

THESIS





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presented by

Monica Patel

has been accepted towards fulfillment of the requirements for

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ADHERENCE TO MAMMOGRAPHY GUIDELINES AMONG WOMEN OVER 39 IN RURAL NORTHERN MICHIGAN: A COMPARISON OF MEDICALLY UNDER-SERVED COUNTIES TO ADEQUATELY SERVED COUNTIES

By

Monica Patel

A THESIS

Submitted to Michigan State University in partial fulfillment of the requirements for the degree of

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ABSTRACT

ADHERENCE TO MAMMOGRAPHY GUIDELINES AMONG WOMEN OVER 39 IN RURAL NORTHERN MICHIGAN: A COMPARISON OF MEDICALLY UNDER-SERVED COUNTIES TO ADEQUATELY SERVED COUNTIES

By

Monica Patel

While clinical trials show that early detection of breast cancer through mammography reduces breast cancer fatalities, many women do not follow mammography guidelines. In rural areas, adherence to guidelines appears to be especially low. The study hypothesizes that women who live in Medically Underserved Areas (MUAs) are less likely to follow recommended guidelines than women who live in adequately served counties.

Results of the analyses performed do not support the main study hypothesis. This may support the notion that living in an MUA is less an obstacle to service access as originally thought, due in part to an increasingly mobile society, efficient breast cancer awareness education, and efficacious health care services. While the main study hypothesis is not supported, four factors do predict lower adherence to screening guidelines in this rural population: low levels of education, lack of insurance, not being married, and being in a large household. This thesis is dedicated to my father, Mr. Ratan Patel, who has inspired me to go after my dreams.

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INTRODUCTION

Breast cancer is a major health care problem that affects a large number of women in the United States. In 1996 alone, there were an estimated 182,000 newly diagnosed breast cancer cases and 46,000 women died from the disease. (SEER, 1996). Approximately 32% of all new cancers in women are those of the breast, making it the most common cancer diagnosis (Henderson, 1992). Several randomized clinical trials have shown that early detection of breast cancer through mammography, by itself, reduces breast cancer mortality in women aged 50-69 by about one third. For women under the age 40 years, the benefits of mammography are less clear, chiefly because of the relatively high rates of false positives among these younger women (NIH, 1997). However, for women 40 and older, there is a general consensus that the benefits of mammography outweigh any drawbacks of recommended guidelines. As a result, screening recommendations agreed upon by the National Cancer Society are as follows: 1) for women 50 years and older, screening mammograms should be done every 1-2 years; 2) for women aged 40-49 years with an average risk for breast cancer, screening mammograms should be done every 1-2 years; 3) women at high risk for breast cancer should consult with

their doctor about beginning screening mammography before 40 and to determine if more frequent mammograms need to be done in their 40s (NCI, 1997).

Although adherence to these guidelines could significantly lower the number and proportion of deaths among women diagnosed with breast cancer, evidence suggests that many women do not follow these guidelines (Zapka et al., 1991). Especially in rural areas, adherence to screening guidelines appears to be low (AHCPR, 1998). One important practical question that arises from these observations is whether there are any barriers to following the recommended screening guidelines. Such barriers may be external, in the sense of a poor service environment or deficient health care infrastructure, or they may be related to `enabling' characteristics of the individuals involved, such as their income, insurance status, or education.

Once identified, barriers may well be overcome with appropriate strategies. It is the advanced practice nurse (APN), with experience as an educator and counselor, who is well placed to help middle-aged and older women with accessing prevention and early detection services. Especially in the primary care setting, the APN can educate female clients, share scientific knowledge and nurture clients' motivation to engage in prevention activities.

In the case of non-adherence to prevention guidelines, it is important to know whether or not the barriers are primarily found in the characteristics of the service

delivery system or in specific client circumstances. Thus, in this study the focus will be on whether or not characteristics of the service environment affect women's adherence to mammography guidelines, regardless of other barriers reflecting their personal situation. Specifically, the following research question will be pursued:

Research Question

Are women, aged 40 or older, who live in Medically Underserved Areas (MUAs) less likely to adhere to the recommended guidelines for mammography than women who live in counties that are adequately served?

Data for this investigation come from a stratified probability sample representing the entire mid-1995 population (approximately 451,000) in 21 counties of rural Northern Michigan. However, for the purposes of this investigation, the four counties with the poorest health care infrastructure are compared to the four counties with the best infrastructure. In addition, the expected differences based on the service environments are examined in the context of other predictors of adherence and nonadherence. These are sociodemographic characteristics of the population that tend to influence the likelihood that a woman would adhere to appropriate screening regimens.

Study Relevance

The results of this study have the potential to provide the APN with a greater understanding of how the environment presents a barrier for women to adhere to mammography

guidelines. In understanding the complications from living in MUAs, APNs can adapt their actions to facilitate improved adherence to screening guidelines. These actions may include creating physical and emotional environments which support examination and screening, strengthening community action to communicate the need for mammography (such as transportation services or mobile screening units), and reorienting health services towards education on the importance of mammograms and guidelines for individual action.

