinations. This study considers both modes.

Mammography

Figure 1 presents data on recency of mammograms for rural, elderly women in our sample. For the total sample, approximately one-third had never had a mammogram. Almost half had a mammogram in the last two years. The young-old (ages 62-74) were significantly more likely to receive mammograms than the old-old (ages 75+), $t(347) = 2.122$, $p < .0345$ (See Table 3).

Place Figure 1 and Table 3 about here

Predictors of two issues regarding mammography utilizations were examined. First, what predicts recency of mammography exam among rural, elderly women? And second, for

women who have had two or more mammograms, what predicts the interval between mammographies? These questions were asked for the total sample and separately for the young-old, and the old-old groups.

Place Table 4 about here

Young-Old Sample

The significant correlates of recency of mammogram for the young-old sample (ages 62-74) were: Pap Smear Frequency, $r = 0.623$, $p < .0001$, $n = 120$, OB/GYN Examination Frequency, $r = 0.586$, $p < .0001$, $n = 117$, Clinical Breast Exam Frequency, $r = 0.502$, $p < .0001$, $n = 118$, Medical Checkups, $r = 0.421$, $p < .0001$, $n = 122$, Positive Nutrition Behaviors, $r = 0.201$, $p < .0264$, $n = 122$, and Ever Having Had a Mastectomy, $r = 0.182$, $p < .0456$, $n = 121$.

Two significant predictors of recency of mammogram were found for the young-old sample (See Table 4). The more frequent the pap smear examination, the more recent the mammography exam. Second, the more frequent the clinical breast exam, the more recent the last mammogram. Note that, once again, pap smears account for 37 percent of the total explained variance.

Old-Old Sample

The significant correlates of recency of mammogram for the old-old sample (ages 75+) were: Pap Smear Frequency, $r = 0.511$, $p < .0001$, $n = 223$, OB/GYN Examination Frequency, $r = 0.419$, $p < .0001$, $n = 205$, Clinical Breast Exam Frequency, $r = 0.362$, $p < .0001$, $n = 223$, Medical Checkups, $r = 0.300$, $p < .0001$, $n = 228$, Breast Self-Examination Frequency, $r = .206$, $p < .0019$, $n = 227$, and Ever Having Had a Mastectomy, $r = 0.147$, $p < .0294$, $n = 221$.

Predictors of Recency of Last Mammogram

Total Sample

The significant correlates of recency of mammogram for the total sample were: Pap Smear Frequency, $r = 0.558$, $p < .0001$, $n = 343$, OB/GYN Examination Frequency, $r = 0.458$, $p < .0001$, $n = 322$, Clinical Breast Exam Frequency, $r = 0.438$, $p < .0001$, $n = 341$, Medical Checkups, $r = 0.343$, $p < .0001$, $n = 350$, Age, $r = -0.226$, $p < .0001$, $n = 350$, Breast Self-Examination Frequency, $r = .161$, $p < .0026$, $n = 348$, Ever Having Had a Mastectomy, $r = 0.146$, $p < .0067$, $n = 342$, Positive Health Maintenance Activities, $r = 0.136$, $p < .0106$, $n = 350$, and Positive Nutrition Behaviors, $r = -0.118$, $p < .0268$, $n = 350$.

Four significant predictors were found in a forward stepwise regression (See Table 4). The more frequent the pap smear examination, the more recent the mammography exam. Second, the greater the variety of health check-ups/procedures, the more likely one will have had a recent mammogram. Third, older woman reported having had less recent mammograms. Finally, more recent clinical breast exams were predictive of recency of mammogram. Pap smears account for 32 percent of the total explained variance.

Two significant predictors of recency of mammogram were found for the old-old sample (See Table 4). The more frequently one has a clinical breast exam, the more likely she will have had a recent mammogram. Second, the greater the variety of health check-ups/procedures, the more recent the last mammogram (i.e., within the last two years). Note that, once again, pap smears account for 26 percent of the total explained variance.

Interval between Mammograms

If subjects said they had had at least one mammogram, they were then queried about their mammogram history. They were asked to give their age at first mammogram and to estimate the total number of mammograms received. The variable, Interval Between Mammograms, was then calculated by dividing the number of mammograms by the number of years since first mammogram.

