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A Comparative Study of Primary Preventive Behaviors and Secondary Preventive Behaviors Among Michigan Adults

Jing Chang
Western Michigan University

A COMPARATIVE STUDY OF PRIMARY PREVENTIVE BEHAVIORS AND SECONDARY PREVENTIVE BEHAVIORS AMONG MICHIGAN ADULTS

by

Jing Chang

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A COMPARATIVE STUDY OF PRIMARY PREVENTIVE BEHAVIORS AND SECONDARY PREVENTIVE BEHAVIORS AMONG MICHIGAN ADULTS

Jing Chang, Ph.D.

Western Michigan University, 1993

Many researchers have documented the range and extent of the health preventive behaviors. However, previous studies have generally focused on either the contact with medical professionals (secondary preventive care) or compliance with their recommendations (primary preventive care). Some have treated the two types of behaviors as one and related them to social demographic characteristics and socio-structural conditions (e.g., access to medical service). There have been very few studies that have compared the two sets of preventive behaviors. This study takes a first step to explore the correlates of secondary preventive activities and compare them with the correlates of primary preventive activities. We ask if there are patterns of relation among these activities and if social economic status affects more on secondary preventive behaviors than on primary preventive behaviors.

This study uses the data from The Behavioral Risk Factors Survey, a sample survey of 2400 adults in Michigan. The major variables in this study include socio-demographic factors and both sets of primary preventive behaviors and secondary preventive behaviors.

This dissertation examines the relation of these dimensions with

socio-demographic variables and develops multivariate models of the factors that contribute to primary and secondary preventive activities. The major statistical measurements in the study are stepwise regression and canonical correlation analysis. Stepwise regression is conducted for each of the health preventive variables with demographic/socioeconomic variables and canonical correlation analyses are conducted to compare primary and secondary health preventive behaviors. Although they are significant at statistical level, the variances in stepwise regression tests and the redundancies of canonical correlation analyses are so that they have less predicting power in the interest direction. Of all the independent variables, socio-demographic variables such as age and gender are statistically significant in almost every single test among primary and secondary preventive variables. The results show that considerable similarity existed among socioeconomic groups involving the health risk factors. The analyses also reveal a reverse direction among socioeconomic and secondary preventive variables that those who in the disadvanted socioeconomic groups are more likely to receive the secondary preventive care. Thus, the tests do not show striking socioeconomic differences between the primary preventive and secondary preventive behaviors and they do not reveal that socio-economic variables impact more on the secondary preventive than on the primary preventive behaviors.

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Chang, Jing, Ph.D.

Western Michigan University, 1993

U·M·I
300 N. Zeeb Rd.
Ann Arbor, MI 48106

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Jing Chang

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CHAPTER I

INTRODUCTION

Statement of the Problem

Patterns of mortality and morbidity in the United States have changed. Most infectious diseases have been conquered, and relatively few people die from them. The average life expectancy from birth has jumped from 47 years in 1900 to 75 years in 1988. The major health threat to contemporary society is a variety of chronic diseases which are largely effects of life styles and man-made environments. Certain diseases such as heart disease, cancer, and stroke are the leading causes of death for people of middle and later age. Chronic diseases cause most of two million deaths occurring annually. Chronic diseases are also responsible for 60% of days spent in acute care hospitals and for more than 50% of visits to physicians (Mumford, 1983).

Knowles (1977) claimed that "Over 99% of us are born healthy and made sick as a result of personal misbehavior and environmental condition" (p. 58). For example, cigarette smoking is the single most preventable health problem in American society. Although the prevalence of smoking has declined steadily over the last two decades, 31.5% of American men and women smoke. Cigarette smoking accounts for an estimated 350,000 deaths each year (Mason & Tolsma, 1986, pp. 3-4). Alcohol-misuse is another important cause of premature

death and it accounts for an estimated 200,000 deaths annually (US DHEW Public Health Service, 1978). The Surgeon-General's Report on Health Promotion and Disease Prevention concluded that: "In fact, of the 10 leading causes of death in the United States, at least seven could be substantially reduced if persons at risk improved just five habits: Diet, smoking, lack of exercise, alcohol abuse, and use of antihypertensive medication" (DHEW, 1979, p. 14). The evidence shows that behavioral changes have saved many lives in the past two decades. The declines in both coronary heart disease and stroke death rates (about 40% and 50% respectively) since 1970 are associated with reduced rates of cigarette smoking, lower mean blood cholesterol, and increased control of high blood pressure. In the same period, road accident rates have also declined due to a variety of reasons, mostly lower rates of alcohol use, increased seatbelt use, and changes in speed limits.

The result has been a growing awareness that numerous diseases are caused by particular styles of living, and medicine is no longer the automatic answer for all threats to one's health. Since 1980, living a healthy lifestyle and promoting one's own health have received a great deal of attention. Many studies have related a variety of different health behaviors to chronic disease morbidity and mortality (Wiley & Camacho, 1980). Some studies have focused on preventive care such as the development of healthy habits (Bennett, Stephen, & Johson, 1987). Others have associated demographic factors with personal health practices and lifestyle choices (Dutton, 1986;

Cockerham & Lueschen, 1988; Cockerham, Lueschen, & Spaeth, 1986). This is an important area of investigation in medical sociology because health-oriented behavior is not limited to those activities concerned with recovering from disease or injury, but also includes the kinds of behaviors that permit healthy people to stay healthy. Consequently, health professionals and social researchers divide healthy behaviors into two general categories: Healthy lifestyles (primary health care) and health screening preventive care (secondary health care).

Primary health care refers to a number of everyday non-medical activities. These activities include, but are not are limited to, duration of sleep, eating habits, weight management, physical recreational activity, consumption of alcoholic beverages, not smoking, using seat belts and motor cycle helmets, obeying traffic laws; and following health and safety regulations at work. Such behaviors are designed to prevent the development of disease.

Secondary preventive care refers to medical activities when healthy people contact physicians or other medical personnel for preventive care. It includes behaviors of the individual who uses the medical profession to facilitate early screening and detection of a condition and thus minimize its impact (Commission on Chronic Illness, 1957). These behaviors include, but are not limited to, undergoing general physical examination for detecting the early signs of disease, dental checkups, Pap tests, and similar tests designed to discover health problems at an early stage before symptoms may be

presented.

Tertiary prevention is aimed at individuals in whom the disease has become symptomatic. In tertiary prevention, medical professionals treat a disease "to (1) cure it or reverse its clinical manifestations, (2) control disease progression to avoid complications, (3) Control the spread of disease to others, or (4) anticipate and modify the impact of clinical disease" (Povar & Riegelman, 1988, p. 68). This is the focus of curative medicine and is outside of the scope of this study.

Purpose of the Study

The purpose of this study is to explore the correlates of secondary preventive activities and compare them with the correlates of primary preventive activities.

Many researchers have documented the range and extent of the health preventive behaviors. However, previous studies have generally focused on either the contact with medical professionals (secondary preventive care) or compliance with their recommendations (primary preventive care). Some have treated the two types of behaviors as one and related them to social demographic characteristics and socio-structural conditions (e.g., access to medical service). Little attention has been given to the comparison of the two sets of preventive behaviors. Although both primary preventive behaviors and secondary preventive behaviors fall in the category of health-related behaviors, they may vary in the way people pursue them. We ask if

there are patterns of relation among these activities and whether people who engage in primary preventive behaviors are also likely to go for secondary preventive care. Does social economic status affect people's secondary preventive behaviors? Do socioeconomic factors have more impact on secondary preventive behaviors than primary preventive behaviors? This analysis will take a first step in answering these questions.

This study will use data from the 1990 Behavioral Risk Factors study, a sample survey of 2400 adults in Michigan. The statistical analysis will examine underlying dimensions of health protective behaviors. The major variables in this study will include socio-demographic factors and both sets of primary preventive behaviors and secondary preventive behaviors. Demographic variables include race, age, sex, and marital status of the respondent. SES will be measured by the variables of education, household income, and employment status. Primary preventive behaviors will include exercise, seatbelt usage, smoking, drinking, drinking and driving, and mass index category. Routine health checkups will include blood cholesterol checks and routine health checkups, and, for females, mammograms, breast exams, and Pap smears. This dissertation will examine the relation of these dimensions to socio-demographic variables and will develop multivariate models of the factors that contribute to primary preventive activities and secondary preventive activities. These models will be compared and hypotheses for future research will be suggested.

Chapter Summary

In this chapter the problems and purpose of the study were discussed. The major health threat to contemporary society is a variety of chronic diseases due to unhealthy life styles and man-made environments which are responsible for the leading causes of deaths for people of middle and later age. Therefore, healthy lifestyles and preventive care behaviors are crucial in health promotion and disease prevention. In this chapter preventive behaviors were defined. The difference between primary preventive behavior and secondary preventive behavior lies in the fact that the first refers to nonmedical activities and the second involves medical procedures. A central question raised in this study is whether socioeconomic factors have more impact on secondary preventive behaviors than primary behaviors.

CHAPTER II

REVIEW OF THE RELATED LITERATURE

The Problem and the Conceptualization of Routine Health Checkups

This chapter will review the literature on preventive care and health-related behavior. The first part will focus on the historical background of routine health checkups, the criteria for screening examinations, and the cost and medical insurance coverage for secondary preventive care. The second part will focus on the health behaviors that take place outside of the formal health care delivery system.

Historical Perspective

The concept of routine health checkups or periodic health examinations was first brought to the United States by Dr. G. M. Gould at the turn of the twentieth century (Hudson, 1988). By 1922, the American Medical Association (AMA) endorsed these efforts, and in 1923 the National Health Council encouraged Americans to have an annual physical examination with the slogan "Have a Health examination on Your Birthday." By 1950, it was common practice among health professionals to recommend routine health checkups and comprehensive laboratory tests as an aspect of effective preventive medicine.

In mid-1960 a randomized clinical trial of the benefits of annual screening for breast cancer with mammograms and other clinical

examinations was undertaken involving 62,000 women who were enrolled in the Health Insurance Plans of Greater New York. The result showed that benefits of this breast cancer screening program were only found in women over age 50 (Barker, 1987).

In 1970 a large clinical trial designed to study routine health checkups was conducted by the Kaiser-Permanent Health Plan (Dale, Friedman, & Collen, 1979). Over 10,000 women were divided into two groups, one group was encouraged to undergo a special multiphasic program, while the control group was not urged to do so. The mortality rates for hypertension and colorectal cancer were significantly lower in the group receiving regular routine health checkups compared with a matched control group. However, the total mortality was similar in the two groups. The conclusion of the Kaiser program was that routine health checkups provided little or no overall benefit when applied to the general population.

Many analyses of routine health checkups data have been done since those controversial findings, including those by Fram and Carlson (1975), Breslow and Somers (1977), the Institute of Medicine (1979), the Surgeon General's Report on Health Promotion and Disease Prevention (1979), the Canadian Task Force (1979), the American Cancer Society (1980), the American College of Physician (1981), the Henry Ford Hospital (1983), the American Medical Association (1983), and the American Heart Association (1987). Among the many researchers and study groups, some of them supported preventive intervention, others did not. Thus, it was not surprising that there was a

lack of general agreement among these studies on what routine health checkups should include and how frequently they should be done. The Canadian Task Force and the American Task Force, for example, were the only comprehensive efforts to examine these issues systematically.

The Canadian Task Force: In 1976 the Canadian Government convened the Canadian Task Force on the periodic health examination. The expert panel evaluated the effectiveness of clinical preventive service and developed explicit criteria to judge the quality of evidence from published clinical research. The panel also used uniform decision rules to link the strength of recommendations for or against a given preventive service to the quality of the underlying evidence. The results were intended to provide the clinician with a means of selecting those preventive services supported by the strongest evidence of effectiveness.

The American Task Force: A similar study was established in the United States in 1984. A 20-member panel commissioned the U.S. Preventive Services Task Force and developed recommendations for clinicians on the appropriate use of preventive interventions based on a systematic review of evidence of clinical effectiveness (Report of the U.S. Preventive Services Task Force, 1989). The U.S. Task Force met 14 times between July 1984 and February 1988 and developed comprehensive recommendations addressing preventive services for all age groups. The findings showed that the most effective interventions for reducing the incidence and severity of the leading causes

of disease and disability in the United States were personal health practices. For example, age-adjusted mortality from stroke decreased by more than 50% since 1972 due in part to life style changes and earlier detection and treatment of hypertension (The Joint National Committee, 1988). Cervical cancer mortality fell by 73% since 1950 in part due to widespread Papanicolaou testing to detect cervical dysplasia (Report of the U.S. Preventive Services Task Force, 1989).

In 1989, the U.S. Preventive Service Task Force reported on its review of the scientific evidence on 169 clinical preventive services for 60 target conditions. Based on well established criteria, the Task Force published its recommendations on the basic services that should be provided in the Guide to Clinical Preventive Services (U.S. Preventive Services Task Force, 1989).

The Task Force indicated that although screening tests remained important preventive services, the most important role for disease prevention was in changing the personal health behaviors of individuals long before clinical disease developed. Primary prevention as it related to such risk factors as smoking, physical inactivity, poor nutrition, alcohol, and other drug abuse held generally greater promise for improving overall health than many secondary preventive measures such as routine screening for early disease.

The Task Force paid great attention to the uncertainties of routine health checkups. The reasons why physicians were less likely to provide recommended clinical preventive service was due to a variety of factors including skepticism about their clinical effectiveness.

It was often unclear whether performance of certain preventive interventions significantly reduce morbidity and mortality from the target condition the clinician was attempting to prevent. These uncertainties increasingly raised questions about the value of the routine health checkups of asymptomatic persons.

The Task Force found inadequate evidence to evaluate effectiveness or to determine the optimal frequency of routine health checkups. Some necessary studies had not been performed. Also, some findings were unreliable because of improper study design or systematic biases. This report called for the need to improve the overall quality of clinical research (Report of the U.S. Preventive Services Task Force, 1989). The report, however, resolved some of the uncertainties regarding the effectiveness of secondary preventive care and provided the guidelines for the prevention measurement of a wide range of disease categories and for patients of all age groups. It is now increasingly clear that while routine health checkups are important, performing the same interventions on all patients and performing them as frequently as every year are not the most clinically effective approaches to disease prevention. Rather, both the frequency and the content of routine health checkups need to be tailored to the unique health risks of individuals and should take into consideration the quality of the evidence that specific preventive services are clinically effective.

Finally, the systematic approach used by the U.S. and Canadian Task Force to evaluate effectiveness of routine health checkups was

a contribution to medical policy because the techniques that have been developed for the standardized view of evidence and for developing clinical practice recommendations based on documented decision rules are equally applicable to many other medical practice. The techniques presented in these reports may be useful for others who share an interest in using systematic methods for evaluating effectiveness in clinical practice (Institute of Medicine, 1985).

The Criteria and Definition for Routine Health Checkups

What criteria can be established for adequate routine health checkups? How often should a healthy person be examined by a physician? Such questions are always important considerations.

The AMA, the American Task Force, the Canadian Task Force, the Institute of Medicine, the American College of Physicians, and many others all have favored routine health checkups for healthy people. The following points are the principles and concepts that were described by these institutes and associations.

First, routine health checkups or secondary preventive care is important for early detection of disease and for the recognition and correction of certain risk factors that may trigger the diseases. It is regarded as an effective strategy in health promotion and disease prevention.

Second, routine health checkups should vary in content and frequency depending on age, sex, and other risk factors. A healthy person should have medical evaluation at intervals of five years

until they reach 40 years old. After the age of 40 years, periodic evaluation is recommended at intervals of one to three years depending on the individual's sex, occupation, and family disease history.