Conceptual Framework

The Population Health Promotion (PHP) Model will serve as the conceptual framework for this study. It was developed in 1996 by Nancy Hamilton and Tarig Bhatti from the Health Promotion Development Division in Canada. The PHP model attempts to explain the relationship between population health and health promotion. The following discussion is based on two documents that were used in the development of the PHP model. Strategies for Population Health, 1994 was used to define and identify health determinants and The Ottawa Charter, 1986 was used for a description of comprehensive action strategies. The PHP model is an approach that addresses the entire range of factors that determine health in a population. The model may provide a framework for the improvement of health promotion strategies. It is said that, in order to improve the health of people, action must be taken on health

determinants and comprehensive strategies are needed to influence the underlying factors and conditions that determine health (Hamilton & Tariq, 1996).

The PHP model identifies 9 health determinants that are here grouped into 3 overarching factors affecting population health: Individual/Family factors, Society/Community factors, and Health System/Sector factors.

INDIVIDUAL/FAMILY FACTORS OF POPULATION HEALTH

Income and Social Status: Income and social status both influence health status. Social status affects health by determining the degree of control, people have over life circumstances and, therefore, their capacity to take action.

Education: Education that is meaningful and relevant, equips people with knowledge and skills for daily living, enables them to participate in their community, and increases opportunities for employment. Thus, educated people can be expected both to have a greater appreciation for the benefits of preventive care and a greater capacity to organize resources to gain access to prevention services.

Biology and Genetic Endowment: Recent research in the biological sciences has shed new light both on the importance of a person's genetic endowment and the stage in the life cycle as determinants of health.

Personal Health Practices and Coping Skills: Personal health practices are key in preventing disease and promoting self-care. Just as important are people's coping skills.

Effective coping skills enable people to be self-reliant, solve problems and make choices that enhance health.

Healthy Child Development: Positive prenatal and early childhood experiences have a significant effect on subsequent health.

SOCIETAL/COMMUNITY FACTORS OF POPULATION HEALTH

Social Support Networks: Support from friends and communities is important in helping people deal with difficult situations and maintaining a sense of mastery over life circumstances. Support can be both positive and negative. Negatively, support can prevent one from doing the sensible thing.

Employment and Working Conditions: Meaningful employment, economic stability, and a healthy work environment are associated with good health.

Physical Environment: Factors such as air and water quality, the type of housing and the safety of our communities have a major impact on health.

SYSTEM/SECTOR FACTORS OF POPULATION HEALTH

Health Services: There is a relationship between the availability of preventive and primary care services and improved health (e.g., well baby and immunization clinics, education programs about healthy choices).

While the model attributes many determinants of population health to individual/family factors, health system and environmental factors play a prominent role in shaping overall population health.

To help improve conditions for better population health, The Ottawa Charter describes five specific areas for action:

ACTIONS TO HELP ALLEVIATE INDIVIDUAL/FAMILY CONDITIONS

CONTRIBUTING TO ILL HEALTH

Develop Personal Skills to enable people to have the knowledge and skills to meet life's challenges and to contribute to society (e.g., life-long learning, health literacy).

ACTIONS TO INFLUENCE SOCIETAL, COMMUNITY AND SYSTEM

FACTORS THAT CONTRIBUTE TO POPULATION HEALTH Build Healthy Public Policy to ensure that policy developed by all sectors contributes to health-promoting conditions (e.g., healthier choices of goods and services, equitable distribution of income).

Create Supportive Environments (physical, social, economic, cultural, spiritual) that recognize the rapidly changing nature of society, particularly in the areas of technology and the organization of work, and that ensure positive impacts on the health of the people (e.g., healthier workplaces, clean air and water).

Strengthen Community Action so that communities have the capacity to set priorities and make decisions on issues that affect their health (e.g., healthy communities).

Reorient Health Services to create systems, which focus on the needs of the whole person and invite a true

partnership among the providers and users of the services (e.g., home care, child development services).

The PHP model is based on the following assumptions:

- Health problems may affect certain groups more than others. However, the solution to these problems involves changing social values and structures. It is the responsibility of the society as a whole to take care of all its members.
- 2. The health of individuals and groups is a combined result of their own health practices and the impact of the physical and social environment in which they live, work, pray and play. There is an interaction among people and their surroundings. Settings, consisting of places and things, have a physical and psychological impact on people's health.
- 3. In order to enjoy optimal health, people need opportunities to meet their physical, mental, social and spiritual needs. This is possible in an environment that is based on the principles of social justice and equity and where relationships are built on mutual respect and caring, rather than power and status.
- 4. Policy and program decision makers agree that comprehensive action need to be taken on all the determinants of health using the knowledge gained from research and practice.

- 5. It is the role of health organizations to analyze the full range of possibilities for action, to act on those determinants that are within their jurisdiction and to influence other sectors to ensure their policies and programs have a positive impact on health. This can best be achieved by facilitating collaboration among stakeholders regarding the most appropriate activities to be undertaken by each.
- 6. Multiple points of entry to planning and implementation are essential as demonstrated by the examples in the following section. However, there is a need for overall coordination of activity.
- 7. Health care, health protection and disease prevention initiatives complement health promotion. Comprehensive approaches will include a strategic mix of the different possibilities for action. Meaningful participation of people in the development and operationalization of policies and programs is essential for them to influence the decisions that affect their health.