Since the American Cancer Society recommends annual mammograms for women over the age of 50 (American Cancer Society, 1980), we asked the question, "What is the average interval between mammograms for elderly women who have had two or more mammograms?" Rural elderly women with a history of mammography had mammograms approximately every 2.7 years, $\bar{x} = 2.8$, $n = 163$. Young-old women had mammograms approximately every 2.3 years, $\bar{x} = 2.1$, $n = 66$, while old-old women had mammograms every 2.9 years, $\bar{x} = 3.2$, $n = 97$.

Total Sample

The significant correlates of the interval between mammograms for the total sample were: Clinical Breast Examination Frequency, $r = -0.307$, $p < .0001$, $n = 162$, Pap Smear

Frequency, $r = -0.290$, $p < .0002$, $n = 161$, OB/GYN Examination Frequency, $r = -0.258$, $p < .0014$, $n = 151$, Medical Checkups, $r = -0.255$, $p < .001$, $n = 163$, Age, $r = 0.196$, $p < .0122$, $n = 163$, and High Blood Pressure, $r = -0.163$, $p < .0379$, $n = 163$.

Four significant predictors of interval between mammograms were found for the total sample (See Table 5). First, the more frequent the pap smear examination, the shorter the interval between mammography examinations. Second, the women reporting elevated blood pressure have shorter intervals between mammography examinations. Third, the greater the variety of medical checkups/procedures, the shorter the interval between mammograms. Finally, older women report longer intervals between mammograms. Pap smears account for 8 percent of the total explained variance.

Place Table 5 about here

Young-Old Sample

The significant correlates of the interval between mammograms for the young-old sample were: Pap Smear Frequency, $r = -0.305$, $p < .0141$, $n = 64$ and Clinical Breast Examination Frequency, $r = -0.254$, $p < .0394$, $n = 66$.

Only one significant predictor of interval between mammograms was found for the young-old (See Table 5). The more frequent the pap smear examination, the shorter the interval between mammography examinations. Pap smears explain nine percent of the explained variance.

Old-Old Sample

The significant correlates of the interval between mammograms for the total sample were: Clinical Breast Examination Frequency, $r = -0.324$, $p < .0013$, $n = 96$, Medical Checkups, $r = -0.320$, $p < .0014$, $n = 97$, OB/GYN Examination Frequency, $r = -0.273$, $p < .01$, $n = 88$, Pap Smear Frequency, $r = -0.267$, $p < .0082$, $n = 97$, and High Blood Pressure, $r = -0.253$, $p < .0379$, $n = 97$.

Three significant predictors of interval between mammograms were found for the old-old (See Table 5). First, the greater the variety of medical check-ups/procedures, the shorter the interval between mammograms. Second, the greater the frequency of pap smears, the shorter the interval between mammograms. And third, women reporting an elevated blood pressure report shorter intervals between mammograms. Medical checkups/procedures explain 10 percent of the total explained variance.

Frequency of Breast Self-Examination

A second focus of study was on breast self-examination. For the total sample, 33.2% ($n = 121$) reported never performing breast self-examination, and 32.9% ($n = 116$) reported doing breast self-examination at least once a month (See Figure 2). The young-old (ages 62-74) are significantly more likely to regularly do breast self-examination than were the old-old (ages 75+), $t(351) = 2.3592$, $p < .0189$ (See Table 3).

Place Figure 2 about here

Knowing that younger, elderly women are more likely to do regular (i.e., monthly) breast self-examination, we then asked what predicts women's usage of this exam. As with mammography, we asked this question for the entire sample and then by age group (young-old v. old-old).

Total Sample

The significant correlates of frequency of breast self-examination for the total sample were: Clinical Breast Examination, $r = 0.258$, $p < .0001$, $n = 344$, Pap Smear Frequency, $r = 0.196$, $p < .0002$, $n = 346$, Medical Checkups, $r = 0.195$, $p < .0002$, $n = 353$, Positive Health Maintenance Activities, $r = 0.178$, $p < .0008$, $n = 353$, OB/GYN Examination Frequency, $r = 0.175$, $p < .0015$, Age, $r = -0.173$, $p < .0011$, Recency of Mammogram, $r = 0.161$, $p < .0026$, $n = 348$, and Positive Health Perceptions, $r = 0.152$, $p < .0041$, $n = 353$.