Third, the general recommendations are modified as appropriate in terms of each person's age, gender, occupation, and other characteristics. This approach is based on the recognition of the leading causes of illness and injury in an individual. For persons in the high-risk categories, such as persons with exposure to risk factors--tobacco or excessive amounts of alcohol, and persons with a family or personal history of different kinds of cancer, diabetes, past or present intravenous drug users, clinicians are advised to target preventive measures toward those conditions most likely to significantly influence health.

Besides the general recommendations, the Task Force also provided particular guidelines for certain clinical examinations. Cholesterol level is an important risk factor for coronary artery disease. It is recommended to check blood cholesterol level at age 25 and every 3-5 years thereafter.

The current guideline of the American Cancer society recommends an initial mammogram between the ages of 35 and 40, a repeat every one or two years for next ten years, and an annual mammography after 50. One of the useful preventive care measures for elderly is the recommendation that healthy persons between the ages of 65 to 74 be seen regularly every two years and those 75 and over have routine health checkups annually to assess the progressive effects of aging.

The Cost and Medical Insurance Coverage for Routine Health Checkups

When comparing primary to secondary preventive behaviors, primary preventive activities such as quitting smoking or doing exercise does not cost as much as does secondary preventive care. Secondary prevention care is high cost and the average annual cost for comprehensive physical checkups usually is between $400 to $800 (Bailey, 1990). It offers advantages, but at a high cost, and it may be more expensive than providing medical care. For example, screening and treating hypertension over a life time to prevent heart disease could cost as much as bypass surgery, or even cost more to produce the same quality-adjusted years of life (Becker, 1989).

A key issue is the question of third-party coverage for the checkups provided by medical practice. Vanderschmidt (1987) documented that most (about 90%) of the American population have some kind of medical insurance and about 56% have insurance which covers outpatient care (for instance, care that is provided in the physician's office). The outpatient coverage generally is associated with deductible and coinsurance limitations. As shown in Table 1, such limitations often exclude coverage of many preventive services.

Practice settings with responsibility for a patient's total health care on the basis of a flat premium payment or grant from the government do not bill patients for services unless such services are somehow excluded from the policy. For example, some practice settings do not include dental care or certain routine health checkups under their total care package. They often provide these services,

however, and bill patients for them just as if they were a fee-for-service practice with respect to these services.

Table 1

Third-party Coverage of Service for Preventive Services

Coverage for Routine Health Checkups*					
Third Party	Control	Note a	Note b	Note c	Note d
Blue Cross/ Blue Shield	Contract	Usual	Usually not	Usually not	Yes
Commercial	Contract	Usual	Usually not	Usually not	Yes
Medicare	Federal Government	Yes	No	No	No
Medicare	State/ Federal Government	Yes	No	No	No

* Assuming that outpatient coverage is offered.
! With the possible exception of some children's programs.

Note a: Covers diagnosis and treatment of recognized disease even through the thrust of the treatment is prevented (e.g., high blood pressure, hyperlipidemia).

Note b: Covers examination to discover asymptomatic disease with negative outcome (e.g., Pap smear with negative outcome, mammogram with negative outcome).

Note c: Covers health education and behavior modification to reduce risk.

Note d: Sponsors experimental programs to test the coverage of preventive services of all types (notes a through c).

Source: Adapted from Vanderschmidt, H. F. 1987. Practice Management for Clinical Prevention. Handbook of Clinical Prevention. Baltimore: Williams & Wilkins.

Some programs offer certain kinds of coverage for screening of breast and cervical cancers. For example, Medicaid (a public health program to provide services for lower income people) mandates certain coverage of diagnostic and preventive services.

Of the 50 states and the District of Columbia, 49 provide some level of coverage for Pap smears (Table 2), and 39 for screening mammography (Table 3). As Table 2 and Table 3 show, Michigan was one of 27 states that provided coverage of Pap smears for all eligible women and was one of 12 states that did not cover screening mammograms for Medicaid-eligible women. In 1989, Medicaid provided health benefits to roughly 9.4 million women of the appropriate ages for Pap smear tests and roughly 3.3 million women of the appropriate ages for mammography (Boss & Guckes, 1992).

Since secondary preventive behaviors or routine health checkups are generally obtained at personal expense, it is assumed that people who go for routine health checkups have both motivation as well as economic resources. While many low-income people do not have a regular source of medical care, and secondary preventive care is not covered by health insurance, these people must pay out of their own pocket--and this can be a significant reason for keeping them from visiting a doctor when they feel well (Cockerham, 1992). For those poor without any health insurance (or those too rich to qualify for the public medical insurance and too poor to buy private insurance), going to the doctor for preventive care may be an unaffordable luxury. Dutton (1986) observed that while the lower class group visits

doctors more frequently than upper-middle class groups, the need of the lower class for care is greater because of relatively poorer health and underutilization of secondary preventive care.

Table 2

Medicaid Coverage of Pap Exams, by State, October 1990

Extent of Coverage	States Providing	Legislation Yes*	No	Total
All eligible persons covered	AR, CA, CT, HI, IN, IA, KY, ME, MI, MT, NE, NY, NC, ND, OH, OR, TN, UT, VT, VA, WI, WY, MA, MN, RI, SD, WV+	5	22	27
Covered with physician's order	AK, AZ, DC, FL, ID, NH, NJ, SC, DE, KS	2	8	10
Laboratory costs covered only	LA, MD, MS, MO, OK		5	5
Prenatal, family planning service covered	AL, CO, IL, PA, TX, NM, WA		7	7
Not covered	GA, NV	1	1	2
Total number		8	43	51

*Includes the District of Columbia.

+These states have legislation related to third-party payment for Pap exams.

Source: Adapted from Boss, L. P. & Guckes, F. H. 1992. Medicaid Coverage of Screening Tests for Breast and Cervical Cancer. American Journal of Public Health. 82, 252-253.

Table 3

Medicaid Coverage of Screening Mammography, by States October 1990

Extent of Coverage	States* Providing	Legislation Yes	No+	Total
All eligible persons covered	AR, CA, CT, IL, IA, KY, MA MN, MO, NY, ND, OK, PA, RI, SD, TN, WA, WV, WI, IN, MT, OH, OR+	19	4	23
Covered with physician's order	AZ, CO, FL, KS, ME, NH, AK DE, DC, MS, NE, NJ, SC, UT, VT, WY	6	10	16
Not covered	GA, HI, MD, MI, NV, NM, TX, VA, AL, ID, LA, NC	8	4	12
Total number		33	18	51

*Includes the District of Columbia.

+These states do not have any legislation related to third-party payment for screening mammography.

Source: Adapted from Boss, L. P. & Guckes, F. H. 1992. Medicaid Coverage of Screening Tests for Breast and Cervical Cancer. American Journal of Public Health.82:252-253.

Related Social-Demographic Factors

Social-demographic variables such as age, gender, race, and social class or socioeconomic status are important variables employed in the research on health-related behaviors. These variables may show significant differences in health status, health-related behaviors, and the patterns in utilization of medical service among those social groups. The question of what social influence encourages or

discourages a person from seeking medical treatment and pursuing preventive care can be of great significance. The focus of this part, therefore, will be on reviewing social factors influencing the health practices among the social groups.

Gender

Gender differences in health related-behaviors and health care utilizations are marked in the United States. Women consistently have been found to utilize more health service for both curative and preventive purpose (Verbrugge, 1989). The following paragraphs will briefly summarize gender differences in the dimensions of health-related behavior, which include risk behavior, preventive behavior, and seeking treatment and self-treatment.

Risk Behaviors and Accidents: In Western countries, males are more likely to engage in risky behaviors than are females. Males are more often found to use guns, drive unsafely, drink heavily, engage in illegal behaviors, and work at hazardous jobs (Waldron, 1986). Smoking also has been more common among males than among females. Males tend to sleep less and tend toward overweight more than females. Males have more accidents than do females, and this gender difference is substantial in magnitude and is found across countries. Accidental death rates are higher in males for almost all types of accidents for almost all age groups (Verbrugge, 1985, Waldron, 1986).

Preventive Behaviors: The differences between males and females are also reflected in preventive behaviors. It appears that women

are more likely to take vitamins, brush their teeth, and use dental floss. Females report that they are on diets in order to lose weight more frequently than males. However, despite women's greater expressed concern with health, men are more likely to engage in some types of preventive behaviors such as seat belt use and physical exercise, and females are much more likely to engage in the risky behaviors associated with anorexia or bulimia (Waldron, 1983, 1988).

Seeking Treatment and Self Treatment: Women are more likely to respond to all kinds of symptoms by visiting physicians and self-medicating, but for symptoms of serious disease there are no gender differences in obtaining medical care. Women have more self-reported symptoms and poorer self-rated health (Verbrugge, 1985). The studies of physician visits typically show an excess in female rates. Thus, it is assumed that women may be healthier (e.g., have a greater life expectancy) in part because they are more active consumers of health care service.

Verbrugge (1989) suggested some theoretical explanations for gender differences in health and health behaviors. Biological and psychosocial aspects contribute the most to the differences.

Biological factors: The human male is simply weaker than the human female. Evidence of this comes, in part, from the fact that the prenatal or fetal death rate for males is about 120% higher than for females. The neonatal (newborn) death rate of males is 130% higher than that of females (Cockerham, 1992).

Psychosocial aspects: Verbrugge (1989) found that women value

health more than do men, report physical symptoms more, assume the sick role more readily, and appear to take better care of themselves in general. However, men feel more mastery in their lives and have higher self-esteem. It may be true that the lifestyle of the male with his emphasis on career contributes strongly to high rates of coronary heart disease (Verbrugge, 1989).

Thus, the analysis of gender differences indicates many factors influencing the health-related behaviors. The evidence viewed above suggests gender differences in many types of health-related behavior have been influenced more by the specific types of health behaviors with male and female roles than by gender differences in health-related motivations.

Age

Over the past twenty years, the population aged sixty-five and older has been increasing at a more rapid rate than that of the U.S. population as a whole. From 1960 to 1980, the number of elderly increased from 16.7 million (9%) to 25.9 million (11%) of the population --a 55% increase (Estes and Lee, 1989). These persons 65 and older are more likely to suffer from chronic illnesses and require costly medical care than are younger people. For example, the percentage of persons extremely limited by chronic conditions is 6.2% among forty-five to sixty-four-year-olds and 14.4% for sixty-five and older (Estes & Lee, 1989). Although the elderly comprise only 11% of the U.S. population, they consume 30% of the national health funds

and 50% of the federal health budget (Stults, 1986).

The data on trends in mortality, morbidity, and disability of the aged present a disturbing picture of health and aging. They show increased overall life expectancy for the elderly, but with a substantial increase in the number of years lived with chronic disease and disabilities. A critical question for the elderly and for health care providers is the impact of the rapid decline in mortality among the elderly on their need for utilization of health and social services.

Meeting the needs of the aging clearly calls for the treatment and management of chronic illness as well as the program of disease-prevention and health-promotion. However, Medicare and Medicaid, which were designed to treat acute illness and disease, poorly matched the needs of the older population in the American society.

Overall, national medical care spending in 1990 exceeded $661 billion, reflecting a 10.4% increase over the previous year, and costs of medical care continue to grow at two to three times the rate of general inflation (Ory, Abeles & Lipman, 1992). For the elderly population, the rising cost of medical care means rising copayments and deductibles under Medicare. Both the Medicare Part A hospital deductible and the Part B Premium each rose 229% between 1980 and 1990, more than five times the rate of inflation (Villers Foundation, 1987). Out-of-pocket medical expenses now exceed 18% of elders' annual incomes and the burden of the costs is disproportionately borne by low- and middle-income older people, those who also suffer

more illness (Estes & Rundall, 1992).

Medicare only covers some acute diseases and excludes virtually all types of long-term care such as in-home medical services and any types of preventive care. Periodic health checkups, dental care, foot care, and mental health service are often out-of-pocket expenses (Estes & Rundall, 1992). As a consequence, elderly people find a large portion of their medical bills must be paid out-of-pocket. The data presented by Finkel and Ruchlin (1991) indicated that (as of 1984) individuals 65 and over paid for an average of 25% of their own health care. Stults (1986) indicated that nearly 90% of elderly did not regularly visit a personal doctor. Physician-patient contacts were actually shorter for patients aged 65 and older than for those aged 45 to 64 years, especially for comprehensive and consultative visits (Keeler, Solomon, & Beck, 1982). Many elderly persons failed to report their illness and health conditions until they reached an advanced stage of disease. The reasons for that were many; the most important one was the cost. Income and health insurance coverage have been found in almost all studies to be important predictors of health care utilization.

Ethnicity

We would expect that there are patterned differences in medical utilization among the ethnic groups. Many researchers reported that Jewish people were more likely than Protestant or Catholic people to take physical symptoms to psychiatric rather than to general medical

facilities (Scheff & Silverman 1966, Segal and Weiss, 1965, and Srole 1962). Zola (1973) studied the differences in the symptoms of patients seeking medical help. He compared diagnostically matched patients from different ethnic groups. When the results were evaluated, Italians tended to seek medical help after their symptoms interfered with social or personal relations, while Irish patients tended to see a doctor only after others urged them to do so.

Two variables are believed to be associated with seeing doctors: the perception of symptoms and the extent of physical disability resulting from symptoms. According to Mumford (1983), a person's ability to recognize symptoms is influenced by social and psychological factors. That is, it is not just the objective risks to life, but the person's perception, which determines what she or he does about symptoms.

When describing factors that can be a trigger to seek medical care, Zola (1973) pointed to the importance of the occurrence of interpersonal crisis. A recent stressful life event increases the chances that people will seek medical help when they do not feel well. Physical symptoms of a chronic disease that have been endured for a long time finally become unbearable when a stressful life event happens. Perceptions of susceptibility can also influence treatment seeking behavior. Some people are more likely to believe themselves to be susceptible to disease. In some extreme cases, people so preoccupied with their health interpret each odd perception as implying they have certain diseases.

Thus, the analyses of cognitive aspects of health illustrate the importance of the culture dimension that influences health behaviors among subgroups. This discussion is necessary because a sub-cultural perspective on health behavior requires that individuals' health-related behavior be understood within the context of culture and health culture from a cognitive point of view.

Socioeconomic Status and Race

Social economic status is used here to refer to inequality in education, income, and occupational status. As Green (1971) defined it: "Conceptually, an index of socioeconomic status is intended to reflect the balance or net effect of social, environmental, situational, educational, financial, and other forces in the individual's personal world" (p. 54). The differences in social economic status for individuals such as levels of income and education influence the life chances of people, which in turn influence their preventive health behavior, health attitude, and access to medical care. In this study, the influence of the components of SES will be examined in order to understand the SES-preventive behavior link.

Race is strongly correlated with social class. Although two-thirds of the poor are white, almost half of all blacks are poor (Aiken, 1986). In the United States, black people have higher mortality rates than whites in all age groups. The severity and prevalence of certain infectious diseases have also been greater among minority children. Among adults in the United States, blood

pressures are consistently higher among blacks than whites, regardless of age and gender (Freeman, 1989). The health problems of black Americans may best be illustrated, however, by examining infant mortality. In 1988, the infant mortality rate of blacks was 17.6 versus 8.5 for whites (Cockerham, 1992). A major factor causing this difference is poverty. Blacks are overrepresented among the poor, and the poor have the highest rates of infant mortality (Brooks, 1980; Polednak, 1989).

Given the health disparity between the white and black populations, it is also important to consider the differences in health utilization patterns. A study of such patterns shows that nonwhites have lower rates of utilization of health services than whites. For example, a smaller proportion of nonwhites see a physician during the year, and a larger proportion report no regular source of health care (Shumaker, Schron, & Ockene, 1990, p. 279). Blacks are more likely to be covered by public medical insurance or to be uninsured than whites. Blacks are about 1.5 times more likely than whites to be uninsured (Long, 1987).