The model provides a tool for organizing evidence about which persons are most likely to be at risk for ill health. The illustration in Figure 1 presents a modified version of the PHP model, focusing on one particular health prevention action: the timely use of mammography among women 40 years of age or older living in a rural environment. The reason for focusing on this problem is because adherence to



Figure 1. Adapted PHP Model

guidelines for secondary preventive care is a major strategy for improving overall population health. In particular, since the primary focus is on the possible effects of service environments, personal client characteristics are treated as "control variables". Such variables are hypothesized to influence adherence to mammography guidelines, but they are not the primary focus of attention in this study.

Literature Review

Numerous studies have been conducted which provide evidence that individual and family factors as well as system and environmental factors contribute to variation in

adherence to mammography guidelines. This is outlined in the PHP model. Further, the research will show that system factors, such as reduced availability of health services, are commonly found in MUAs. As a result, the researcher believes that female residents of MUAs may have reduced rates of adherence to mammography guidelines.

INDIVIDUAL/FAMILY FACTORS AFFECT ADHERENCE TO MAMMOGRAPHY

Individual and family factors which contribute to adherence to mammography include income level, education, personal health practices and coping skills.

Income and Mammography: Many studies have demonstrated that the poor are less likely to receive appropriate cancer screening. For instance, according to the National Center of Health Statistics (1999), among women over 40, whose household income was below the poverty level, only 52% had a mammogram within the past 2 years, while 65% of women above the poverty level had one. The reasons for this situation are multiple, including transportation, unavailable neighborhood health facility, and being uninsured or under-The latter may entail the requirement of a coinsured. payment for screening services. However, even with adequate insurance or health plan coverage, it has been shown that other economic barriers to health care usage and preventive cancer screening may persist. Patients with Medicaid coverage attending an inner-city hospital clinic with an annual income below \$10,000 were given a voucher for a free Only 44% of the women with vouchers obtained mammogram.

screening mammograms, compared with 10% of those without vouchers. For women without the voucher, the main reason for not obtaining a mammogram was financial; the main reason for women with the voucher was transportation. Thus, the researchers concluded that in a low-income, inner city population of older women, financial barriers to screening mammography persists despite Medicaid coverage. Economic concerns, including hidden costs related to cancer screening are a major barrier for patients. Hidden costs include transportation costs, lost pay and time from work, and daycare costs. Women in the lowest income group are more likely to fear breast cancer and least likely to believe they can personally do something to prevent cancer (Thomas, 1995). Other studies have also shown that higher income is a factor associated with adherence to guidelines (Zapka, Stoddard, Maul & Coatanza, 1991).

Education and Mammography: One study showed that women with less education or income are less likely to be screened, less likely to present with early stage breast cancer, less likely to get standard treatment, and less likely to survive five years; conversely, they are more likely to die from breast cancer than women with more income or, especially, more education (Breen, Kessler & Brown, 1996).

Personal Health Practices and Mammography: Womeodu and Baily (1996) state that patient attitudes and behaviors regarding health care visits and cancer screening measures

are important determinants of whether they receive routine screening. They claim that institutions play a major role in promoting or discouraging cancer screening. They state that health care institutions may fail to promote cancer screening effectively because of lack of institutional will. Screening efforts should be promoted to all persons, particularly the most vulnerable, such as certain ethnic minorities, the elderly, the poor and those with low educational attainment. Womeodu and Baily (1996) identify seven specific barriers: an individuals non-adherence to screening recommendations, perceived susceptibility to disease, culturally determined health beliefs and practices, lack of knowledge of disease and health related issues, socioeconomic factors and miscommunication between patient and providers (Womeodu & Baily, 1996).

Marital Status and Mammography: Consistent with other literature, women who are married or live with someone as married are more likely to have been screened according to guidelines. It is proposed that a steady relationship provides the social support that is often associated with higher levels of compliance with health care recommendations (Bastani, Marcus, & Hollatz-Brown, 1991). Similarly, researchers have also found a significant relationship between being married and the frequency of performing breast self-examinations (BSE). Several explanations for this relationship have been cited. Patistea et al. (1992) state that frequent performance of BSE by married women may be

related to the level of responsibility assumed within the family structure (Phillips & Wilbur, 1995).