Four significant predictors of frequency of breast self-examination were found (See Table 6). First, the more frequently a woman has a medical breast examination, the more frequently she does breast self-examination. Second, younger elderly women do breast self-examination more frequently than older women. Third and fourth, women who sustain higher levels of positive health maintenance activities and who hold more positive perceptions about their health are more likely to perform regular breast self-examination. Clinical breast examination accounts for 7 percent of the total explained variance.

Place Table 6 about here

Young-Old

The significant correlates of frequency of breast self-examination for the young-old sample were: Medical Checkups, $r = 0.265$, $p < .0033$, $n = 121$ and Positive Health Maintenance Activities, $r = 0.209$, $p < .0216$.

Two significant predictors of breast self-examination among the young-old were found (See Table 6). First, the greater the variety of medical checkups/procedures, the more frequently a woman is likely to do breast self-examination. Second, women who sustain higher levels of positive health maintenance activities are more likely to perform regular breast self-examination. Medical checkups/procedures account for 7 percent of the total explained variance.

Old-Old

The significant correlates of frequency of breast self-examination for the old-old sample were: Clinical Breast Examination, $r = 0.336$, $p < .0001$, $n = 226$, Pap Smear Frequency, $r = 0.248$, $p < .0002$, $n = 227$, Recency of Mammogram, $r = 0.206$, $p < .0019$, $n = 227$, OB/GYN Examination Frequency, $r = 0.187$, $p < .0070$, Positive Health Perceptions, $r = 0.182$, $p < .0054$, $n = 232$, Medical Checkups, $r = 0.155$, $p < .0184$, $n = 232$, Positive Health Maintenance Activities, $r = 0.153$, $p < .0196$, $n = 232$, and Positive Functional Health Status, $r = 0.135$, $p < .0402$, $n = 232$.

Two significant predictors of frequency of breast self-examination among the old-old were found (See Table 6). First, the more frequent the clinical breast examination, the more frequent the breast self-examination. Second, women who hold more positive perceptions about their health are more likely to perform regular breast self-examination. As with the total sample, clinical breast examination accounts for 11 percent of the total explained variance.

DISCUSSION

We asked two major questions in this study for both mammography screening and breast self-examination. First, what is the usage pattern of these two screening procedures among rural elderly women? And second, what predicts frequency of these screening mechanisms? First, we'll summarize the findings on usage patterns.

Patterns of Usage

Annual mammography screening is used by about half of the rural, elderly women in our sample. This is similar to the finding from the Pennsylvania state-wide health survey conducted in 1992 that combined both rural and urban citizens (PA Dept. of Health, 1992). However, almost one-third of women in our study have never had a mammogram. This is somewhat higher than the 27 percent reported in the 1992 statewide survey.

Frequency of screening is also of concern. The average interval between mammograms was approximately 32 months for the women who reported having had two or more mammograms. This interval is at the outer range of the 12 to 33 month guideline set forth by the Forum on Breast Cancer Screening in Older Women (Forum on Breast Cancer

Screening, 1992). The Forum also recommended that women age 60 and over perform breast self-examination on a monthly basis. In our rural sample, only one-third of the women were following this recommendation.

Thus in terms of usage of breast cancer screening methods, the rural women within this sample were somewhat less likely than the general population to use mammography and were at the outer range of the recommended guidelines in terms of recency and interval between mammograms. They were also less diligent than is recommended for performing breast self-examination.

Predictors of Breast Cancer Screening

Our first set of predictors are indicators of compliance with screening guidelines. Elderly, rural women who receive a greater variety of medical checkups and procedures are more likely to have had a recent mammogram and to have had mammogram screenings within the recommended guidelines. Elderly, rural women who receive clinical breast examinations regularly also have had a recent mammogram and report shorter intervals between mammograms as well as more frequent breast self-examination. Women who report having more frequent pap smears report having had a recent mammogram and a shorter interval between mammographies. Women with more positive health maintenance activities (e.g., use of seat belts, exercise) and who view their health more positively are ^{more} likely to perform breast self-examination.

In addition, women who report having normal/low blood pressure report a greater interval between mammography. In contrast, women who report an elevated blood pressure

and compliance with blood pressure reduction guidelines (i.e., regular intake of medication and regular self-monitoring of blood pressure) report shorter intervals between mammograms.