This differential presumably also reflects differences in demographic factors, such as education, income, and cognitive psychological factors, such as attitudes and knowledge which influence behaviors. The general studies show that blacks tend to have lower levels of cancer knowledge than whites and that they have a higher incidence and mortality for cancer than whites (Polednak, 1989).

Life expectancy has increased for each socioeconomic group.

However, the gap between the rich and poor remains. The middle and upper classes are enjoying the best health and longer lives, while the lower class suffers more from communicable diseases and other chronic diseases (Polednak, 1989). Although rates of coronary heart disease have declined for all classes in the past decades, the decline is significantly greater in the middle and upper classes (Cockerham, 1988).

In recent years, more and more people believe that lifestyle determine the level of health. Middle and upper classes are found more likely to cope with obesity and smoking, leisure-time exercise, and diets. In 1985, poor women of all ages and races were less likely than middle and upper class women to have recent preventive screenings and they were more likely to have never received breast or Pap screening (Dutton, 1986).

Coburn and Pope (1974a) measured socioeconomic status together with other variables such as social participation and self-direction and they found that education, income, and social participation were positively related to making preventive dental visits and to seeking vaccinations for polio. The data from The National Health Interview Survey (NHIS, 1985) showed that people with higher education, income, and social position were more likely to develop good health habits and to reduce the health risk factors. In addition to some of the demographic characteristics identified in the studies, Lave and his colleagues (1979) found low-income and unmarried males who were new to their communities and in good health were less likely to receive

regular health care service than people who were married and had resided for some time in their communities.

Krick and his colleague (1990) observed that of the component variables in socioeconomic status, education typically showed the highest partial correlation with health behaviors, occupation the lowest, with income in the middle.

The impact of education, income, and other social indicators is an important influence on the use of medical facilities. Low income and low education are generally assumed to interfere with obtaining help. Dutton (1986) observed that the poor were the least likely to use preventive care. Aday and colleague (1980) reported only less than one-third of low-income women received prenatal care in the first trimester of pregnancy. In other survey data, children of low-income families were four times more likely than high-income children under seventeen years old never to have had routine physical examinations in 1973 (National Center for Health Statistics, 1977). Other procedures like dental care, breast exams, and childhood immunization were also considerably less common among the poor (Cockerham, 1992).

The underutilization of preventive care by the poor has also been found in other countries. In Western Europe the lower class were found to use preventive medical and dental services significantly less frequently. Data from Great Britain indicated that those persons at the lowest end of the social scale were considerably less likely to use the preventive care than those higher up the social

ladder (Calnan, 1987).

These research findings showed socioeconomic factors to be significant in predicting health status and health-related behaviors, especially secondary preventive behaviors. The most important relationship of social class, race, health and health behaviors is the manner in which social economic status affects the opportunities a person has for a generally healthy life.

Primary Preventive Care vs. Secondary Preventive Care

In the last few decades, the emphases on health promotion and disease prevention have been increasing in American society. Many experts from medicine and from related fields spread the message that lifestyle is the most important modifiable factor influencing health and illness (Cockerham, 1988, 1992). Health-related information, including discussion of risk factors, nutritional acts and statistics on excess deaths from substance abuse, is widely disseminated in the media. In addition, the importance of individual responsibility for health maintenance has been emphasized repeatedly in the last few decades. Interest in diet and its relation to health, the growth in exercise as a leisure time activity, the growth in health spas and fitness clubs, and the increasing programs on ceasing substance abuse all indicate that a way to stay healthy is to adopt a healthy lifestyle and to eliminate unhealthy habits.

The media have become a powerful vehicle for health education, and some attempts to use the media to change health habits have

proved effective. For example, the Stanford Heart Disease Three Community Program found that an intensive mass media health education effort over a two-year period substantially reduced cardiovascular risk factors among persons in the target communities compared with a control town (Ulmerr, 1986).

Cockerham and others (1988) compared health lifestyles in two systems of health care delivery--West Germany and the United States. West Germany had national comprehensive health care benefits provided through the government. The United States remains as the only industrialized nation in the world that does not provide financial coverage for the medical care of a majority of its citizens. The government is obligated directly only to the poor and the aged through Medicaid and Medicare public health insurance; and business corporations may provide private health benefits to their employees. Access to quality care is largely determined by one's ability to pay. The research did not show any differences between American and West Germans in regard to participating in healthy lifestyles outside the health care delivery system. Whether one had private or public health insurance in either the United States or West Germany made absolutely no difference with respect to healthy lifestyles (Cockerham, 1988).

Kronenfeld and his colleagues (1988) used data from an employee health promotion project for state employees in South Carolina to examine health practices and their relationship to social and demographic variables. Most people in this sample of employees made

positive changes in health habits in at least one of the following areas: smoking, seatbelt usage, diet, exercise, and alcohol consumption. Their research showed that no social or demographic variables were significant predictors of whether people changed their health behaviors. This finding was consistent with the observation of Harris and Guten (1979) who suggested that everyone engaged in some sort of health-protective behaviors and socioeconomic status did not produce extensive differences in participation in healthy lifestyles.

These data suggested that increasing emphasis on the importance of health promotion and preventive practices and the emphasis on the individual's responsibility for his or her own health have contributed to the increase of preventive behaviors among all the social groups in the Western society. Social variables may be capable of influencing health behaviors, but these variables are also believed to work through the effects on individuals' belief systems and health motivations.

An unanswered question in existing research is whether SES has an equal impact on both primary preventive behaviors and secondary preventive behaviors. Do socioeconomic factors impact less on primary preventive behaviors than on secondary preventive behaviors?

The focus of this study, accordingly, is to relate the two sets of behaviors to the sociodemographic factors and to determine if these factors affect health-related behaviors. First, we ask if there are any patterns among these preventive behaviors. Are those

who participate in primary preventive activities also likely to engage in secondary preventive care? Second, among the sociodemographic variables, which ones significantly affect the health preventive behaviors? Finally, we ask if socioeconomic variables impact more on secondary preventive behaviors than on primary preventive behaviors.

Chapter Summary

In this chapter, the literature relevant to the current study was reviewed. The first part of the chapter focused on conceptualization and the criteria of secondary preventive behaviors. The second part of chapter discussed the sociodemography of health-related behaviors from the standpoint of age, sex, socioeconomic status, and ethnicity. Since it emerged in the beginning of this century, the concept of routine health checkups has drawn great attention. Many clinical trials and studies proved the effectiveness of routine health checkups in reducing the incidence and severity of certain chronic diseases. The American Medical Association, as well as other institutions, recommend that routine health checkups vary in content and frequency depending on age, sex, and other risk factors. Because of the high cost of medical care and the limited coverage by medical insurance, cost becomes a major barrier among people of limited resources. Gender differences in health-related behaviors exist for risk behaviors and accidents, preventive care, seeking treatment and self treatment. These differences were

provided with theoretical explanations. As for age differences, the increased life expectancy impacts the patterns and levels of utilization of medical care services. The aged, however, are less likely to receive preventive care than younger age groups due to the high cost and limited coverage from Medicare. The differences in socioeconomic status for individuals not only influence people's life chances, but also influence their preventive behaviors and access to medical care. People with low socioeconomic status and people in minority groups are less likely to adopt healthy lifestyles and other preventive behaviors. The literature review also disclosed the cognitive aspect of health culture among ethnic groups. The studies and observations indicated that health-related behaviors should be understood within the context of culture and health culture from cognitive points of view. The last section of the chapter emphasized the effectiveness of health promotion and disease prevention campaigns through the mass media and other related field. Primary preventive behaviors have become popular among all the social groups in the Western society.

CHAPTER III

DESIGN AND METHODOLOGY

Research Method

In this section, the methods and procedures for this study will be discussed. The section also includes descriptions of the research data, measurement of the variables, and the statistical analysis.

The research was a secondary analysis of data collected in 1990 by the Behavioral Risk Factors Survey (BRFS), a project sponsored by the Michigan Department of Public Health and conducted by the Kercher Center for Social Research at Western Michigan University. Michigan is one of 44 states that participated in the BRFS. The telephone survey was designed to assess the prevalence of high-risk health-related behaviors and practices such as lack of exercise, smoking, obesity, and alcohol use. Since 1987, the Michigan BRFS has conducted 2400 telephone interviews annually.

Sampling

The 1990 survey sampling followed the Waksberg methodology which involves a three-stage cluster design (Waksberg, 1978). In the first stage, a primary sampling unit (PSU) was drawn consisting of an area code, a three-digit prefix, and the first two of the last four numbers. Each PSU represented one hundred potential telephone numbers. In the second stage, complete ten-digit numbers were randomly

selected from each PSU. If the first dialing was a business number, the primary sampling unit would be dismissed. If the first number was a residential number, the PSU was kept. In the third stage, when a residential number was successfully reached, an adult member of the household was randomly selected for the telephone interview. Telephone interviews were conducted at the time when people were more likely to be home, primarily in the evenings on weekdays and in the late morning and early afternoon on weekends.

Representativeness of the Sample

In order to avoid overrepresenting or underrepresenting segments of the population, weights were calculated so that the sample would more closely approximate the Michigan population as a whole. There were two steps to complete the procedure--calculation of the initial unadjusted weight and the adjustment with a post-stratification factor (Michigan Department of Public Health, 1992). In the first step, each case in the unadjusted data was assigned a weight based on the probability of selection. This weight was the number of adults in the household multiplied by the reciprocal of the number of phone lines in the household, multiplied by the ratio of the expected number of records in the cluster, divided by the actual cluster size. In the second step, the initial weight was adjusted by using the 1989 intercensal Michigan population estimates for age, sex, and race. The procedure included some adjustments for missing data. For example, for respondents who refused to report their age, the value 31

(the average age in the United States) was entered; if respondents refused to answer the race question, race was recoded to "other."

Description of the Data

The sample of the 1990 Michigan BRFS consisted of 2400 Michigan adults, 18 years and older. A total of 200 individuals were interviewed by telephone each month from January through December. The interviews followed the Centers for Disease Control Protocol (BRFSS Operation Manual 1989) and were conducted by the Kercher Center for Social Research at Western Michigan University under contract with the Michigan Department of Public Health. Initial data management was performed by the Kercher Center, but weighting of these data was conducted within the Injury Research and Control Section of the Center for Health Promotion and Chronic Disease Prevention of the Michigan Department of Public Health.

The questionnaire consisted of two parts--the core questions and additional questions. The core items were developed by the Centers for Disease Control (CDC) and included questions on safety belt usage, high blood pressure, leisure-time physical activity, cigarette smoking, alcohol consumption, routine health checkups, blood cholesterol tests and levels, and standard demographic questions. Forty-four states and the District of Columbia participated in the 1990 BRFS, and all of them used the same core questionnaire. In addition to the core questions, Michigan also added its own questions which included beliefs and opinions about organ donation, knowledge and

attitudes about AIDs, screening mammography, clinical breast examination, treatment and management of diabetes, and screening for cervical cancer.

Operationalization of Variables

Operationalization is the process specifying empirical measurements for given concepts. The preventive behaviors were operationalized in a series of questions that drew distinctions between primary and secondary preventive behaviors.

The primary preventive behaviors consisted of seven variables: use of seat belts, exercise, active or sedentary lifestyles, smoking, drinking, drinking and driving, and body mass index. The secondary preventive behaviors included blood cholesterol checkup and general routine health checkup and, for females, mammogram test, breast physical exam, and Pap smear.

Primary Preventive Behaviors

Exercise was measured by the question: "During the past month, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise?" The answer was coded as (1) yes and (2) no.

Active or Sedentary lifestyle: Respondents who reported engaging in leisure-time physical activities for 20 minutes or more, three or more times per week were categorized as active. Conversely, those who reported doing no leisure-time physical activities during the

previous month were categorized as having a sedentary lifestyle. Those who reported doing some kind of exercise, but less than twenty minutes per session or fewer than three times per week, were considered as engaging in irregular exercise (Michigan Department of Public Health, 1992). The question was coded as (1) sedentary, (2) irregular, and (3) active.

Using seat belts was measured by the question: "How often do you use seat belts when you drive or ride in a car?" The answer was coded as (1) never, (2) seldom, (3) sometimes, (4) nearly always, and (5) always.

Drinking status was measured by the following question: "Considering all types of alcoholic beverages, that is, beer, wine, wine coolers, cocktails, and liquor, as drinks, how much did you drink in the past month?" The answer was coded as (1) abstainer, (2) light, (3) moderate, and (4) heavy. Heavy drinking was defined as a consumption of five or more alcoholic drinks per day; moderate drinking for women was defined as one or fewer drinks per day and moderate drinking for men continued to be defined as two or fewer drinks per day (Michigan Department of Public Health, 1992). Light drinking, in turn, was defined as less than one drink per day or occasion of drinking.

Drinking and driving was measured by the question: "During the past month, have you driven when you've had perhaps too much to drink?" The answer was coded as (1) no drinking and driving and (2) drinking and driving.

Smoking status was measured in terms of the question: "Now I'd like to ask you a question about cigarette smoking. Do you smoke cigarettes now?" The answer was coded as (1) current smoker, (2) former smoker, and (3), non-smoker.

Body Mass Index Category: The weight status of the respondents in this study was defined as the body mass index (BMI), which was calculated by dividing weight in kilograms by the square of height in meters. BMI is one method used to adjust body weight for height to derive a height-free measure of weight, and it has been used to measure the weight status of the Michigan adult population in the BRFS survey since 1988 (Michigan Department of Public Health, 1992). The definition of overweight used in this study was a BMI greater than or equal to the 85th but less than the 95th percentile; and very overweight was defined as a BMI greater than or equal to the 95th percentile. That was overweight greater than or equal to 27.8 Kg/m square for men and 27.3 Kg/m square for women. The cut-off points used to define very overweight approximated 31.1 Kg/m square and 32.3 Kg/m square for men and women, respectively. Similarly, underweight was defined as a BMI greater than the 5th percentile (males 20.7 Kg/m square, females 17.9 Kg/m square) but less than or equal to the 15th percentile (males 20.7 Kg/m square, females 19.1 Kg/m square). Very underweight was defined as less than or equal to the 5th percentile. Ideal weight was then defined as weight between the 15th and the 85th percentiles of the BMI (Michigan Department of Public Health, 1992). The answer to this question was coded as (1) very underweight,

(2) underweight, (3) ideal weight, (4) overweight, and (5) very overweight.

Secondary Preventive Behaviors

Use of routine checkup was measured by the question: "Some people visit a doctor for a routine checkup, even though they are feeling well and have not been sick. About how long has it been since you last visited a doctor for a routine checkup?" The answers were coded as (1) never, (2) more than five years ago, (3) within the past five years, (4) within the past two years, and (5) within the past year.

Use of blood cholesterol checkup was measured by the question: "About how long has it been since you last had your blood cholesterol checked?" The answers was coded as (1) more than five years ago, (2) within the past five years, (3) within the past two years, and (4) within the past year.

Use of mammogram was measured by the question: "About how long has it been since you had your last mammogram?" The coding categories was (1) more than five years ago, (2) within the past five years, (3) within the past two years, and (4) within the past year.

Use of breast physical exam was measured in terms of the questions: "About how long has it been since your last breast physical exam?" The answer was coded as (1) more than five years ago, (2) within the past five years, (3) within the past two years, and (4) within the past year.

Use of Pap smear was measured by the question: "How often do you get a Pap smear?" The answer is coded as (1) no regular time period, (2) every 3 years, (3) every 2 years, (4) once a year, and (5) every six months.