Age and Mammography: While breast cancer is the leading contributor to cancer mortality in women aged 15-54, 48% of all new breast cancer cases and 56% of all deaths from breast cancer occur in women age 65 and over (U.S. Preventive Services Task Force, 1996). It is well documented in the literature that the annual incidence of breast cancer increases with age. Age-specific incidence rates for breast cancer in American women are as follows: 127 cases/100,000 for women aged 40-44; 229/100,000 for women ages 50-54; 348/100,000 for women aged 60-64; and 450/100,000 for women aged 70-74 (SEER, 1994). A number of randomized clinical trials have shown clearly that early detection of breast cancer by mammography, with or without clinical breast examination (CBE) at regular intervals, reduces breast cancer mortality in women ages 50-69 by about one-third (NIH, 1997). However, although incidence rates for breast cancer increase with age, a study found that older women were less likely to concur with a recommendation for screening mammography. They were also more likely to believe that they are too old for testing that the test was unnecessary (Dolan, Reifler, McDermott, & McGaghie, 1994). Their beliefs conflict with data suggesting that mammography benefits elderly women. In addition, older women may be less likely to have mammograms for several reasons. Many older women may not be able to afford mammograms and are

likely to suffer from chronic illnesses that appear more salient or prevent them from having a mammography. In addition, a shorter remaining life expectancy reduces the subjective value of early detection and, finally, older women often lack experience with prior breast screening (Dolan, Reifler, McDermott, & McGaghie, 1994). Contrary to these findings, however, it has been shown in at least one study that knowledge of cancer screening guidelines was higher among older women. Particularly, compared with women 40-49 years old, women over 50 years of age were twice as likely to know the guidelines (Bastani, Marcus, & Hollatz-Brown, 1991). Still, overall there appears to be lower acceptance of mammography among older women, which is a major public health concern, given the well-established association between increased age and greater breast cancer risk (Dolan, Reifler, McDermott, & McGaghie, 1994).

SECTOR/SYSTEM FACTORS AFFECT ADHERENCE TO MAMMOGRAPHY

In addition to individual and family factors, the health care delivery system can also affect adherence to mammography. Specifically, studies show that lower levels of medical insurance and access to qualified health care providers contribute to reduced adherence to mammography guidelines.

Medical Insurance and Mammography: Studies show significant differences in adherence levels between insured and non-insured women. In addition, adherence rates of insured women show distinct variation by type of insurance.

Zapka, Stoddard, Maul, and Costanza (1991) studied 693 women 50 years of age and greater. They found that adherence was high in women enrolled in Health Maintenance Organizations and/or covered be commercial plans than women with no insurance (Zapka, Stoddard, Maul, & Costanza, 1991).

Dolan, Reifler, McDermott, and McGaghie, (1994) studied 349 asymptomatic women ages 50 years and over. These women had no prior history of breast cancer and received a health care provider's recommendation for screening mammography. Among the women who accepted the recommendation, adherence varied according to insurance type (Medicare as only insurance 45%, Medicaid 66%, non-health maintenance organization, non-HMO, private 62%, HMO 73%). AVAILABILITY/ACCESS TO HEALTH CARE PROVIDERS AND MAMMOGRAPHY

Bailey, Bennett, Hicks, Kemp, and Warren (1996) studied cancer detection activities. They identify socioeconomic factors, structural aspects of the health care system and cultural factors. Within the structural aspects of the health care system, they identify access to services and understanding the need for service, understanding how to get into and negotiate the system, making and keeping appointments, communicating with providers and transportation issues.

In addition, Dolan, Reifler, McDermott, and McGaghie, (1994) study of adherence rates show clear variation by health care provider (attending physician 73%, residents 58%, nurse practitioners 47%).

While the term `medically under-served' does describe a shortage in the supply of health care services, it also includes indicators of the social conditions (poverty and age) that result in greater demands for health care services.

According to American Health Care Policy and Research (AHCPR), one fourth of America's population lives in rural areas. Compared to urban America, rural residents have higher poverty rates, a larger percentage of elderly, tend to be in poorer health, have fewer doctors, hospitals and other health resources, and face more difficulty getting to health services. Therefore, AHCPR has brought together rural experts to develop a research agenda on key health care issues facing Rural America. Some of these issues are access to care, including unavailability of resources and transportation problems. The supply of primary care health providers is decreasing because some are leaving rural areas to join managed care organizations elsewhere. Health promotion and disease prevention which include goals for improving the nation's health over the next decade, outlined in Health People 2000, can only be achieved if rural populations are included in efforts to remove barriers to access and use of clinical preventive services. However, organization of services for vulnerable rural populations is difficult, because low population density makes it hard to deliver services that target people with special health

needs. Groups that are at particular risks are the elderly, the poor, people with HIV or AIDS, the homeless, mothers, children, and adolescents, racial or ethic minorities and persons with disabilities. AHCPR has conducted and funded projects that have found that almost one in three adults living in rural America is in poor to fair health. They state that nearly half have at least one major clinical illness. Knowing this, rural residents still average fewer physician contracts per year than those in urban communities. They also found that traumatic injuries are more common in rural areas partly because of transportation Another issue that is a concern is that underproblems. insurance is as much a problem for rural residents as being uninsured (AHCPR, 1998).

Link Between MUAs and Reduced Adherence to Mammography: In addition to the link between MUAs and reduced health care delivery, available statistics show that women living in MUAs are more likely to be diagnosed with late stage breast cancer (Kerner, 1996). This confirms the importance of studying the linkages between mammography and medically under-served populations. However, research information on the link between a woman's residency in a MUA and her adherence to mammography guidelines is scarce. This study aims to provide a contribution to filling this knowledge gap.