Age is also a common predictor for both mammography screening and breast self-examination. As age increases, rural women are less likely to have had a recent (i.e., annual) mammogram, to have longer intervals between mammograms, and to perform breast self-examination less frequently.

Factors found to be related to screening include those under the control of both physician and patient. As with previous research, medical contact appears to be an important predictor of compliance (Mor, Pacala, & Rakowski, 1992). Our findings concur with this research. The best contact predictors as well as the best overall predictors are related to gynecological issues. Having regularly scheduled pap smears and clinical breast examinations are the best predictors for compliance with screening guidelines. Note that both of these medical examinations occur about twice as often as mammographies (i.e., annually v. every 32 months). Additional contact with physicians for regular medical checkups and procedures (e.g., annual physicals, cholesterol checks, colon-rectal exams, etc.) is also effective.

The findings of compliance by patients related to health perception and health maintenance activities may reflect an individual's preventative orientation (Buraek & Liang, 1987, Calnan, 1984, Zapka et al., 1989). That is, women who are concerned about staying in shape and who believe that they maintain good health are probably more proactive in terms of their gynecological health as well. This proactive behavior thus results in regular breast self-examination as well as a willingness to comply with mammography screening guidelines.

The single finding of non-compliance deals with women who report having no problems with their blood pressure. These women go for longer intervals between mammograms. This finding of non-compliance may be a matter of denial. That is, as with high blood pressure, breast cancer is initially asymptomatic. Rural, elderly women may therefore deny their susceptibility to breast cancer and may additionally not perceive any benefit from mammography screening even when they can see the need for other health maintenance activities (Williams, 1988). However, once the risk has been recognized, then compliance might increase.

Finally, the negative relationship between age of the woman and compliance with breast screening guidelines may reflect an age bias in doctors' recommendation of breast cancer screening. Physicians, particularly general practitioners who provide the majority of medical services, may be setting an upper age limit on recommending mammographies or breast self-examination to their elderly, female patients (Costanza & Gaw, 1990; Rimer, et al., 1992).

REFERENCES

- American Cancer Society (1980). Cancer of the breast in guidelines for cancer-related checkup: Recommendations and rationale. *CA: A Cancer Journal for Clinicians*, 30, 224-229.
- Baker, L. (1982). Breast cancer detection demonstration project: Five-year summary report. *CA: A Cancer Journal for Clinicians*, 32, 194-225.
- Burack, R.C. & Liang, J. (1987). The early detection of cancer in the primary care setting: Factors associated with the acceptance and completion of recommended procedures. *Preventive Medicine*, 16, 739-751.
- Calnan, M. (1984). The health belief model and participation in programmes for the early detection of breast cancer: A comparative analysis. *Social Science Medicine*, 19, 823-830.
- Champion, V. (1992). Breast self-examination: Women 65 and older. *The Journals of Gerontology*, 47(Special Issue), 75-79.
- Center for Disease Control (1988). Provisional estimates from the National Health Interview Survey Supplement on cancer control: United States, January-March 1987. *MMWR*, 371, 417-427.
- Costanza, M.E., Annas, G.J., Brown, M.L., Cassel, C.K., Champion, V., Cohen, H.J., Frame, P.S., Glasse, L., Mor, V., & Pauker, S.G. (1992). Supporting statements and rationale. *The Journals of Gerontology*, 47(Special Issue), 7-16.
- Costanza, M.E. & Gaw, V.P. (1990, Oct). *Cancer prevention and control practices of Massachusetts primary care physicians*. Paper presented at the Massachusetts Division of the American Cancer Society Professional Education Committee, Boston, MA.
- Costanza, M.E., Stoddard, A., Gaw, V.P., and Zapka, J.G. (1992). The risk factors of age and family history and their relationship to screening mammogram utilization. *Journal of the American Geriatric Society*, 40, 774-778.
- Fox, S.A., Murata, P.J., and Stein, J.A. (1991). The impact of physician compliance on screening mammography for older women. *Archives of Internal Medicine*, 151, 50-56.
- Forum on Breast Cancer Screening (1992). Screening recommendations of the Forum Panel. *Journals of Gerontology*, 47(Special Issue), 5.

Table 1. Orthonormalized Factor Loadings for the Seven Health Behavior Factors.