The independent variables in this study were selected demographic characteristics and SES variables, including race, sex, age, income, education, marital status, and employment status. The measurements of these variables are described below.

Education level was measured by the question: "What is the highest grade or year of school you completed?" The answer was coded as (1) eighth grade or less, (2) some high school, (3) high school graduate or GED certificate, (4) some technical school, (5) technical school graduate, (6) some college, (7) college graduate, and (8) post grad or professional degree.

Race: Due to the small number of cases in the non-white categories, Black, Hispanic,Asian, Pacific islander, Aleutian, American Indian, and other races were all combined into one category. Race was coded as (1) white and (2) black and other.

Sex was coded as (1) male and (2) female.

Age was measured by the question: "How old were you on your last birthday?" The answer was coded in actual years.

Income was measured in the following question: "Which of the following categories best describe your annual household income from all sources?" The answer was coded as (1) less than $10,000, (2) $10,000 to $15,000, (3) $15,000 to $20,000, (4) $20,000 to $25,000,

(5) $25,000 to $35,000, (6) $35,000 to $50,000, and (7) over $50,000.

Employment Status: Due to the small number of respondents in the unemployed categories, any statuses other than employment status were all coded into one category, which included self-employed, out of work for more than one year, out of work for less than one year, homemaker, student, and retired. Thus, employment status was coded as (1) employed for wages and (2) other.

Marital Status: Due to the small numbers of respondents in the nonmarital categories, divorced, widowed, separated, never married, and unmarried couples were all combined into one category. It was coded as (1) married and (2) other.

Screening Data

Prior to statistical analyses, the variables chosen in the study were examined through various SPSSx programs for missing data, scope of distribution, ratio of cases to independent variables, outliers, and normality and linearity.

The ratio of cases to independent variables has to be adequate to meet the requirements for multiple regression and canonical analysis. With seven independent variables and a data set ranging from 475 to 2350 respondents, the case-to-independent variable ratio was at least 85:1, which was well above the minimum requirement of the two tests.

Missing data are a common problem in data analysis. Since it was a relatively large sample and only a few data points were

missing, the missing data were treated as missing values and were simply excluded from the analysis.

Outliers are cases with such extreme values on one variable or a combination of variables that they substantially influence summary statistics. In this study, the problem of outliers was detected through the graphical method. Any dichotomous variable with 9-1 splits between categories was defined as an outlier (Tabachnick & Fidell, 1989). According to this criterion, all the dichotomous variables (race, marital status, employment status, sex, and exercise) were retained in the analysis, although the worst split was found in RACE categories (with 2072 to 317 or roughly a 6 to 1 ratio).

Multivariate outliers were examined as a part of a SPSSx REGRESSION analysis in which the Mahalanobis distance of each case to the centroid of all cases was computed. Mahalanobis distance was treated as a chi square distribution with degrees of freedom equal to the number of independent variables. If a value of any case was larger than the value of the critical chi square at the alpha level at .001 for the degree of freedom, the case was determined to have multivariate outliers. Through this process, only one variable (Mammogram age 40 years and over) was considered as a multivariate outlier. It contained ten cases with a Mahalanobis distance greater than the critical chi square value (20.515), but the ten cases were retained in the analysis due to the consideration that the sample size was large enough (474 cases) that the multivariate outliers would not have

much influence in the analysis.

Multivariate normality requires that each variable and all linear combinations of the variable be normally distributed. When this assumption is met, the residuals in the analysis are also normally distributed and independent. If a distribution is normal, the values of skewness and kurtosis are approximately zero. In this analysis, two variables were found to have a stronger skewness than others: RACE with skewness of 2.17 and kurtosis of 2.22; TIME FOR CHECKING BLOOD CHOLESTEROL with skewness of 2.10 and kurtosis of 3.10. The decision was made to retain the existing variables, due to the relatively weak skewness and the large sample size. With a large sample, the significance of skewness and kurtosis are not as important.

Statistical Analysis

In this study, product-moment correlation, multiple regression, and canonical correlation analyses were selected as the major techniques of analyses. Bivariate correlation analysis was utilized to measure the size and direction of the relationship between pairs of variables. The value of r ranges between -1.00 and +1.00 where .00 represents no monotonic relationship between two variables. In the multiple regression analysis, stepwise regression was chosen to test the impact of sets of independent variables on every dependent variable. In the procedure, each independent variable was added one at a time if it met the statistical criteria, and was subject to deletion

at any step when it no longer contributed significantly to the regression. This statistical approach was useful in identifying variables that predicted the dependent variables.

In canonical correlation, there are several variables on both sides of the equation. Sets of variables on each side were combined to produce, for each side, a predicted value that had the highest correlation with the predicted value on the other side. The combination of variables on each side was a dimension that relates the variables on one side to the variables on the other. Using canonical analysis, one can measure how much variance the canonical variates from the independent variables extract from the dependent variables, or vice versa. Therefore, one could decide how the canonical variate from the demographic/socioeconomic variables extracts the variance in judgments of the primary preventive behaviors or the secondary preventive behaviors.

In this study, all the dependent variables were treated as interval variables although most of them were ordinal variables. Due to the small number of cases, the nominal variables, including race, employment status, and marital status, were treated as dichotomous variables. For example, in the race categories, Black, Hispanic, Asian, American Indian, and other races were all combined into one category. Race, thus, was coded as white and nonwhite. For the employment status, any status other than employment status was all coded into one category which included self employed, out of work for more than one year, out of work for less than one year, homemaker,

student, and retired. Finally, marital status was coded as married and others. In the survey year, the respondents who were divorced, widowed, separated, never married, and unmarried couples were included in the "other" category.

Figure 1 provides a summary or flow diagram of statistical procedures for screening data and building statistical models of the study. The statistical analyses and findings are presented in the next chapter.

Chapter Summary

In this chapter the research methods and procedures were discussed. The study was a secondary data analysis based on a telephone interview survey developed and conducted by the Michigan Department of Public Health and the Kercher Center for Social Research at Western Michigan University. Data collection, the size of the sample, the weighting procedure, the measurement of validity and reliability, screening of data, and operationalization of the variables were also described. The principal statistical techniques used in this study were product-moment correlation, stepwise regression, and canonical correlation.

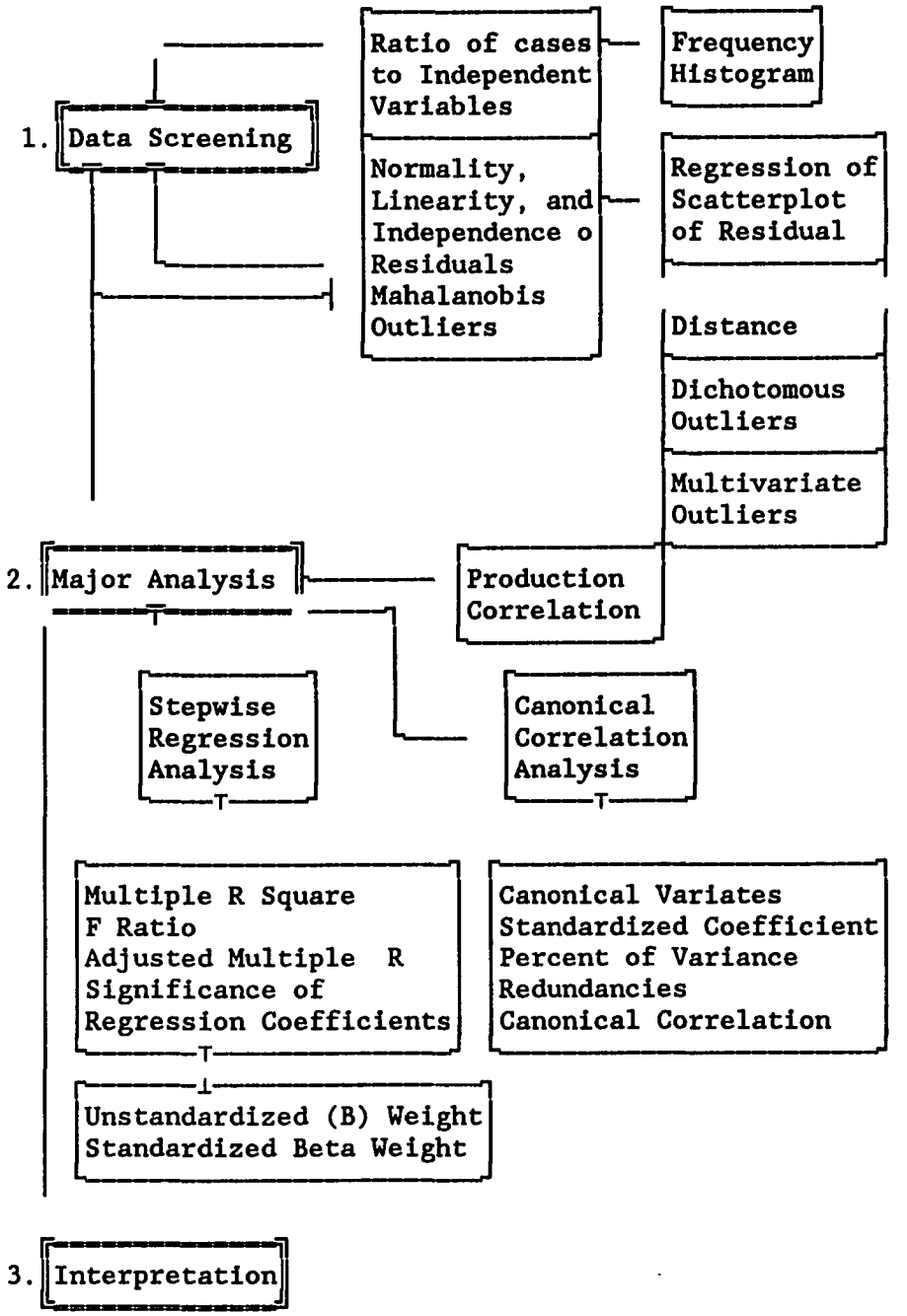

Figure 1. Flow Diagram of Statistical Model.

CHAPTER IV

THE FINDINGS

Description of the Sample

Socio-demographic characteristics of the respondents are presented in Table 4. Among the respondents, 47.8% were male and 52.2% female; the racial composition was 86.7% white and 13.3% non-white. Respondents included 61.4% who were married and 38.6% who were in the other status category including divorced, separated, widowed, and unmarried. Respondents who were employed in the survey year accounted for 53.9% of the sample and the unemployed for 46.1%. The unemployed included the unemployed, homemakers, students, and retired. Age ranged from 18 to 65 years and older with a mean of 43.5. Mean family income in 1990 was $27,500 and the mean level of education was 14.5 years.

The description of preventive behaviors is presented in Table 5 and Table 6. As for the primary preventive behaviors, 61% of the Michigan respondents reported using safety seat belts very often when driving compared to 42% nationally in 1988 (U.S. Department of Health and Human Service Public Health Service, 1992). In terms of exercise and active lifestyle, 67.6% of Michigan respondents did exercise during the past month of the survey year, 32.4% adopted an active lifestyle; and 41.9% engaged in no leisure-time physical activity. A cigarette smoker was defined as a person who has smoked at least

100 cigarettes and currently smokes cigarettes (U.S. Department of Health and Human Service Public Health Service, 1992).

Table 4

Characteristics of Respondents

	%	f
Gender		
Male	47.8	1145
Female	52.2	1250
Race		
White	86.7	2072
Black and others	13.3	316
Marital Status		
Married	61.4	1469
Not married	38.6	923
Employment Status		
Employed-wages	53.9	1287
Unemployed	46.1	1103
Age		
18-24 yrs old	15.2	365
25-34 yrs old	22.8	545
35-44 yrs old	19.6	470
45-54 yrs old	14.2	340
55-64 yrs old	12.0	288
65+ yrs old	16.2	388
Income		
Less than $10,000	14.1	294
$10,000-19,999	20.2	421
$20,000-35,000	28.5	596
$35,000 and over	37.2	778
Education		
Less than High Sch	16.9	403
High School Grad.	37.0	886
Some College	27.6	660
College Grad.	18.5	443

Table 5

Percentage of Respondents Practicing Primary Preventive Behaviors

		%	f
Smoking:	Current smoker	45.3	1085
	former smoker	25.5	610
	Non-smoker	29.2	698
Drinking:			
	Abstainer	47.6	1122
	Light	29.0	683
	Moderate	17.7	418
	Heavy	5.7	135
Drinking & driving:			
	Abstainer	47.0	1122
	No Drinking & driving	49.8	1189
	Drinking & driving	3.3	78
Safety seat belts:			
	Always	61.0	1454
	Nearly always	17.9	427
	sometimes	10.7	256
	Seldom	4.8	114
	Never	5.6	134
Exercised during the past month:			
	No exercise	32.4	776
	Exercise	67.6	1619
Active or Sedentary lifestyle:			
	Active lifestyle	32.4	776
	Irregular	25.7	614
	Sedentary lifestyle	41.9	1004
Body Mass Index Category:			
	Ideal weight	67.6	1566
	Overweight	17.2	400
	Very overweight	9.3	216
	Underweight	5.9	137

Table 6

Percentage of Respondents Practicing Secondary Preventive Behaviors

	%	f
Both Males and Females		
Time of last routine Health checkup:		
Never	1.6%	39
More than 5 years 7.6%	182	
Within 5 years	8.9%	212
Within 2 years	14.5%	345
Within year	67.3%	1603
Time of last checked blood cholesterol:		
More Than 5 years	1.6%	24
Within 5 years	5.7%	87
Within 2 years	15.5%	239
Within year	77.2%	1186
Females		
Time of last mammogram:		
More than 5 years	5.5%	35
Past 5 years	12.0%	76
Past 2 years	16.9%	107
Past year	65.6%	414
Time of last breast examination:		
More than 61 months	4.4%	51
25-60 months	7.6%	87
13-24 months	12.1%	138
0-12 months	75.8%	865
When last Pap smear:		
More than 60 months	7.8%	90
36-60 months	5.7%	66
25-36 months	5.1%	60
13-24 months	12.2%	143
0-12 months	69.3%	808
Frequency get Pap smear:		
No regular time	18.5%	212
Every 3 years	3.2%	37
Every 2 years	8.0%	91
Once a year	60.2%	692
Every 6 months	10.2%	117

By late 1987, smoking prevalence for the U.S. population aged 20 andolder was 29%, much less than that found in the current survey (45.3%).

About half (52.4%) of Michigan adults consumed alcohol in the month prior to the survey, and only 5.7% were heavy drinkers. Among the respondents who drank, 3.3% reported they were drinking and driving. Comparison with the 1989 Michigan BRFS alcohol usage indicated that the proportion of the population reporting current alcohol use remained relatively steady in 1989 (54.4%) and 1990 (Michigan Department of Public Health, 1992). The prevalence of heavy drinkers in Michigan is 1989 BRFS was 6.4%, which was higher than the current figures (Michigan Department of Public Health, 1992).

As for weight status, 26.5% of respondents were considered overweight, which was slightly higher than the national prevalence of overweight from both the 1985 National Health Interview Survey (23.9%) and the 1976-80 National Health and Examination Survey (26%) (U.S. Department of Health and Human Service, 1992).

Secondary preventive measures included the routine health checkups and the necessary screening appropriate for age and gender, as recommended by the U.S. Preventive Service Task Force (Vanderschmdt, 1987). In this study, secondary preventive behaviors included routine health checkups and blood cholesterol checkups, as well as screening tests applying to female respondents (mammogram, Pap, and clinical breast physical examination--Table 6). As for routine health checkups, 67.3% of the respondents received their last routine medical checkups within the survey year and 64.5% had checked blood

cholesterol. The proportion of blood cholesterol checkups was higher than the proportion in the Cholesterol Awareness Survey of 1988 that found 59% of people aged 18 and older had ever had their cholesterol checked (Michigan Department of Public Health, 1991). The national target in 2000 is that at least 75% of adults will have had their blood cholesterol checked within the preceding five years (U.S. Department of Health and Human Service, Public Health Service, 1992).