Higher rates of breast cancer mortality, as well as late stage diagnoses, point to the practical deficiencies in screening, diagnosis, follow-up and treatment of breast cancer for women who live in MUAs. One source of literature says that there is limited access to and less use of baseline and routine clinical breast examinations and mammography. Furthermore, there is a delay in diagnostic resolution and higher rates of incomplete clinical follow up (Kerner, 1996).

The literature on mammography has documented "that older, low income, less educated, and ethnic minority populations make less use of available mammography and clinical breast examination services than their younger, better educated, white middle class counterparts" (Kerner, 1996). While populations in MUAs are, by definition, older and poorer than populations in other areas, it is not clear to what extent the barriers to mammography use are primarily the result of limited availability and inferior health care infrastructure or of population-based factors such as education and income.

Information on populations in MUAs has historically been lacking. With respect to breast cancer, as well as many other cancers, the medically under-served are understudied, not well understood by many in the medical and academic research community (Kerner, 1996).

Hypothesis

As was shown, several factors have been identified in the literature as influencing a woman's likelihood of getting regular mammograms and of adhering to recommended screening guidelines. Most of these factors will be taken into account when examining the effects of living in MUAs. On the basis of the available evidence about MUAs, the main study hypothesis for the following analysis is: Women who live in MUAs are less likely to receive mammograms within the recommended guidelines than women in adequately served counties, regardless of their age, education, marital status, and insurance status.

Methods

Sample

Data for the current analysis comes from the Northern Michigan Community Health Assessment Project which involved a representative telephone survey of adult residents in the 21 most-northern rural counties of Michigan's lower peninsula. The largest town in this region of almost 452,000 permanent residents had 15,000 residents at the time of the survey (1995 Bureau of Census estimates). However, since this area is a major resort area, the population during the summer months tends to swell by more than 10,000. Data were collected from mid-July, 1995 through the beginning of September, 1995. Information Transfer Systems, Inc. of Ann Arbor, Michigan conducted the survey employing computerized telephone survey software for data entry. The

sampling design was based on Survey Sampling's equal probability of selection method which results in equal probability of selection for all households with telephone within the geographic sampling frame. The study called for a minimum of 300 completed interviews from each of the 21 counties involved. To compensate for anticipated nonresponse as well as non-working and non-residential phone numbers, almost 20,000 phone numbers were called. Of these, 8,059 produced households with at least one eligible adult resident. Within each sample household, an adult respondent was randomly chosen from all eligible resident adults 18 years of age and older. Eligibility criteria specified the exclusion of short-term vacationers (staying fewer than 3 weeks), non-English and incapacitated residents. A total of 6,533 adult residents participated in the survey allowing for a cooperation of 81% (6533/8059). Given the disproportionate probability of selection of households within different counties (population size ranged from 7,264 in the smallest to 76,814 in the largest county), and of eligible adults from households (number of adults within households ranged from 1 to 10), all statistical estimates are weighted to reflect these stratification factors. For the purposes of this analysis, cases were selected from 8 of the 21 counties: four counties with the `worst' health care infrastructure and four counties with the `best'.

Identification of Medically under-served areas: Under the provisions of Public Law 99-280, enacted in 1986, an

area or population group is considered `medically underserved', if it scores less than 62 on the Index of Medical Under-service (IMU). This index is based on an algorithm that makes use of the following information: the poverty rates in an area's population, the proportion of the population over 65 years of age, an area's infant mortality rate, and the number of full-time equivalent physicians per population. Even if an area does not meet the established criteria of an IMU less than 62, it can nevertheless be considered for designation if "usual local conditions which are a barrier to access or the availability of personal health services" exist and are documented, and if such a designation is recommended by the chief executive officer and local officials of the State where the requested population resides.

Operational Definition of Variable Medically under-served counties

The designation of an area as `medically under-served' (MUA) involves the application of the Index of Medical Underservice (IMU) to data from service areas to obtain a score for the area. The IMU is a scale with scores ranging from 0 to 100, where 0 designates a completely under-served area and 100 represents the `best-served' or `least underserved' area. Under the established criteria, each service area found to have an IMU of 62 or less qualifies for designation of an MUA. The IMU involves four variables, the primary medical care physician-to-population ratio, the

infant mortality rate, the percentage of the population with incomes below the poverty level, and the percentage of the population aged 65 or older. The value of each of these variables for the service area is converted to a partial score, according to established criteria. The resulting four scores are then summed to obtain the IMU score for the area. The MUA designation process therefore requires the following information:

- The definition of the service area: in this study, service areas are defined as identical with the county boundaries.
- 2. County data for 1995 (the year of the survey) on: a) the resident civilian, non-institutional population; b) the percent of the population with incomes below the poverty line; c) the percent of the population over age 65; d) the infant mortality rate (IMR) for the county using a 5-year average for the years before and including 1995; e) the 1995 number of full-timeequivalent (FTE) primary care physicians.
- 3. The computed ratio of FTE primary care physicians per thousand population in the county (from items 2a and 2e above).
- The IMU is the weighted sum of the four scores. For
 detailed information, see website of Bureau of Primary
 Health Care (1999).