Item	Substance Use	Positive Nutrition Behaviors	Preventative Medical Checkups	Health Maint. Activities	Positive Health Perception	High Blood Pressure
Current Smoker	.1816					
Years Smoked	.2457					
Amount smoked present	.1458					
Amount smoked past	.3514					
Attempt to quit smoking	.0619					
Alcohol consumption	.0137					
Read sodium labels		.2064				
Buy low sodium		.2043				
Cook low sodium		.0676				
Read fat labels		.2227				
Buy low fat		.2079				
Eat butter (-)		.0339				
Cook without butter		.0398				
Drink caffeinated beverages (-)		.0174				
Vision checked			.0695			
Flu shots			.0912			
Cholesterol checked			.3525			
Medical checkup			.3094			
Colon/rectal checkup			.1773			
Regular exercise				.1207		
Teeth brushing				.2041		
Tooth flossing				.2881		
Use of seat belts				.5316		
Good vision (self-rating)					.1926	
Good hearing (self-rating)					.0946	
Change in vision (self-rating)					.2347	
Change in hearing (self-rating)					.1570	
Health (self-rating)					.0246	.1390
Change in health (self-rating)					.2964	
Read without glasses						.0250
Blood pressure taken by medical personnel						.1009
Number of doctor visits (-)						.1306
Days in hospital (-)						.0788
Diabetes diagnosed (-)						.0250
Bowel stimulant (-)						.0426
Sleep 7 or 8 hours						.0180
Need assistance for stairs (-)						.2169
Use walker(-)						.1328
Number falls last year (-)						.0904
Blood pressure taken by self						.0208
High blood pressure diagnosed						.4392
Blood pressure medication						.5266
Body Mass Index						.0134
						-.1446

Funkhouser, E., Waterbor, J.W., Cole, P., and Rubin, E. (1993). Mammographic patterns and breast cancer risk factors among women having elective screening. *Southern Medical Journal*, 86, 177-180.

Love, S.M. (1989). Use of risk factors in counseling patients. *Hematology/Oncology Clinics of North America*, 3, 43-49.

Maier, H., McGuire, L.C., & Willis, S.L. (1994, April). *Everyday competence as a correlate of health behaviors in late life*. Paper presented at the Biannual Meeting of the Cognitive Aging Conference, Atlanta, GA.

Mor, V., Pacala, J.T., Rakowski, W. (1992). Mammography for older women: Who uses, who benefits? *The Journals of Gerontology*, 47(Special Issue), 43-49.

Morrison, A. (1989). Review of evidence on the early detection and treatment of breast cancer. *Cancer*, 41-50.

Pennsylvania Department of Health (1992). *Behavioral health risks of Pennsylvania adults*. Harrisburg, PA: Pennsylvania Department of Health, Division of Health Promotion, Health Risk Reduction Program.

Rimer, B.K., Ross, E., Cristinzio, C.S., & King, E. Older women's participation in breast screening. *The Journals of Gerontology*, 47(Special Issue), 85-91.

Shapiro, S., Strax, P., Venet, L., & Rosen, R. (1982). Ten to fourteen year effect of screening on breast cancer mortality. *Journal of the National Cancer Institute*, 69, 349-355.

Taber, L., Gad, A., Holmquist, et al. (1985). Reduction in mortality from breast cancer after mass screening with mammography. Randomized trial from the Breast Cancer Working Group of the Swedish National Board of Health and Welfare. *Lancet*, 8433, 829-832.

Williams, R.D. (1988). Factors affecting the practice of breast self-examination in older women. *Oncology Nursing Forum*, 15, 611-616.

Yancik, R., Reis, L.G., Yates, J.W. (1989). Breast cancer in aging women: A population-based study of contrasts in stage, surgery, and survival. *Cancer*, 163, 976-981.

Table 2. Interpretation of Factors and Variable Used in Regression Analyses.