The U.S. Preventive Service Task Force (1979) recommended certain screening tests for females (depending on age) which included mammogram, clinical breast examination, and Pap smear. Comparison with the 1985 National Health Interview Survey (NHIS) indicated a strong increasing trend in women receiving the Pap smear test and clinical breast examination. For instance, nearly all female respondents (91.8%) reported that they had a breast physical examination at some point as compared with only 50.3% of NHIS data. Also, 94.6% of females had a Pap smear at some earlier time and about two-thirds of them received the test within a year of the survey, compared with 45.6% of the respondents who had received a Pap smear test in 1985 NHIS data (Michigan Department of Public Health). Finally, 65.6% of Michigan female participants had received a mammogram prior to the survey. Most of them (80.2%) took the test for routine check-up and at their doctors' recommendation (73%).

Bivariate Relationships

In this analysis, the Pearson product-moment correlation was used to measure the size and direction of the relationships between pairs of variables.

As may be seen in Table 7, particularly significant positive correlations were found between males and smoking (.13), males and drinking (.28), and males and drinking and driving (.21). A significant negative correlation was found between males and use of seat belts (-.16). Male gender was positively correlated with exercise and active lifestyle (.05).

Bivariate relations with the preventive behaviors suggested that older people were more likely to use seat belts (.13), receive routine health checkups (.13), have blood cholesterol checkups (.11) and mammograms (.23). Age was negatively associated with Pap smear (-.25), drinking and driving (-.20), clinical breast examinations (-.08), drinking (-.17), exercise (-.13), and active lifestyle (-.11).

Only a few weak to moderate correlations were found between socioeconomic variables and preventive behaviors. Socioeconomic variables were significantly correlated only with exercise and active lifestyle in general (.20 with education, .18 with income, and .09 with employment status) and with Pap smear and clinical breast examination for females. For example, positive correlations were found for Pap smear and education (.08), Pap smear and income (.09), and Pap smear and employment status (.14). Also the bivariate

Table 7

Correlation Coefficient, Means, and Standard Deviation for the Major Measures

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	1	1.00																			
2	.01	1.00																			
3	.20	.08	1.00																		
4	.09	.23	.03	1.00																	
5	.04	.17	.02	.05	1.00																
6	.38	.35	.17	.37	.14	1.00															
7	.21	-.41	.07	-.19	-.05	-.14	1.00														
8	-.01	.18	-.07	.14	*	.12	-.25	1.00													
9	-.05	.14	-.11	.08	*	.09	-.25	.56	1.00												
10	-.00	-.08	-.10	-.06	-.15	-.04	.13	.39	.33	1.00											
11	-.02	-.08	-.06	-.09	-.08	-.08	.11	.18	.11	.40	1.00										
12	-.01	.04	.03	-.17	.13	-.00	-.04	-.09	.01	-.06	-.03	1.00									
13	-.03	.17	.06	.17	.21	.17	-.20	.05	.05	-.06	-.06	.17	1.00								
14	-.01	-.01	-.00	-.04	.03	-.04	.09	-.05	-.05	.03	.01	-.03	-.05	1.00							
15	-.04	.18	.07	.14	.28	.17	-.17	.03	.03	-.08	-.05	.22	.85	-.05	1.00						
16	.17	-.02	.07	.16	-.16	.11	.13	.02	-.01	.07	.03	-.17	-.09	.00	-.14	1.00					
17	.02	.09	.04	.20	.05	.18	-.13	.07	.01	-.01	-.04	-.07	.09	-.07	.09	.06	1.00				
18	.02	.09	.04	.20	.05	.18	-.11	.07	.00	-.03	-.03	-.09	.08	-.06	.08	.06	.89	1.00			
19	.09	-.01	.07	.01	*	-.03	.18	.40	.22	.31	.25	-.11	-.03	.07	-.06	.10	.07	.09	1.00		
20	.01	-.04	-.03	-.04	*	-.02	.23	.03	-.01	.16	-.00	-.11	-.06	.10	-.07	.09	.09	.08	.19	1.00	
21	-.01	.09	-.01	.09	*	.03	-.08	.66	.47	.53	.33	-.10	.02	.06	.01	.03	.04	.03	.59	.09	1.00
X	.61	.58	1.15	4.37	.48	4.55	43.49	4.30	3.40	4.38	3.68	1.84	1.56	1.21	1.81	4.24	.68	2.10	3.42	.81	3.59
S.D.	.49	.50	.45	2.06	.50	2.31	17.75	1.26	1.27	1.03	.65	.85	.56	.41	.92	1.17	.47	.86	.90	.40	.81
N	2393	2390	2388	2395	2395	2088	2395	1166	1149	2380	1535	2392	2389	2318	2356	2385	2395	2395	631	631	1141

*** Applying only to women**
Bold: p<.05
Underline: p<.01 (2-tailed)

relationships between clinical breast examination and education (.09) and employment status (.09) were weakly positive. Socioeconomic variables were found significantly and negatively correlated with routine health checkups (-.08 with employment status and -.06 with education) and blood cholesterol checkup (-.08 with employment and -.09 with education). Smoking was negatively associated with education (-.17) but shared no relation to employment status (.04) and income (.00).

Table 7 also demonstrates which preventive behaviors are intercorrelated. For instance, in the category of primary preventive behaviors, smoking and drinking were significantly correlated (.22). In the category of secondary preventive behaviors, the higher covariates were Pap smear with mammogram (.40), routine health checkup with Pap smear (.39), clinical breast examination with Pap smear (.66), and routine health checkups with clinical breast examination (.53).

Another important finding from the examination of the bivariate relationships was the weak relationship between the two major sets of variables--primary preventive behaviors and secondary preventive behaviors. Most of these correlations were unexpectedly low. All the correlations between primary and secondary preventive variables were less than .1.

Finally, bivariate associations among sociodemographic variables were generally in the expected direction. For example, the data show a positive relation between education and income (.37), between

employment and income (.35), between marital status and income (.38), between employment and education (.24), between race and income (.17), between race and education (.03), and between race and employment (.08). Negative associations were also found between age and employed status (-.41), and between age and education (-.09).

Stepwise Regression Test

Stepwise regression is one of the major analytic strategies that allows one to assess the relationships between one dependent variable and several independent variables. Since the decisions about which independent variables are included or omitted from the equation are based on statistics computed from the sample, the results of regression analysis represents the best prediction of dependent variables from the given independent variables. The test is essentially a measure of explained variance to determine the effect of one or a combination of predictor variables and their relative strengths. In this instance, by using multiple regression analysis, one can determine how much the variance in the social variables accounts for the variance in the health preventive behaviors.

Stepwise regression analysis was performed using SPSSx REGRESSION for each of the health measures. Included in the regression analysis were measures of independent variables (age, race, gender, marital status, household income, education, and employment status) and the various dependent variables (primary and secondary preventive behaviors). The stepwise regression was conducted in three phases.

In the first phase, the test was conducted between seven independent and seven dependent variables. In the second phase, the dependent variables of secondary preventive behaviors were tested with the independent variables. Finally, since certain secondary preventive variables only applied to females, an analysis of female respondents was conducted to examine the cause of seeking routine health check-ups.

Primary Preventive Behaviors

The primary preventive variables included using safety seat belts, smoking, drinking, drinking and driving, exercise, active lifestyle, and a body mass index. The independent variables included: Education, household income, employment status, age, race, gender, and marital status.

Table 8, which presents the regression results for using safety seat belts, displays the unstandardized regression coefficients (B), standardized regression coefficients (Beta), the multiple Rs and R Squares. Four of the independent variables (education, sex, age, and marital status) contributed significantly to the use of seat belts. Education entered the equation first and marital status was the final entry. Altogether, 9% of the variance in using seat belts was predicted by the four independent variables.

Table 9 displays the multiple regression solution for smoking status. Four independent variables (education, sex, age, and household income) contributed to the prediction of smoking status.

Table 8

Multiple Regression Solution for Using Seat Belts

	R	R Square	B	Beta
1. Education	.17	.03	.20	.17*
2. Sex	.24	.06	-.39	-.17*
3. Age	.28	.08	.11	.15*
4. Marital Status	.31	.09	.29	.12*

F (4,2065)=53.43, p = .0000

*Significant at .05 level
Sex: Male=1, Female=0
Marital Status: Married=1, Others=0

Table 9

Multiple Regression Solution for Smoking Status

R	R Square	B	Beta	
1. Education	.19	.04	-.16	-.19*
2. Sex	.22	.05	.20	.18*
3. Age	.24	.06	-.05	-.09*
4. Income	.24	.06	.04	.06*

F (4,2072)=32.70, P = .0000

*Significant at .05 level
Sex: Male=1, Female=0

Education entered the equation first and household income was the final entry. Only 6% of the variance in smoking status was predicted

by the independent variables.

A stepwise regression was performed between drinking status and the seven independent variables. Table 10 shows that after the final entry, with six independent variables (sex, age, household income, marital status, race, and education) in the equation, the independent variables accounted for 13% of the variance in drinking status.

Table 10

Multiple Regression Solution for Drinking Status

	R	R Square	B	Beta
1. Sex	.28	.08	.52	.28*
2. Age	.32	.10	-.09	-.06*
3. Income	.34	.11	.10	.11*
4. Marital Status	.35	.12	-.18	-.09*
5. Race	.36	.13	.21	.08*
6. Education	.36	.13	.06	.06*

F (6,2043)=51.88, P = .0000

*Significant at .05 level
Sex: Male=1, Female=0
Marital Status: Married=1, Others=0
Race: White=1, Others=0

A stepwise regression was performed between drinking and driving status and the independent variables. Table 11 shows that six independent variables contributed significantly to the prediction of drinking and driving status. However, the addition of marital status

and race did not result in improvement of the R Square. By the end, 11% of the variance in drinking and driving status was predicted by the six independent variables.

Table 11

Multiple Regression Solution for Drinking and Driving Status

	R	R Square	B	Beta	
1. Age		.21	.05	-.07	-.21*
2. Sex		.29	.08	.22	.20*
3. Income		.32	.10	.07	.13*
4. Education		.33	.11	.05	.09*
5. Marital Status		.33	.11	-.08	-.07*
6. Race		.34	.11	.10	.06*
F (4,2067)=44.54, P = .0000					

* Significant at .05 level
Sex: Male=1, Female=0
Marital Status: Married=1, Others=0
Race: white=1, Others=0

Table 12 presents the multiple regression for exercise and the independent variables. Only three independent variables (education, income, and age) were significantly related to exercises and they only accounted for 6% of the variability in exercise.

Table 13 displays the result for active or sedentary life style. Here too, three independent variables (education, income, and age) significantly predicted active or sedentary lifestyle, but they only

Table 12

Multiple Regression Solution for Exercise

	R	R Square	B	Beta
1. Education	.19	.04	.09	.19*
2. Income	.23	.05	.06	.13*
3. Age	.25	.06	-.03	-.10*
F (3,2075)=44.53, P = .0000				

* Significant at .05 level

Table 13

Multiple Regression Solution for Active or Sedentary Life Style

	R	R Square	B	Beta
1. Education	.19	.04	.17	.19*
2. Income	.22	.05	.10	.12*
3. Age	.23	.05	-.04	-.08*
F (3,2075)=40.11, P = .0000				

* Significant at .05 level

accounted for 5% of the variance.

Body Mass Index Category was the last of the primary preventive behaviors in the analysis. Table 14 indicates that only 4% of the variance in Body Mass Index category was predicted by the seven independent variables.

Table 14

Multiple Regression Solution for Body Mass Index

	R	R Square	B	Beta
1. Age	.18	.03	.05	.18*
2. Sex	.19	.04	.05	.06*
3. Income	.20	.04	-.02	-.06*
F (3,2015)=28.05, P = .0000				

* Significant at .05 level
Sex: Male=1, Female=0

Secondary Preventive Behaviors

Secondary preventive behaviors in this study included routine health checkups, blood cholesterol checkups, mammogram (2 measures), clinical breast examination, and Pap smear (2 measures). A stepwise regression was performed for each of the secondary preventive measures.

Table 15 displays the result for the routine health checkup measure. Three independent variables, sex, age, and race, were included, but altogether they only explained 5% of the variance in routine health checkups.

Table 16 shows the stepwise solution for blood cholesterol checkups. Five independent variables (age, income, education, race, and sex) predicted 19% of the variance in blood cholesterol checkups.

Stepwise multiple regressions were also conducted for each of

Table 15

Multiple Regression Solution for Routine Health Checkup

	R	R Square	B	Beta
1. Sex	.16	.03	-.33	-.16*
2. Age	.20	.04	.08	.12*
3. Race	.23	.05	-.31	-.10*

F (3,2062)=36.64, P = .0000

* Significant at .05 level
Sex: Male=1, Female=0
Race: White=1, Others=0

Table 16

Multiple Regression Solution for Ever Checked Blood Cholesterol

	R	R Square	B	Beta
1. Age	.37	.14	.11	.37*
2. Income	.41	.17	.08	.19*
3. Education	.42	.18	.04	.09*
4. Race	.43	.18	-.09	-.06*
5. Sex	.43	.19	-.06	-.06*

F (5,2032)=323.60, P = .0000

* Significant at .05 level
Race: White=1, Others=0
Sex: Male=1, Female=0

secondary preventive behaviors among female respondents. However, only the females who responded to the questions were included in the analysis. Therefore, the size of sample in each regression analysis varies.

Table 17 presents the regression solution for last Pap smear test. Four independent variables (age, education, race, and employment status) significantly predicted the receiving of the Pap smear test. Altogether, 9% of the variability in how recent was the Pap smear test was predicted by the independent variables.

Table 17

Multiple Regression Solution for Last Pap Test

	R	R Square	B	Beta
1. Age	.28	.08	-.21	-.28*
2. Education	.29	.09	.12	.09*
3. Employment Status	.30	.09	.17	.07*
4. Race	.31	.09	-.24	-.06*
F (4,992)=25.56, P = .0000				

* Significant at .05 level
Race: White=1, Others=0
Employment: Employed=1, Others=0

Table 18 displays the regression solution for frequency of Pap smear test. Only three of the independent variables (age, race and income) contributed significantly to predict frequency of Pap smear test, and altogether 10% of the variance in frequency of Pap smear

was predicted by the independent variables.

Table 18

Multiple Regression Solution for Frequency of Pap Test

	R	R Square	B	Beta
1. Age	.29	.09	-.23	-.29*
2. Race	.31	.09	-.36	-.09*
3. Income	.32	.10	.10	.08*
F (3,977)=36.30, P = .0000				

* Significant at .05 level
Race: White=1, Others=0

Table 19 presents the results for clinical breast examination. Two of the independent variables (education and age) significantly contributed to the prediction of clinical breast examination. Although R was different from zero, only 2% of the variance was accounted by the independent variables.

Table 19

Multiple Regression Solution for Clinical Breast Examination

	R	R Square	B	Beta
1. Education	.11	.01	.10	.11*
2. Age	.13	.02	-.03	-.07*
F (2,966)=8.34, P = .0003				

* Significant at .05 level

Table 20 shows the results for ever having a mammogram. Four of the independent variables (age, income, race, and employment status) were statistically significant. Altogether, 22% of the variability was predicted by the independent variables.