On the basis of their IMU score, all 21 counties represented in the data set have been ranked-ordered from

the best served county (score of 100) to the county with the greatest service needs (score of 0). The four counties with the highest and four counties with the lowest scores were selected for subsequent comparisons of `medically underserved' and `adequately served' counties. Table 1 shows the IMU index for the 8 selected counties. As is apparent, all four of the lowest scoring counties actually have an index value of less than 62 and thus meet the formal criterion for a medically under-served county. By contrast, the four highest scoring counties with index numbers greater than 84 show substantial evidence of `rich' service environments and are thus considered `adequately served counties'. Table 1 also displays the number of female survey respondents older than 39 years of age who reside in each county.

Other Study Variables

Age was self reported as age in years. Only those 40 years and greater included.

<u>Sex</u> was self reported as male or female. Only female participants included.

Education is coded: 1-sixth grade or less, 2-eleventh grade or less, 3-high school graduate of GED, 4-some college, 5-college graduate, 6-some graduate school, masters, or doctorate.

<u>Marital status</u> is coded: 0-divorced, widowed, separated, never married, or member of an unmarried couple, 1-married.

TABLE 1: MUAS vs. ADEOUATELY SERVED AREAS

INDEX OF IMU

COUNTY

N OF RESPONDENTS LIVING IN

		0 = NO	1 = YES	
OSCODA	51.9		141	141
ROSCOMMON	52.1		155	155
ALCONA	56.3		134	134
PRESQUE ISLE	56.9		131	131
ALPENA	84.4	121		121
WEXFORD	85.2	97		97
GRAND TRAVERSE	93.8	102		102
EMMET	94.0	114		114
TOTAL		434	561	995

MU COUNTY

TOTAL

<u>Health insurance status</u> is coded: 0-never had insurance, 1-no coverage > 6 months, 2-no coverage < 6 months, 3-Medicaid, or 4-Medicare.

Results

Table 2A and Table 2B show the demographic characteristics of the respondents. Among the 995 female respondents from the eight selected counties, 98% were white, 60.3% were married, and only 36.5 were gainfully employed (Table 2A). In addition, almost 80% of these women lived either alone or with a spouse, and some 60% had no college level education. As Table 2B shows, the mean age for this sample was 61 years and the median income was \$28,757, ranging from a minimum income of \$4,000 and a maximum income of \$200,000. Thus, the sample reflects the rural population characteristics of poorer and less educated women.

TABLE 2A: DEMOGRAPHIC INFORMATION

	N	Percentage
Race/Ethnicity		
White	979	98.5
Other	15	1.5
<u>Marital Status</u>		
Married	600	60.3
Divorced/ Separated	104	10.4
Widowed	245	24.6
Never Married	46	4.6
Employment Status		
Employed for wages	363	36.5
Unemployed	233	23.4
Retired	398	40.0
Number of Household		
Members		
1	315	31.7
2	479	48.1
3	104	10.5
4-13	97	9.7
Education Level		
Some High School or	185	18.6
Less		
High School Completed	408	41.1
Some College	238	24.0
Bachelor's Degree or	162	16.4
Higher		

TABLE 2B: CONTINUOUS VARIABLES

	MEAN	MEDIAN	MIN	MAX	SD
AGE	60.72	61.00	40	97	12.96
EDUCATION	12.66	12.00	1	19	2.56
INCOME	32,997	28,757	4,000	200,000	23,526

Table 3 presents the distribution of the outcome variable in this sample: adherence to mammography. It shows

	N	Percentage
0=NO MAMMOGRAM	249	25.0
WITHIN LAST 2 YEARS		
1=HAD MAMMOGRAM WITHIN LAST 2 YEARS	749	75.0
TOTAL	995	100.0

TABLE 3: OUTCOME VARIABLE - ADHERENCE TO MAMMOGRAPHY

that only 25% of the respondents did not adhere to the mammography guidelines. The 75% of the respondents who did adhere to the guidelines represent a proportion that is higher than one would have expected based on literature reports.

Table 4 shows the result from a logistic regression model that tests the major study hypothesis. The outcomes in this analysis are the odds that a woman over 39 years of age in this study population of eight counties has had her last mammography within the last two years, as required by the consensual mammography guidelines. As the p-value of .59 associated with the main predictor variable of interest (IMUGP: does a woman live in a MUA or not?) shows, the hypothesis that residency in a MUA affects the odds of adherence to mammography guidelines is not supported: the probability that the observed sample odds-ratio of .33 is likely to be the result of mere sampling chance is 59%.

Discussion

This paper examined adherence to mammography guidelines among MUAs and adequately served areas. It was hypothesized that MUAs would have lower adherence rates than adequately served areas. The results of the analysis performed did not support the hypothesis. Some explanations on why the hypothesis was not supported may be that, in today's highly mobile society, living in an underserved county may not be a big deal, unless one lives a far distance from a major medical center or clusters of health providers. Breast cancer awareness education may be more efficient than originally thought. Health care services may also be more efficient than in years past. For example, more mammograms may be performed in one day than before, decreasing waiting time for women and increasing adherence.