Factor/Variable	Interpretation
HEALTH BEHAVIOR FACTORS	
Substance Use	Current or past smoking (i.e., cigarettes, pipes, cigars) and consumption of alcoholic beverages.
Positive Nutrition Behaviors	Adherence to a low fat and low sodium diet, and low consumption of caffeinated beverages.
Preventative Medical Checkups	Medical checkups and procedures (e.g., cholesterol, colon/rectal exams). Higher values indicate having had a greater variety of these checkups/procedures.
Health Maintenance Activities	Engagement in self-initiated activities that promote health (e.g., exercise) and avoid risks (e.g., seat belt usage).
Positive Health Perception	Self-ratings of general health and general functioning.
Positive Health Status	Self-reported health taking into account physically restricting problems (e.g, use of a walker) and diseases (e.g., diabetes). Higher values indicate a more positive status.
High Blood Pressure	Diagnosis of elevated blood pressure and intake of cardiovascular medication.
GYNECOLOGICAL VARIABLES	
Clinical Breast Exam	Frequency of breast examinations conducted by medical personnel.
Pap Smears	Frequency of pap smears.
OB/GYN Examination	Frequency of OB/GYN examinations.
Mastectomy	History of having had a mastectomy.
Self-Breast Examination	Frequency of self-breast examinations.
Recency of Mammogram	When was most recent mammogram (1=never, 2=not in last two years, 3=within last 2 years).
Interval between Mammograms	Average length of time between mammograms. Low values indicate shorter intervals between mammograms for those women who have had two or more mammograms.

Table 3. Proportion of Subjects Having Mammograms and Self-Breast Exams.

Variable	Total Sample			Young-Old (62-74)			Old-Old (75+)			
	n	\bar{x}	sd	n	\bar{x}	sd	n	\bar{x}	sd	Percent
Breast Self Exam										
Never	121			35			86			37.1
Few times per year	59			14			45			19.4
4-6 times per year	57			25			32			13.8
Monthly	116			47			69			29.7
Total	353	2.48	1.26	121	2.69	1.26	232	2.36	1.25*	
Recency of Mammogram ¹										
Never	109			31			78			34.2
More than 2 years	69			21			48			21.1
Within last 2 years	171			69			102			44.7
Total	350	2.18	0.88	122	2.32	0.85	228	2.11	0.88*	
Interval between Mammograms ²										
Interval between Mammograms ²	163	2.66	2.82	66	2.34	2.05	97	2.87	3.23	

¹ This variable is a composite of two items: 1) Have you ever had a mammogram? and 2) If yes, Have you had a mammogram within the last two years?

² This variable was calculated for those individuals reporting having had 2 or more mammograms.

* $p < .05$.

Table 4. Significant Predictors of Recency of Mammogram.

Variable	β	t	p	partial R ²	Total R ²
Total Sample ^a					
Pap Smear Frequency	0.42	7.56	.0001	.32	
Medical Checkups/Procedures	0.15	2.98	.0031	.03	
Age	-0.11	-2.52	.0122	.01	
Clinical Breast Exam Frequency	0.13	2.24	.0259	.01	.37
Young-Old ^b					
Pap Smear Frequency	0.40	4.15	.0001	.37	
Clinical Breast Exam Frequency	0.32	3.33	.0012	.06	.43
Old-Old ^c					
Pap Smear Frequency	0.46	7.80	.0001	.26	
Medical Checkups/Procedures	0.19	3.14	.0019	.03	.29

^a $F(4,329) = 48.572, p < .0001.$

^b $F(2,113) = 42.038, p < .0001.$

^c $F(2,220) = 45.584, p < .0001.$

Table 5. Significant Predictors of Interval Between Mammograms.

Variable	β	t	p	partial R ²	Total R ²
Total Sample ^a					
Pap Smear Frequency	-0.23	-2.91	.0041	.08	
High Blood Pressure	-0.16	-2.15	.0334	.04	
Medical Checkups/Procedures	-0.16	-2.04	.0427	.02	
Age	0.15	1.91	.0574	.02	.16
Young-Old ^b					
Pap Smear Frequency	-0.31	-2.53	.0141	.09	.09
Old-Old ^c					
Medical Checkups/Procedures	-0.22	-2.18	.0318	.10	
Pap Smear Frequency	-0.22	-2.31	.0234	.04	
High Blood Pressure	-0.22	-2.23	.0284	.04	.18

^a F(4,156) = 7.612, p < .0001.

^b F(1, 62) = 6.380, p < .0141.

^c F(3, 93) = 6.982, p < .0003.

Table 6. Significant Predictors of Frequency of Breast Self-Examination.