Table 20

Multiple Regression Solution for Ever Having a Mammogram

	R	R Square	B	Beta
1. Age	.44	.19	.13	.44*
2. Income	.45	.21	.06	.13*
3. Race	.47	.22	-.15	-.10*
4. Employment Status	.47	.22	.07	.07*
F (4,1035)=73.64. P = .0000				

* Significant at .05 level
Race: White=1, Others=0
Employment Status: Employed=1, Others=0

Table 21 displays the stepwise regression for timing of last mammogram. Only one independent variable (age) significant contributed to the prediction of the dependent variable, with only 2% of the variance.

In addition to the independent effects on mammogram test, the analysis also introduced the control for age to be compatible with the recommendation by the American Cancer Society (1988) of an initial mammogram for those between the ages of 35 and 40, a repeat every 1 or 2 years for next 10 years, and annual mammography after

50. In this procedure, the females who were aged 40 and older were selected in the analysis.

Table 21

Multiple Regression Solution for Time of Last Mammogram

	R	R Square	B	Beta
1. Age	.15	.02	.09	.15*
F (1,514)=11.62, P = .0007				

* Significant at .05 level

A stepwise multiple regression was performed with mammography as the dependent variable and socioeconomic indicators as independent variables among those 40 years and older. Table 22 indicates that only

Table 22

Multiple Regression Solution for Mammogram (Age 40 years and over)

	R	R Square	B	Beta
1. Education	.14	.03	.07	.14*
F (1,474)=8.95, P = .003				

* Significant at .05 level

education contributed significantly to prediction of mammography test for women 40 years of age and older. As a result, 3% of the

variability in Mammogram of the age group was predicted by knowing scores of the independent variable.

Comparison of Primary Preventive and Secondary Preventive Behaviors (Canonical Correlation Analyses)

In the previous section, stepwise regression was conducted for each of the health preventive variables with demographic/socioeconomic factors serving as the independent variables. However, the measurement only provided a series of solutions for the independent variables to predict each separate dependent variable. Regression tests do not make any contributions to questions about the extent to which a set of dependent variables could be predicted by a whole set of independent variables and what relative power a set of independent variables have to explain different relationships among different sets of dependent variables. Thus, it was necessary to add canonical analysis to the statistical measurement to compare the sets of preventive variables.

In canonical correlation, there are several variables on both sides of the equation. Sets of variables on each side are combined to produce, for each side, a predicted value that has the highest correlation with the predicted value on the other side. The combination of variables on each side is a dimension that relates the variables on one side to the variables on the other. Using canonical analysis, one can measure how much variance the canonical variates from the independent variables extract from the dependent variables, or vice versa. In canonical analysis, a variance is called a

redundancy (Tabacknick, 1989), which is the percent of variance extracted by a canonical variate times the canonical correlation for the pair. By measuring the redundancies, one can compare primary preventive behaviors with secondary preventive behaviors and decide if the socioeconomic variables have more impact on the secondary preventive behaviors than on the primary preventive behaviors.

With the use of BMDP6M (Dixon & Wilfrid, 1983), canonical correlation was performed in the three separate procedures. First, canonical correlation test was conducted between seven demographic/ socioeconomic and seven primary preventive variables. In the second procedure, canonical analysis included the same set of independent variables and two secondary preventive variables. Finally, certain secondary preventive items appropriate only for females were put into the test.

In the first run, the canonical analysis included age, race, marital status, sex, education, income, and employment status on the independent variables side, and exercise, active lifestyle, seat belt use, over weight, drinking, drinking and driving, and smoking on the dependent variables side. As a criterion, correlations between variables and variates in excess of .3 are interpreted (Tabachnick & Fidell, 1989). Therefore, only the first two pairs of canonical variates were the significant relationships between the two sets of variables. Table 23 shows correlations between the variables and the canonical variate, standardized canonical variate coefficients, redundancies, and canonical correlations.

Table 23

Major Measures of the Primary Preventive Variables and the Corresponding Canonical Variates*

	First Canonical Variates Correlation Coefficient		Second Canonical Variates Correlation Coefficient	
Socioeconomic Set				
Sex	.76*	.67	-.28	-.39
Income	.54*	.38	.51*	.23
Age	-.50*	-.34	.09	.32
Education	.43*	.17	.83*	.81
Employment Status	.38*	-.01	.11	.03
Marital Status	-.14	-.32	.36*	.20
Race	.06	.08	.04	-.03
Redundancy	.03		.02	Total=.05
Primary Preventive Set				
Drinking Status	.90*	.82	-.02	.16
Exercise	.43*	.30	.46*	.20
Active Lifestyle	.40*	.05	.47*	.22
Seatbelt Use	-.31*	-.21	.76*	.70
Over Weight	-.27	-.18	.03	.09
Drinking & Driving	.18	.02	-.05	-.04
Smoking	.16	-.02	-.57*	-.48
Redundancy	.03		.02	Total=.05

*Correlation between variables and variate in excess of .3 is interpreted.

The variables in the socioeconomic set associated with the first pair of canonical variates were education, income, employment status, age, and sex. Among the primary preventive variables, exercise, active lifestyle, drinking status, and seatbelt use correlated with the first canonical variate. The first pair of canonical variates reflected the congruence between demographic variables (age and sex)

and active lifestyle and the health risk behaviors (less seatbelt use and drinking), and also the congruence between high socioeconomic status and health risk behaviors. The second pair of variates clearly reflected the congruence between high socioeconomic status (income and education) and healthy lifestyles (exercise, seatbelt use, and less smoking). The interpretation of the first pair of canonical variates was not as clear as it was for the second pair. For instance, the variate revealed the correspondence between the demographic variables and health risk behaviors, but also high loading on the other congruence between high socioeconomic status and health risk variables as well. The first socioeconomic variate accounts for 3% of variance in primary preventive variables while the second socioeconomic variate accounts for 2% of the variance. Together, the two demographic/socioeconomic variates explained 5% of the variance in the primary preventive variables.

In the second procedure, canonical correlation analysis was performed between a set of demographic/socioeconomic variables and a set of secondary preventive variables including routine health checkups and blood cholesterol checkups. Only the first pair of canonical variates was reliable and interpreted. Data on the first pair of variables are presented in Table 24.

The variables in the socioeconomic set that were correlated in excess of .3 with the first canonical variate were sex, education, income, employment status, and age on the independent variable set with routine health checkups and blood cholesterol checkups

Table 24

Major Measures of Secondary Preventive Variables and the Corresponding Canonical Variates*

Canonical Variates	First Correlation Coefficient	
Socioeconomic Set		
Sex	-.65*	-.57
Education	-.64*	-.41
Age	.62*	.43
Income	-.60*	-.08
Employment Status	-.41*	-.04
Marital Status	-.23	-.10
Race	-.14	-.13
Redundancy	.01	
Secondary Preventive Set		
Routine Checkups	.87*	.67
Cholesterol Checkup	.79*	.53
Redundancy	.04	

*Correlation between variables and variates in excess of .3 is interpreted.

on the dependent variable set. The first canonical variate reflected the congruence between demographic variables and the secondary preventive variables that females (-.65) and older respondents (.62) tended to have more routine health checkups. Correspondence between socioeconomic variables and the secondary health behaviors was established in the opposite way that those with lower levels of education (-.64), lower income (-.60), and who were unemployed (-.43) tended to have more routine health checkups (.87) and blood

cholesterol checkups (.79). However, demographic/socioeconomic variate only accounted for 1% of the variance in the secondary preventive variables.

In the final procedure, canonical correlation analysis was conducted between a set of demographic/socioeconomic variables and a set of secondary preventive variables applying only to females. The secondary preventive variables included time of last mammogram, time of last clinical breast examination, time of last Pap smear, and frequency of Pap smears.

As Table 25 shows, only the first pair of canonical variates was reliable and interpreted. The variables in the socioeconomic set that related to the first canonical variate were age, race, employment status, education, and income. On the set of secondary preventive variables, time of last mammogram, time of last Pap smear, and frequency of Pap smears were associated with the first canonical variate. The first pair of canonical variates indicated that those older (.94), white (.42), unemployed (-.42), less educated (-.36), and lower income (-.35) tended to have fewer Pap smears (-.64), but more mammograms (.41). As for redundancies, demographic/socioeconomic variate accounts for 3% of the variance in the secondary preventive variate.

Table 26 summarizes and compares the redundancies from all the canonical correlation tests. First, certain demographic/socioeconomic variables explained the primary preventive and secondary preventive behaviors but the redundancy levels in the three tests were so low that

Table 25

Major Measures of Secondary Preventive Variables and the Corresponding Canonical Variates (for Female Respondents)*

	First Canonical Variates Correlation Coefficient	
Socioeconomic Set		
Age	.94*	.84
Employment Status	-.42*	-.01
Race	.42*	.31
Education	-.36*	-.08
Income	-.35*	-.13
Marital Status	.01	.14
Redundancy	.03	
Secondary Preventive Set		
Frequency Pap Test	-.64*	.67
Last Pap Smear Test	-.64*	.53
Last Mammogram Test	.41*	.67
Last Breast Exam.	-.11	.53
Redundancy	.03	

*Correlation between variables and variates in excess of .3 is interpreted.

they had less predicting power in the interest direction. Second, while the relationships between certain demographic variables and health risk factors was established from the canonical variate, the tests also suggested that considerable similarity existed among socioeconomic groups involving the health risk factors. Thus the results were not consistent with the previous studies of the important interrelationships between preventive behaviors and socioeconomic factors that the types of healthy lifestyle were more typical of the

Table 26

Canonical Correlation Outcome with Various Preventive Behaviors as Dependent Variables

Independent/ Dependent Variables	Redundancy
Demographic/ Socioeconomic Variables	.05
Primary Preventive Variables	.05
Demographic/ Socioeconomic Variables	.01
Secondary Preventive Variables (General)	.04
Demographic/ Socioeconomic Variables	.03
Secondary Preventive Variables (Females only)	.03

upper and middle classes who have the resource to support it (Susser, Hopper, & Richman, 1983).

Third, the congruence between socioeconomic variables and the secondary preventive behaviors was not in an expected direction. Excluding the Pap smear test, socioeconomic variables impacted on the secondary health variables all in the opposite way. Those unemployed, those with lower levels of education and income were more associated with routine health checkups. Fourth, the secondary

preventive behaviors were also clearly influenced by the demographic variables. One could see sex, age, and race were the best predictors among others and had "high" loading on the secondary preventive variables.

In summary, although the results from the canonical analysis explained some differences among the preventive behaviors, they did not show striking socioeconomic differences between the primary preventive and secondary preventive behaviors. The test results did not reveal that socioeconomic variables impacted more on the secondary preventive than on the primary preventive behaviors.

Chapter Summary

This chapter provided the discussion of the results from statistical analyses which included descriptive statistics, bivariate relationships, multiple regression, and canonical correlation. In general, socioeconomic variables were weakly related to preventive behaviors. Age, gender, and gender were the most powerful indicators among others in predicting the preventive behaviors and socioeconomic factors did not show striking socioeconomic differences between the primary preventive and secondary preventive behaviors. The test results did not reveal that socioeconomic variables impacted more on the secondary preventive than on the primary preventive behaviors.

CHAPTER V

DISCUSSION AND CONCLUSION

This study compared two sets of health preventive behaviors--primary and secondary preventive behaviors--to examine the impact of sociodemographic/socioeconomic variables on the health preventive behaviors and to determine whether socioeconomic factors had more impact on secondary rather than on primary preventive behaviors.

The research used the data from the 1990 Behavioral Risk Factors Study, a survey sample of 2400 adults in Michigan. Respondents in this study reported a wide variety of health preventive behaviors and health risk habits. More than half had used safety seat belts and about one third participated in some sort of sports and exercise. About a third smoked cigarettes and half drank alcohol regularly, although only 5% were heavy drinkers. Regarding body mass index, about a quarter were considered overweight. About two thirds had received routine health checkups within the past year. The majority of female respondents sought mammograms, clinical breast examinations, and Pap smears.

Stepwise regression analyses were conducted for each of the health preventive behaviors, and canonical correlation analyses were conducted to compare primary and secondary health preventive behaviors. Some findings are especially noteworthy. First, although they were statistically significant, the explained variances in the stepwise regression tests and the redundancies of canonical

correlation analyses were so low (the highest explained variance was 22% in stepwise regression to predict use of the mammogram test and the highest redundancy was 5% in canonical correlation analyses to examine the primary preventive variables) that they had little predicting power. Second, of all the independent variables and sociodemographic variables such as age and gender were statistically significant in almost every single test among primary and secondary preventive variables. Third, the analyses revealed that socioeconomic variables lost their power in predicting the primary preventive behaviors. Instead, the results showed the considerable similarity existed among socioeconomic groups with respect to the health risk factors. Fourth, the results showed an inverse relationship among socioeconomic and secondary preventive variables in that the disadvantaged socioeconomic groups were more likely to receive the secondary preventive care. Thus, the tests did not show striking socioeconomic differences between the primary preventive and secondary preventive behaviors and they did not reveal that socioeconomic variables impacted more on the secondary preventive than on the primary preventive behaviors.

Thus, the outcome of the tests left several unanswered questions:

1. While the redundancies of the analyses were so low that socioeconomic variables lost their prediction power in both sets of primary and secondary preventive variables, the question is: what determining factors other than these variables could serve as

contributors to explain the differences across the secondary preventive behaviors?

2. Why were sociodemographic other than socioeconomic variables the best predictors for primary and secondary preventive behaviors?

3. Why did people with lower socioeconomic status and people in the minority categories receive more routine health checkups than people in the other categories?

Gender Difference in Health-Related Behaviors

This study provides an opportunity for examining the gender trends in preventive behaviors in the general population. Although both men and women adopt certain kinds of health preventive behaviors, they tend to acquire them differently. Men tend to engage in more physical exercise and active lifestyles, but are also likely to expose themselves to risk and dangerous situations (smoking, drinking heavily, and driving and drinking). Women, in contrast to men, use safety seat belts more often, smoke less, and are more likely to receive routine health checkups, but are also less likely to get vigorous physical exercise. These findings are consistent with the previous research (Cockerham, 1992; Verbrugg, 1985, 1990; Waldron, 1983, 1988).

Since the statistical tests failed to support a general position that socioeconomic factors impacted on secondary preventive variables, we asked whether the sample of BRFS was biased in terms of overrepresenting a middle class population. If this was true, there

might be too little socioeconomic variation in the sample to show strong relationships with secondary preventive variables. Thus, it was necessary to conduct tests to look at the distribution of household income with secondary preventive behaviors.

There were two procedures followed in testing the possibility of sample bias. In the first procedure, respondents' household income was compared with that of Michigan 1990 census data to see if the sample overrepresented middle and upper class. Table 27 presents a breakdown of the 1990 BRFS sample and 1990 Census data. Here the study sample appeared to overrepresent the "$10,000 - $34,999" groups and underrepresented the "$35,000 and over" group. The minor dissimilarities, however, should not be a major issue since the comparison did not show that the study sample overrepresented high household income groups.

Table 27

Comparison of the 1990 BRFS Sample and 1990 Census of Michigan Population

Household Income Category	1990 BRFS	1990 Census
Less than $10,000	14.1%	15.6%
$10,000 - $19,999	20.2%	16.9%
$20,000 - $34,999	28.5%	23.5%
$35,000 and more	37.2%	44.1%

In the second procedure, Chi-square tests were applied to evaluate if curvilinear relationships might exist between the secondary

preventive variables and the household income variable. Thus, if the wealthy can afford routine checkups and low income obtain such care through medicaid or other sources, while middle income have insurance that may not cover regular checksups, there may appear to be very little linear relatship between household income and the secondary preventive variables.

Chi-square is a test of deviation from independence for cross-tabulated variables based on a comparison of the observed cell frequencies of a joint contingency tables with frequencies that would be expected under the hypothesis of no relationship between given variables.