While the main study hypothesis is not supported by the data, many of the other predictor variables mentioned in the literature do show significant effects on the appropriate use of mammography. In particular low income, race, age, education, household size, marital and insurance status all seem to affect the odds of adhering to mammography guidelines. Specifically, concerning the effects of insurance status on adherence to mammography, the odds that a woman with no insurance for more than 6 months participates in appropriate mammography are only one fifth (21%) those of a woman with private health insurance. On the other hand, the odds that a women with Medicaid or

TABLE 4: PREDICTORS OF ODDS OF ADHERENCE TO MAMMOGRAMS

Logistic Model: Valid N: 969, Chi - Square: 91.85, Degrees of Freedom: 17, P- value: < .001.

	<u>Adjusted odds-</u> <u>ratio</u>	<u>P-Value</u>	Wald-Statistic
Age	1.00	.78	.08
Race O=all other; l=white	.33	.09	6.47
Education Level Reference Category: post bachelor's education			
l=grade school or less	. 38	.24	1.38
2=some high school	.33	.01	6.11
3=high school degree	. 46	.06	3.49
4=some college	.47	.08	3.15
5=bachelor's degree	. 40	.05	3.79
Employment 0=not employed; 1=employed	. 79	.30	1.09
Marital Status O=not married; 1=married	1.85	.00	9.73
Household Members (#)	.78	.00	9.90
Income (\$)	1.00	.75	1.00
Insurance Status Reference Category: private insurance			
O=Never had insurance	. 43	.53	. 39
l=No coverage > 6 months	.21	.00	21.99
2=No coverage < 6 months	50.61	.56	.34
3=Medicaid	1.14	.72	.13
4=Medicare	.93	.75	1.00
IMUGP O=no; 1=lives in MUA	.33	. 59	.29

Medicare participates in appropriate mammography is similar to the odds for private insurance. The relevant odds ratios are close to one (1.14 and .93, respectively), and the associated p-values of greater than .05 indicate that these odds ratios do not differ from one in the population from which the sample was drawn. Thus, the data indicate that the three groups of women with insurance (whether private, Medicare or Medicaid) all have similar odds of adherence to mammography, but the group of women who are long-term uninsured (> 6 months) has substantially lower odds (about one fifth) of adherence to mammography (Note: The researcher has chosen to disregard the insurance categories of 0=never had insurance and 2=no coverage < 6 months because each only contains 4 cases - too few to say anything with confidence about these groups).

While being married almost doubles (1.85) the odds of getting appropriate mammography, the addition of another household member is actually associated with a 22% reduction (.78) in the odds of participating in this preventive screening. At first glance, this result appears paradoxical (since married women tend to live in larger households). However, the most likely explanation is this: for most married women, living with a husband may provide both an incentive and support to engage in preventive mammography. At the same time, women who live in larger households often become either caregivers for children or elderly relatives.

Therefore, time and attention is directed towards other household members at the neglect of their own health.

As expected, having little formal education is associated with lower odds of receiving appropriate mammography services. Compared to the reference category of post bachelor's education, i.e., the best educated group, all lower educational levels show lower odds of adherence to appropriate mammography. For instance, the odds that a woman with some high school education participates in appropriate mammography, are only one-third (.33 or 33%) of the odds of women with a post bachelor's education. Likewise, women with grade school or less or some high school have the lowest odds of adherence (.38 and .33) (Noted however, there were only 10 cases of women with a grade school education or less, hence, conclusions cannot be made with confidence). Still, the data clearly confirm the overall pattern that higher education leads to increased rates of adherence to guidelines. This effect is independent of the other predictor variables; thus, it is independent of income, employment status or insurance This suggests that higher education results in status. greater awareness of health issues, greater knowledge, and also better knowledge acquisition skills.

In regards to race, there were only 19 minority cases. This group is not large enough to come to any confident conclusions about the patterns in the population from which the sample was drawn. However, the 19 cases in this sample

actually had a 3 times higher (1/.33=3) adherence rate than the white/European American population. One possible explanation is that many minority members in this sample from a rural target population actually are either American Indians (who have access to insurance in the form of the Indian Health Service), or Asian Americans.

No significant relationship was found with respect to employment; thus whether or not a women is employed does not seem to affect her odds of getting appropriate mammography.

As the review of the literature had shown, low adherence rates are frequently associated with race, age, low income, low level of education, marital and insurance status. Similarly, in this rural population, it was found that four variables have significant effects on adhering to guidelines. These four variables are: low level of education, no insurance, not being married, and increased number of household members.

Limitations

This research is subject to limitations based on the instrument, sampling methods, missing data, and data processing errors. Since this study analysis relied on secondary data, the researcher was required to work with the constraints of the original research.