Variable	β	t	p	partial R ²	Total R ²
Total Sample ^a					
Clinical Breast Exam Frequency	0.22	4.33	.0001	.07	
Age	-0.12	-2.26	.0243	.02	
Positive Health Maintenance Activities	0.12	2.22	.0272	.02	
Positive Health Perception	0.11	2.12	.0350	.01	.12
Young-Old ^b					
Medical Checkups/Procedures	0.24	2.68	.0084	.07	
Positive Health Maintenance Activities	0.17	1.93	.0567	.03	.10
Old-Old ^c					
Clinical Breast Exam Frequency	0.33	5.39	.0001	.11	
Positive Health Perceptions	0.20	3.19	.0017	.04	.15

^a $F(4,339) = 11.302, p < .0001$.

^b $F(2,118) = 6.443, p < .0001$.

^c $F(2,225) = 19.923, p < .0001$.

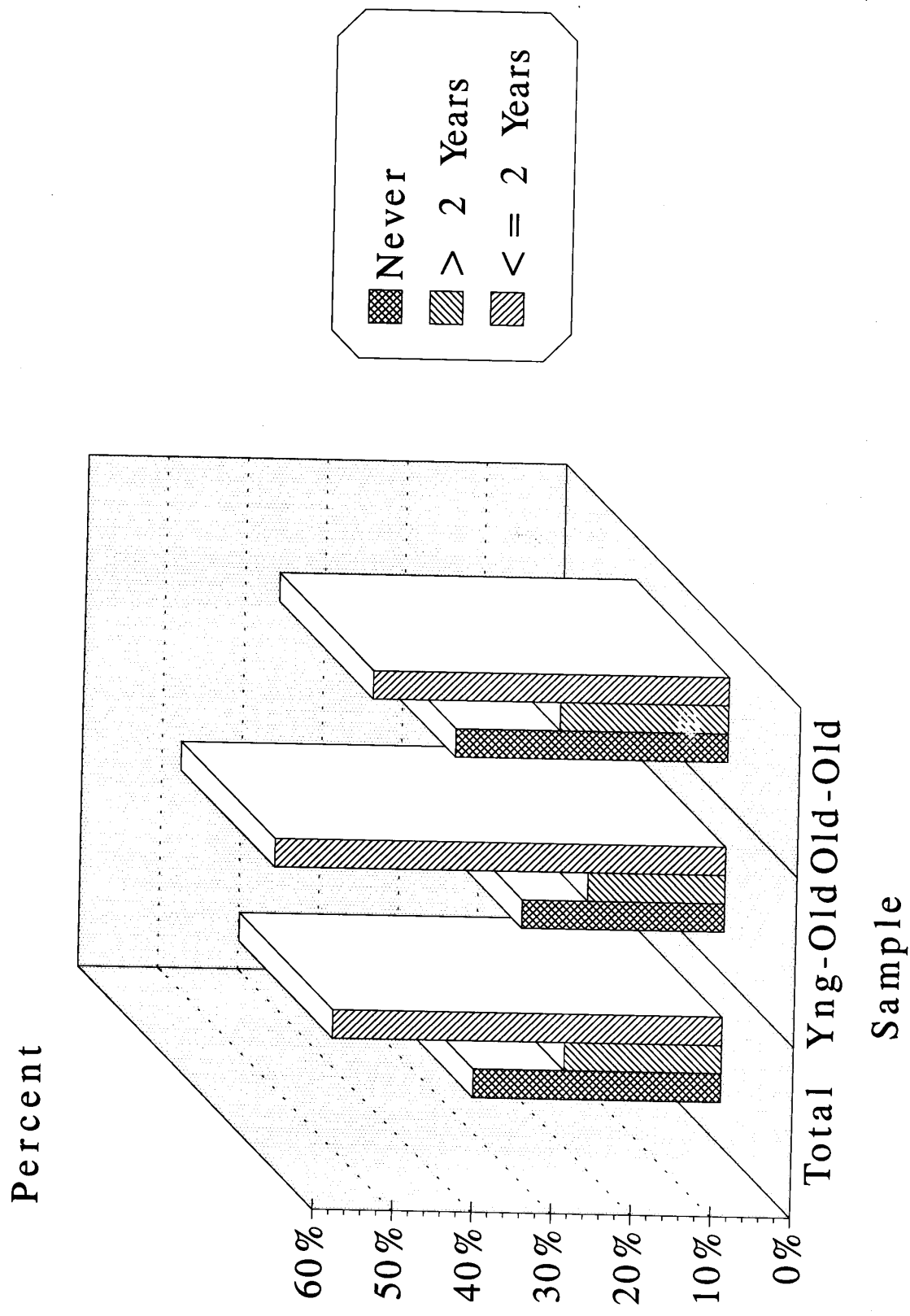


Figure 1. Recency of Mammogram

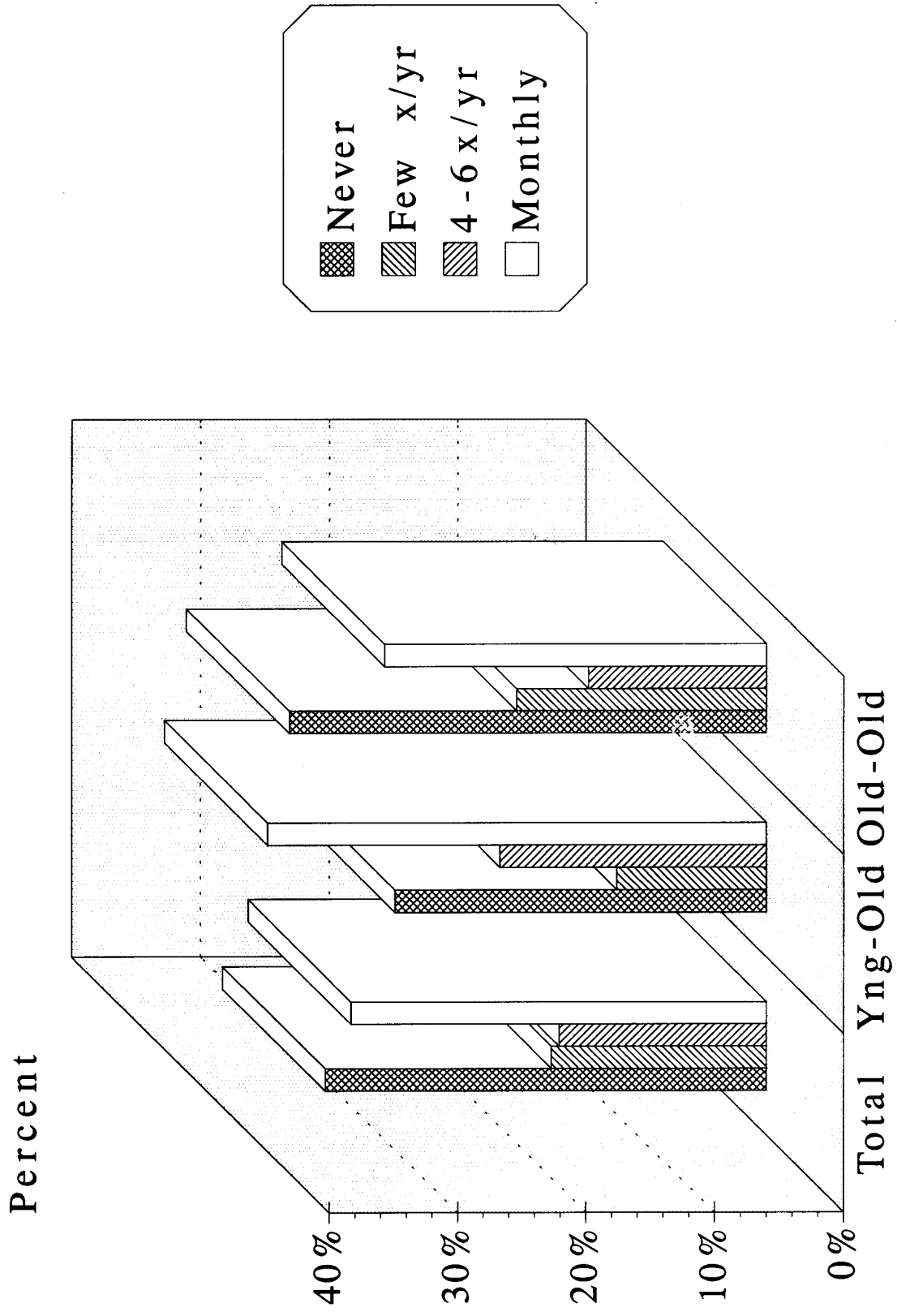


Figure 2. Frequency of Breast Self-Exam