As Table 28 shows, in the relation between blood cholesterol checkup and the household income variable, more of lower income respondents (83.7%) received blood cholesterol checkups within a year than did the highest income group (72.3%). The Chi-square value was 11.56, with 9 degrees of freedom, and alpha = .05. It must be at least 16.91 to reject the null hypothesis. Although the test was not significant at the statistical level, the pattern of the test showed an inverse relationship between the variables. That is, the lowest income group (less than $10,000) rated the highest in taking the blood cholesterol test within a year, $10,000- $20,000 group was in the second place, $20,000-$35,000 group was the third, and the highest income group ($35,000 and over) was the least likely to receive the test.

Table 28

Crosstabulation and Chi-square Test Between Household Income and Blood Cholesterol Checkup

Column Percentage	<$10,000	$10,000-$20,000	$20,000-$35,000	>$35,000	Row Total
More than 5 yrs	3 1.8%	3 1%	5 1.4%	9 1.5%	19 1.4%
Within 5 yrs	6 4.2%	11 4.3%	24 6.2%	40 7.2%	81 6%
Within 2 yrs	15 10.4%	41 15.8%	63 16.7%	106 18.9%	225 16.8%
Within a yr	121 83.7%	205 78.9%	286 75.7%	406 72.3%	1018 75.8%
Column Total	145 10.8%	260 19.4%	378 28.1%	561 41.8%	1344 100%

Chi-square=11.56 DF=9 Significance .23 (at .05 level)

Table 29 shows the crosstabulation and Chi-square test between household income and routine health checkups. While most of respondents received a routine health checkup within a year, a higher percentage of respondents in "$10,000 and less" group (73.9%) received the checkups than did other groups. With a Chi-square value of 22.94 and 12 degrees of freedom, it was significant at .05 level. The test, again, proved the inverse relationship between the variables: the higher the income, the lower the frequency of routine health checkups.

Table 30 displays the crosstabulation and Chi-square test between household income and time of last breast exam. The

Table 29

Crosstabulation and Chi-square Test Between Household Income and Last Routine Health Checkups

Column Percentage	<$10,000	$10,000-$20,000	$20,000-$35,000	>$35,000	Row Total
Never	6 2.1%	4 .9%	10 1.7%	15 2%	35 1.7%
More than 5 yrs	23 7.8%	32 7.7%	49 8.3%	52 6.6%	115 7.5%
Within 5 yrs	22 7.8%	33 7.9%	65 10.9%	73 9.5%	194 9.3%
Within 2 yrs	24 8.4%	55 13.2%	83 13.9%	134 17.3%	297 14.3%
Within a yr	214 73.9%	295 70.3%	385 65.1%	502 64.6%	1395 67.2%
Column Total	289 13.9%	419 20.2%	591 28.5%	776 37.4%	2075 100%

Chi-square=22.94 DF=12 Significance .028 (at .05 level)

crosstabulation shows a mild curvilinear relationship between the two variables. The respondents in the two opposite income categories (the highest and lowest) received clinical breast exam more recently than those household income was in the second and third categories ($10,000 to $35,000). In addition, those who had not received the exam for more than two to five years were more likely to be those in the second and third income categories ($10,000 to $35,000). The Chi-square value was 18.84, with 9 degrees of freedom, and significance value was .02. The test showed the significant difference

between household income and time of last breast exam. Respondents in the middle income categories received the exam much less than did those with the lowest and the highest household income.

Table 30

Crosstabulation and Chi-square Test Between Household Income and Clinical Breast Exam

Column Percentage	<$10,000	$10,000-$20,000	$20,000-$35,000	>$35,000	Row Total
61+ months	4 2.7%	13 6.1%	19 6.8%	8 2.3%	43 4.5%
25-60 months	14 8.9%	21 10.1%	21 7.6%	17 5.3%	74 7.6%
13-24 months	17 10.8%	18 8.5%	36 13%	49 14.8%	120 12.3%
0-12 months	122 77.6%	159 75.2%	198 72.5%	258 77.7%	737 75.7%
Column Total	157 16.1%	211 21.7%	274 28.1%	332 34.1%	737 100%

Chi-square=18.84 DF=9 Significance .03 (at .05 level)

The crosstabulation and Chi-square test were conducted between household income and time of last mammogram. As Table 31 presents, there appears to be an inverse relationship between the two variables. The lower the household income, the more recent the mammogram tests they have received. However, the relationship was not statistically significant.

Table 31

Crosstabulation and Chi-square Test Between Household Income and Last Mammogram

Column Percentage	<$10,000	$10,000-$20,000	$20,000-$35,000	>$35,000	Row Total
More than 5 yrs	5 6%	8 7.2%	10 7.4%	4 2.2%	28 5.3%
Within 5 yrs	7 8.4%	14 12.7%	15 10.7%	24 13.6%	61 11.7%
Within 2 yrs	11 12.6%	16 14.4%	27 19%	41 23.2%	95 18.4%
Within a yr	63 73.1%	74 65.7%	88 62.9%	109 61%	334 64.6%
Column Total	86 16.7%	113 21.7%	140 27.1%	179 34.5%	518 100%

Chi-square=12.99 DF=9 Significance .16 (at .05 level)

Table 32 displays the crosstabulation and Chi-square test between frequency of Pap smear tests and household income categories. Here the pattern showed that higher income respondents were more likely to receive Pap smear test more often, and lower income respondents usually did not take the test on a regular base. The Chi-square value was 39.42, with 12 degrees of freedom, and the value was well above the critical value of 21.02. Therefore the test showed that frequency of Pap smear tests were influenced by household income in the way that lower income respondents were less likely to receive regular Pap smear tests.

Table 32

Crosstabulation and Chi-square Test Between Household Income and Frequency Pap Smear Tests

Column Percentage	<$10,000	$10,000-$20,000	$20,000-$35,000	>$35,000	Row Total
No regular time	37 23.2%	57 26.6%	50 18%	34 10.2%	178 18.1%
Every 3 yrs	7 4.1%	7 3.2%	14 5%	7 2.2%	35 3.5%
Every 2 yrs	13 8.1%	14 6.4%	24 8.6%	31 9.4%	82 8.3%
Once a yr	81 50.6%	113 53%	170 60.8%	226 68.1%	589 59.9%
Every 6 months	22 14%	23 10.7%	21 7.6%	33 10.1%	100 10.2%
Column Total	160 16.3%	213 21.7%	279 28.4%	33 33.7%	983 100%

Chi-square=39.42 DF=12 Significance .0 (at .05 level)

In this session, a comparison was made and some tests were conducted to explore possible sample bias. When compared with Michigan Census data, the proportion of household income was slightly different from the current study data. However the difference was not large enough to indicate that the study sample overrepresented middle class population.

When each of the five secondary preventive variables were tested with household income variable, the crosstabulation and Chi-square revealed that two of the tests showed some curvilinearity. That was

those respondents in the middle income categories (between $10,000 to $35,000) were usually those less likely to receive clinical breast exam and mammogram tests, but the curvilinear relation was not strong.

While all the attempts were made to test a socioeconomic model and to prove if socioeconomic factors effect secondary preventive behaviors, the statistical models failed to meet the hypothesis. The implication from the study does not mean the socioeconomic approach is no longer useful in study of health preventive behaviors, but it suggests that a single paradigm is no longer an answer for studying the complicated social phenomenon. And a more sophisticated paradigm and a multifaceted model should be applied in the subject matter. The following part, therefore, will focus on the issue raised from the study, including the gender difference in health preventive behaviors, the possible contributors to the similarity of primary preventive behaviors among the social groups, and a discussion of the social factors influencing the secondary preventive behaviors. Then, a synthetical theoretic model will be provided for a future research.

An important implication of the diverse patterns found in this research and other studies is that gender difference in health preventive behaviors is strongly influenced by the compatibility of the behaviors with general sex roles and expectations concerning appropriate male and female behaviors. For example, expectations that males more than females will take physical risks in recreation and engage in certain types of risk behaviors such as heavy drinking and

drinking and driving, contribute significantly to males' higher rates of accidents and shorter life expectancy. The patterns of difference in smoking and drinking is also due to widespread social disapproval of certain behaviors for females. Heavy drinking, for example, could interfere with the female's responsibility for care of their children and families (Verbrugg, 1985).

In this study, females were also found to receive more secondary preventive care than did men, which is consistent with the general pattern that women make more physician visits than men. It is believed that women's more complex and demanding reproductive functions are a major reason for women's higher rates of secondary preventive behaviors (Verbrugge, 1985, Waldron, 1983). As Waldron (1988) observed, in the United States, pregnancy accounts for about one-third of the gender differences of physician visits in the 15 to 40 year old age range, and other reproduction-related and sex-specific diagnoses account for roughly an additional quarter of the gender difference in physician visits. Thus, the inherent sex differences in reproductive biology have more effect than other factors on gender differences in the secondary preventive behaviors.

Another reason for females' higher rates of secondary preventive behaviors is that females have more self-reported symptoms and poorer self-rated health (Waldron, 1983). The possibility exists that females are more sensitive to their bodily discomforts and are more willing to report their symptoms to others (Cockerham, 1992). This pattern is also found among special populations like the homeless in

that homeless women report more physical symptoms overall, although homeless men have more severe health problems (Ritchey, LaGory, & Mullis, 1991). These findings suggest that both gender differences in somatic condition and gender differences in perception may contribute to females' higher rates of symptoms and poorer self-perceived health, and these in turn contribute to women's higher rates of secondary preventive behaviors.

Primary Preventive Behaviors

Among the goals of this study was a desire to develop a model to explain the preventive behaviors within or across the population. As found in the study, although a number of socioeconomic variables were related to the primary preventive behaviors, SES did poorly in predicting people's primary preventive behaviors, and instead, sociodemographic variables served as the most important predictors in explaining the differences.

The result of this research supported some previous studies and observations that primary preventive behaviors were pursued by people from all social classes (Cockerham, 1988, 1992; Cockerham, Kunz, Lueschen, & Spaeth, 1986; Featherstone, 1987; Harris & Guten, 1979; Kronenfeld, 1988).

When examining the relationship between SES and the primary preventive behaviors or health lifestyles, we need to look at a number of possible factors to explain the phenomenon of primary preventive behaviors in the American society. First, the participation

of many people in health promotion and disease prevention is enhanced by a campaign by the mass media and health professions emphasizing lifestyle change and individual responsibility for health. Health-related information is widely disseminated in news articles, on radio and in television special events programs and talk shows. The media have spread the message that lifestyle is the most important modifiable factor influencing health and illness and a way to stay healthy is to adopt a healthy lifestyle and to change unhealthy habits.

The social environment is believed to strongly influence health and health-related behaviors (Rosenstock, 1990). Vast changes over the past 20 years in behavior and attitudes toward health risk factors clearly illustrates the influence of social factors. The examples are the attitude and behaviors concerning smoking, drinking, diet, and exercise. Healthy lifestyles and avoidance of health risk factors have been accepted by many people and have become common in the society. More and more people have been convinced that "self-control over the range of personal behaviors that affect health is the only remaining option" (Cockerham, 1992, p. 82).

Second, the movement of health promotion and disease prevention may also be enhanced by the participation of poor people in health protection due to their access to medical care through Medicare and Medicaid public health insurance programs. Though serious problems remain for persons with the lowest socioeconomic status, the financial barrier to health care is no longer absolute (Cockerham, 1992, p. 585). The evidence shows that poor and minority groups use

medical facilities much more for both disease treatment and health prevention than a few decades ago.

Ransford (1986) found in a national sample that lower-class black adults were especially likely to adopt primary preventive behaviors because of particular concern about heart diseases. Harris and Guten (1979) found that practically everyone in their survey did something to protect their health. Featherstone (1987) observed that certain features of upper-middle class culture in Great Britain spread into other social groups. Primary preventive behaviors became a tendency toward similarity among the various social groups.

As these findings suggest, health lifestyles practiced outside the health care delivery system have become a part of the general culture of contemporary life and have spread across socioeconomic boundaries. This seems to hold even though participation in such lifestyles remains a matter of choice and may be seriously constrained by limited personal resources.

Secondary Preventive Behaviors

The most important issue in this study is to answer the original question: Do socioeconomic factors have a significant impact on people's secondary preventive behavior? Are people with higher socioeconomic status more likely receive secondary preventive care than are people with lower socioeconomic status? The conclusion from this research revealed that socioeconomic factors have an impact on the secondary preventive behaviors in that people in the disadvantaged

socioeconomic status were more likely to receive the secondary preventive care. Thus, we need to know what social factors other than those examined in this research are essential in the utilization patterns of routine health checkups and how social structure shapes individuals' secondary preventive behaviors. There is a need for a new approach for discussing the result of this research, which includes: 1) a discussion of medical insurance coverage, 2) the health condition prior to use of medical facilities, and 3) individual's health believe system shaping the patterns of secondary preventive behaviors.

1. Medical insurance coverage. Medical insurance coverage/non-coverage is believed to be the most important factor responsible for the secondary preventive behaviors (Chapman, 1990)). As reviewed in Chapter I, about 90% of the American population have some kind of medical insurance, and 56% of the insured have insurance which covers outpatient visits (Vanderschmidt, 1987). The outpatient coverage generally is associated with deductible and coinsurance limitations and such limitations often exclude coverage of many secondary preventive services.

However, Bailey (1990) observed that although most insurance policies do not cover secondary preventive care, medical practitioners are found often providing screening tests as a part of the evaluation of a related physical problem. According to Chapman (1991), many beneficiaries have learned how to get "medical exams" covered by their health insurance plans. For example, in order to

have a doctor visit covered by their health plan, individuals have fabricated a complaint to have some of the elements of a routine health checkup covered. A patient may give his or her physician vague symptoms as the reason for making an appointment, or a physician might even offer reasons for a routine health checkup. As Chapman observed (1991), physicians often cooperated in identifying a complaint that will allow the visit to be covered. The current study showed that a majority of the female respondents who received a mammogram were following doctors' recommendations, and it was assumed that those services were often charged to the insurance. If this was the case, the factor of social status probably had little effect on the routine health checkup, since such preventive care did not cost patients money directly.

Coburn and Pope (1974b) suggested that socioeconomic status might influence only those preventive activities which were less threatening in their possible physical or social consequences. For example, tooth decay might be viewed as less important compared to certain kinds of cancer. The differential effect of SES on secondary preventive care may be accounted for by variation in the severity of different types of illness.

According to the 1990 U.S. Bureau of the Census, 13.4% of the population had no health insurance coverage at all. These uninsured see physicians less often for minor problems (Cockerham, 1992, 1988), are more likely to be admitted to hospitals through emergency rooms than a scheduled admission, are more likely to be sicker when they

are admitted (Vladeck, 1983), and are especially unlikely to receive screening tests due to absence of reimbursement (Gemson & Elinson, 1988). Using the data from the National Health Interview Survey (NHIS), Woolhandler and Himmelstein (1988) examined patterns of receipt of recommended preventive services among middle-aged women, with particular attention to the effects of insurance coverage. They reported that inadequate receipt of routine health checkups was more prevalent among the uninsured people. Thus, lack of health insurance was the strongest and most consistent predictor of inadequate screening, even when controlling for other social variables.

2. Health Status. The patterns of preventive behaviors are also believed to vary by individuals' health conditions. It is assumed that people who are asymptomatic behave differently in terms of preventive behaviors, as compared to those who perceive symptoms. Harris and Guten (1979) reported that persons in poor condition were more likely to perform sick role behaviors, that is, they were more likely than healthy persons to use the health care system for a physical checkup, take medication, and perform certain kinds of physical activities such as exercise.