The limitations of the instrument included a potential for bias in self-report interviews (for instance, respondents may be reluctant to admit that they did not get a mammogram), reliability and validity of variables

measured, and dependence on the interviewee being honest in responses. In surveys, accuracy of recall may also be a limitation, especially since respondents were asked to report on past use of health care services reaching back for several years.

The responses for education are somewhat limited in their valid comparability across respondents as they account for only years of formal education and are not sensitive to the quality of the formal education achieved. Further, the responses do not account for informal education or generational differences in educational attainment.

Another limitation was the federal guidelines for designation of MUAs. It includes four criteria for designation: the primary medical care physician-topopulation ratio, the infant mortality rate, the percentage of the population with incomes below the poverty level, and the percentage of the population aged 65 or older. The provider definition only includes physicians. This is problematic because it does not include all primary health care providers, such as nurses, nurse practitioner and PA's. Thus, this definition may not have been an ideal measure.

Implications for Advanced Practice Nurse

Although this research did not support the researcher's hypothesis, it is important to target the 25% who did not adhere to guidelines. Data show that low level education, no insurance, not being married and increased number of household members have a significant effect on adherence to

screening quidelines. Thus, it is crucial to reach these people. APNs are in a pivotal position to assess, counsel, educate, and support women. One way to reach these individuals would be to contact the health department. There may be some programs already in place. It is important to increase awareness of breast cancer, perhaps providing an educational pamphlet. This may increase courage and conviction to adhere to preventative screening. APNs need to use their role of assessor to help women identify and utilize available community resources. In order to reach as many women as possible and remove barriers to adherence to preventive care, the APN must focus on the development of community education classes on breast cancer prevention and provide ways for women to obtain CBEs and mammograms. Since having no insurance influences women from adhering to quidelines, APNs need to help establish free mammography stations in each community. Another issue is increase number of household members. This could be caring for children or the elderly. In terms of children, APNs need to coordinate baby-sitting services for those women coming to the clinic. Perhaps, implementing support groups for those women who are alone. This may provide an opportunity for women to meet other women who are alone and establish a friendship that offers support in terms of health care.

Implications for Research

More research is needed to help women adhere to all preventative care guidelines. With increase diagnoses in all types of cancer, research must continue in all areas. Research must be conducted on specific behavior changes that need to take place to prevent cancer and promote ailmentfree healthy lives. Further research on different communities need to continue in order to learn what factors influence women in adhering to preventive care guidelines. For example, future research ought to find ways of measuring the actual distance of a person to the next primary care provider. Another research study would be to find out where the providers live and where they practice. One research study could study the functional ability of respondents and where they live in comparison to distance health care services. This research can serve as a starting point to further research.

Summary

This study did not support the hypothesis that women who live in MUAs are less likely to receive mammograms within the recommended guidelines than women in adequately served counties. The study showed that living in MUAs did not influence women 40 years or older to adhere to mammography guidelines.

As a primary care provider, the APN is obligated to assist women to become as knowledgeable as possible about their bodies and how to take care of them. The APN must use

clinical skills, current practice standards, and scientific research to provide high quality care to all women 40 years and older. By virtue of being a women, they all have a potential for being diagnosed with breast cancer.

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APPENDIX A

.

MICHIGAN STATE

June 1, 1999

TO: Dr.Manfred STOMMEL

A-103 Life Sciences Building

RE: IRB# 99301 CATEGORY: 1-E

APPROVAL DATE: June 7, 1999

TITLE:ADHERENCE TO BREAST CANCER SCREENING GUIDELINES AMONG WOMEN OVER 39 IN RURAL NORTHERN MICHIGAN

The University Committee on Research Involving Human Subjects' (UCRIHS) review of this project is complete and I am pleased to advise that the rights and welfare of the human subjects appear to be adequately protected and methods to obtain informed consent are appropriate. Therefore, the UCRIHS approved this project.

RENEWALS: UCRIHS approval is valid for one calendar year, beginning with the approval date shown above. Projects continuing beyond one year must be renewed with the green renewal form. A maximum of four such expedited renewals possible. Investigators wishing to continue a project beyond that time need to submit it again for a complete review.



REVISIONS: UCRIHS must review any changes in procedures involving human subjects, prior to initiation of the change. If this is done at the time of renewal, please use the green renewal form. To revise an approved protocol at any other time during the year, send your written request to the UCRIHS Chair, requesting revised approval and referencing the project's IRB# and title. Include in your request a description of the change and any revised instruments, consent forms or advertisements that are applicable.

PROBLEMS/CHANGES: Should either of the following arise during the course of the work, notify UCRIHS promptly: 1) problems (unexpected side effects, complaints, etc.) involving human subjects or 2) changes in the research environment or new information indicating greater risk to the human subjects than existed when the protocol was previously reviewed and approved.

If we can be of further assistance, please contact us at 517 355-2180 or via email: UCRIHS@pilot.msu.edu. Please note that all UCRIHS forms are located on the web: http://www.msu.edu/uniVvprgs/UCRIHS/

Sincerely,

David E. Wright, Ph. D. UCRIHS Chair DEW: bd

cc: Monica Patel

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