Kulik and Mahler (1987) examined the role of health status itself as a determinant of health behaviors. They discovered that acutely ill college students believed themselves to be more vulnerable to health problems in the future (even if these were unrelated to their present condition) and more interested in receiving preventive materials than were apparently healthy students. Bastani, Marcus,

and Brown (1991) reported the rate of routine health checkups was high among the respondents who believed in the efficacy of early detection and mammography, with 82% of the sample reporting that the chances were somewhat high or very high that a mammogram could find breast cancer early. Their study also indicated those who had health insurance and those with a family history of breast cancer were more likely to have been screened according to the guidelines.

Sharp, Ross and Cockerham (1983) provided evidence that the poor and blacks were found to use medical facilities more frequently because of bad health conditions. While most middle class people use such facilities for preventive purposes, the majority of poor and black went to see physicians for the treatment of diseases or injury. In examining national changes between 1973 and 1985 in women's use of preventive health services, they also found that black women were more likely than white women to have had both a recent clinical breast examination and a Pap smear.

In 1990, the leading causes of cancer deaths were lung cancer, colorectal cancer, breast cancer, and prostate cancer. For blacks, the age-adjusted cancer death rate was higher than for whites, and the average survival time was shorter. In 1987, black males died from cancer at a rate of 288 per 100,000, compared to 158 per 100,000 for white males. For black females, the rate was 132 per 100,000 versus 110 per 100,000 for white females (U.S. Department of Health and Human Services, Public Health Service, 1992). Recent screening tests for cervical cancer, breast cancer, and hypertension increased

for black women who were at higher risk for cervical cancer and were more likely to have advanced stages of breast cancer at the time of diagnosis (Woolhandler & Himmelstein, 1988). Consistent with their greater risk of certain diseases, there have been great gains among black persons using medical facilities for the routine health check-ups. These findings might explain why nonwhites in the current study were more likely to use medical facilities for routine health check-ups.

Andersen and colleague (1981) found medical utilization rates for minority groups to be very similar to those found in other population groups. Lower use of physician services was found among Mexican-Americans. After adjustments for need and SES, the differences nearly disappeared. The adjusted figures showed 73% of Hispanics saw a physician during the previous year compared with 76% of the total population. Much of the difference in medical utilization was due to younger age, lower income and lower insurance coverage, rather than negative cultural orientation. Markides, Levin, and Ray (1987) also confirmed that Mexican-American did not underutilize physician services, and they were strongly aware of symptom seriousness. The findings suggested that patterns of preventive behaviors are influenced by many factors, including individuals' health conditions. Those who are asymptomatic behave differently in terms of preventive behaviors as compared to those who perceive symptoms and who believe themselves to be more vulnerable to health problems.

3. Health Belief. There are some signs that health belief

may help to explain some preventive health behaviors (Kirscht, 1988). Recent growth in the study of health behavior has significant roots in the efforts of applied psychologists and sociologists, presented in the frameworks outlined in the article by Kasl and Cobb (1966), who believed that the patterns of health behaviors involve a set of health cognition concerned with personal susceptibility to a condition, the perceived severity of that condition, and the efficacy of a behavior.

The Health Belief Model (HBM) designed by Rosenstock (1966) is one of the most influential social-psychological approaches to individuals health-related behaviors. According to the HBM, people's behavior depends mainly on two variables--the value placed on a particular goal and the possible action to achieve the goal. When the two variables are conceptualized in the context of routine health checkups, individuals have (1) the desire to avoid illness and (2) believe these particular actions will prevent or ameliorate illness (Shumaker et al., 1990). Since the model deals with avoidance of health threats, it is assumed that such threats arouse actions which in turn attempt to cope with the situation. In the HBM context, it is understood that demographic and other variables influence health attitude and health behavior and work through the effects on an individual's health motivation and subjective perception.

The Health Belief Model has become the domain of applicability in the field of preventive behaviors. Hockbaum (1958) noted that the perceived value of a screening test must include beliefs about the

difference in outcomes from detection than from nondetection. As part of a survey of senior citizens in a New York county, Rundall and Wheeler (1979) collected information by mail (retrospectively, concerning swine flu) and found susceptibility and perceived danger of the vaccine were significant predictors. Generally similar findings were described by King (1982) in the study of screening for high blood pressure. In that instance, a health center in England sent invitations for hypertension screening to all patients 35-65 years old. Measures of susceptibility and benefits with respect to hypertension predicted attendance. A measure of intention was the best predictor of attendance. Perceptions of severity and of benefits also predicted intention. Taken together, the research and observations on secondary preventive behaviors yield some of the strongest evidence for the predictive usefulness of health beliefs.

In summary, a primary emphasis in health-related behaviors has been an attempt to explore the factors that contribute either independently or in combination to individuals' health activities. While the current study obtained some social factors responsible for the secondary preventive behaviors among healthy persons, the understanding is not complete in terms of how and in which way secondary preventive behaviors had taken place and what social factors might limit the protective behaviors. As it was discussed above, certain social variables such as the types of medical insurance coverage, health conditions, the perceived health status, and health belief are crucial or determinants when pursuing secondary preventive behaviors.

However, the necessary data for these factors are not available in the data set analyzed in this dissertation.

One of the promising approaches to the study of secondary preventive behaviors is to examine the variables and dimensions which possibly influence individuals' utilization behaviors. The following section of the chapter will give a discussion of one possible model for future research.

Model for Future Research

Over the past two decades, a number of theoretical frameworks have appeared that try to account for individuals' health behavior. The major approaches encompass many dimensions: Economic, sociodemographic, geographic, social-psychological, sociocultural, and organizational. These models differ considerably in their theoretical perspectives, in the types of health behaviors they attempt to explain, and in the concepts they employ.

While the current study only emphasized some demographic and socioeconomic variables, the framework for future research presenting determinants of secondary preventive behaviors is dependent upon four components: predisposition, perceived threat of disease and health belief, types of medical insurance coverage, and health conditions.

The hypothetical model shown in Figure 2 serves as a useful paradigm for summarizing knowledge about the secondary preventive behaviors.

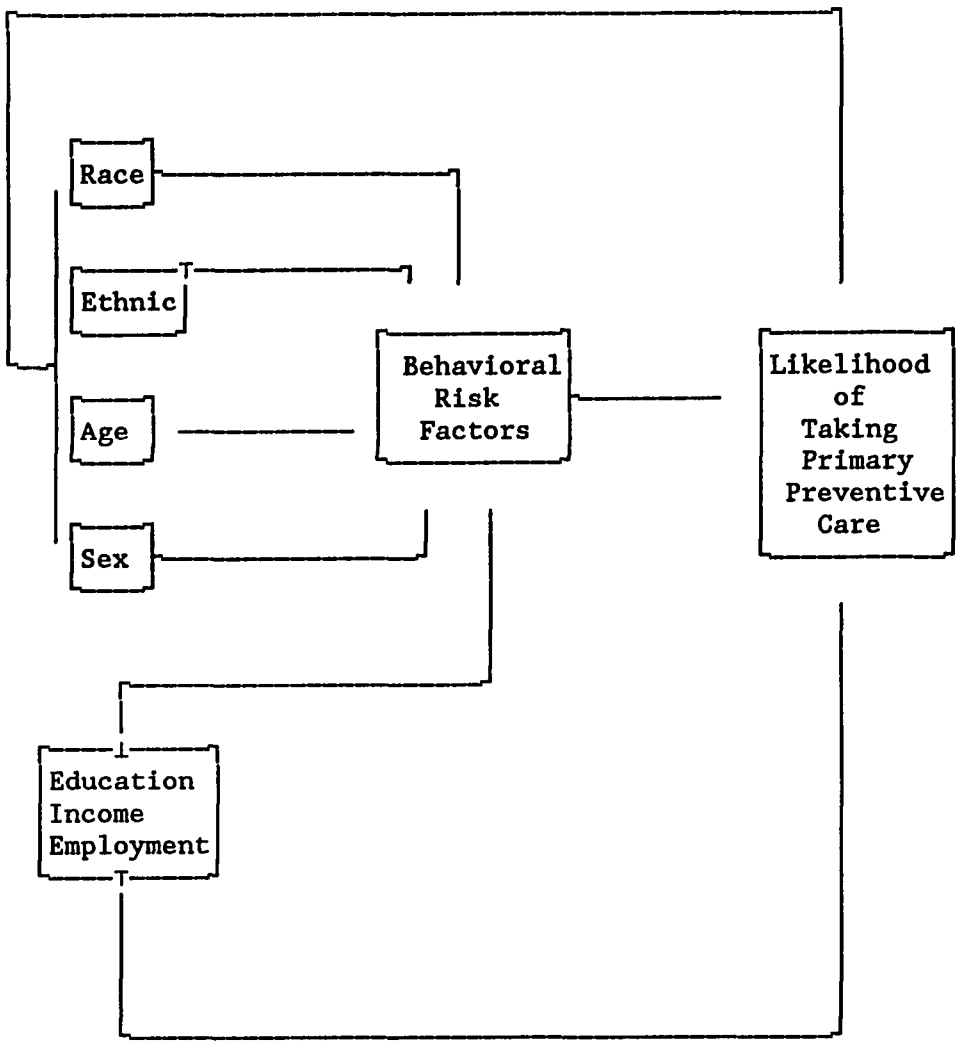

Figure 2. The Model for Primary Preventive Care.

Predisposition Variables: Predisposition variables include the personal characteristics that exist prior to the decision for routine health checkups, including demographic variables (e.g., race, age, sex, and marital status) and social economic variables (e.g., household income, education, and employment status). As revealed from the current study, these predisposing variables may or may not be seen as

directly responsible for the decision to have routine health check-ups.

According to the model, demographic and socioeconomic variables may influence individuals' preventive care behavior through a pathway to preventive care behavior. That is predisposing variables--race, ethnics, age, sex, education, income, and employment status may directly affect the extent to which individuals are exposed to behavioral risk factors (such as smoking, poor diet, less physical activities). The direct impact of these variables was proved by the current study that the patterns of the utilization behaviors were affected by individuals' age, gender, and other variables. These social variables contribute the way an individual reacts to the behavior risk factors and how individuals perceived the threat of disease through their influence on intervening social-psychological variables.

Perceived threat of disease and health belief: The model further suggests that preventive action taken by an individual to avoid the disease is due to that particular individual's perception that the disease would have severe personal implications. The assumption is that by taking a particular action, susceptibility and, the consequences of a disease would be reduced. The perception of the threat posed by a disease is affected by the predisposing variables which can influence both perception and the corresponding cues necessary to take the action. This component could be measured by the subjective perception of the threat of a disease and belief in the benefits of the preventive behaviors.

Economic resource or medical insurance coverage: This component refers to the conditions which make the utilization behaviors available. When appropriate predisposing conditions are present, an individual's secondary preventive care could be delayed because of an economic barrier (including lack of appropriate insurance). Some research and findings (Cockerham, 1992; Gemson & Elinson, 1988; Vladeck, 1983) reviewed in the literature suggested that socioeconomic factors were significant in predicting utilization behaviors and that uninsured individuals saw physicians less often for minor physical problem, especially for routine health checkups. For those who are uninsured, even though they perceive a threat of disease and believe in the benefit from the preventive behaviors, going to a physician for preventive care may be an unaffordable luxury.

Socio-economic resources and insurance coverage in future research could be measured by the report of household income and types of medical insurance coverage (e.g., private policy, Medicaid, and Medicare).

Thus, the patterns of secondary preventive behaviors revealed in the model are affected not only by the demographic and SES variables, but also by the other social and psychological variables. The proposed frame work attempts to link demographic and SES to social-psychological variables, and to combine all the factors into a causal model to account for adults's secondary preventive behaviors.

The Limitations of the Research

This research was a secondary data analysis based on the telephone interviews making up the 1990 Behavior Risk Factor Survey. The secondary analyziz provided a great advantage of economy, since the study did not need to pay the costs of sampling, interviewing, and coding. However, this research had several major disadvantages. First, the current study was limited to the existing data that had been collected and compiled, and those data did not sufficiently represent all variables of interest. For instance, it would have been desirable to collect data on the types of medical insurance coverage held by the respondents, since this would be an important control variable.

Second, another limitation of the research involved the form of questionnaire. In asking questions, the respondents were asked all closed-ended questions (respondents were asked to select their answer from the provided list). These closed questions were easier and quicker to answer and they required no writing. The major shortcoming of this format existed in the structuring of responses which might overlook some important responses. One would never know what the respondents said or thought on their own behalf, and some bias might be introduced by forcing them to choose between given alternatives that might not have occurred to them.

Third, the most obvious problem of the telephone interviewing was the question of sample representativeness. Since the same private telephone served several members, a sample drawn by telephone

was more like a sample of households rather than a sample of individuals. Another question was in which way the sample was biased if the households were not accessible by phone. As Oppenheim (1992) noted, those who were not reached by telephone were usually linked lower income, young and male, and those who moved recently (Oppenheim, 1992).

Fourth, a possible limitation of the research might involve the response bias which was introduced because of the mentality or predispositions of respondents (Alreck, 1985). The different sources of response bias could be classified in a variety of ways. For example, respondents might reply positively to the items that the respondents believed to reflect socially desirable attitudes other than their true answers. Some items in the questionnaire, such as alcohol abuse, or drinking and driving, might require other kind of investigation because survey data would not be reliable.

Finally, a limitation of the research may exist in the sample size itself. As discussed in Chapter 3, due to the small number of cases among certain nominal variables (race, employment status, and marital status), the analyses in which various categories were combined into a single category and this could introduce a bias.

Chapter Summary

In this chapter, the discussion and conclusion of the study were presented. In additional to the discussion of the gender difference in the health-related behaviors, the differences in primary preventive

and secondary preventive behaviors were given and discussed. The vast changes in social environment, the attitude toward health risk factors, and campaigns about the importance of health lifestyle by health professions all might contribute to the positive findings. Healthy lifestyles have become an ideal within the culture. In explaining the test result for secondary preventive behaviors, this chapter provided some possible factors which were likely to influence the research results, such as medical insurance coverage, health status of respondents, and health belief. The chapter also provided a hypothetical model for future research. Finally, this chapter looked at some possible limitations or biases of the research.

BIBLIOGRAPHY

Aday, L. A., Anderson, R. M., & Fleming, G. (1980). Health care in the U.S.: Equitable for whom? Beverly Hills, CA: Sage.

Aiken, L. H., & Mechanic, D. (1986). Applications of social science to clinical medicine and health policy, New Brunswick, NJ: Rutgers University Press.

Alreck, P. L., & Settle, R. B. (1985). The survey research handbook, Homewood, IL: Richard D. Irwin, Inc.

American Cancer Society. (1980). Guidelines for the cancer-related checkup: Recommendations and rationale, 30, 194-240.

American College of Physicians. (1981). Medical Practice Committee. Periodic health examinations: A guide for designing individualized preventive health care in the asymptomatic patient. Annual International Medicine, 95, 729-732.

American Medical Association Council on Scientific Affair. (1983, March 25). Medical evaluation of healthy persons. JAMA, 249, 1626-1633.

Andersen, J. G. (1973). Demographic factors affecting health services utilization. Medical Care, 11, 104-20.

Andersen, R., Lewis, S., Giachello, A. L., Aday, L. A., & Chiu, G. (1981). Access to medical care among the Hispanic population of the Southwestern United States. Journal of Health and Social Behavior, 22, 78-89.

Babbie, E. (1990). Survey research methods. Belmont, CA: Wadsworth.

Bailey, J. (1990). Checking up on checkups. Lexington, MA: Heath.

Bastani, R., Marcus, A., & Brown, A. H. (1991). Screening mammography rates and barriers to use: A Los Angeles county survey. Preventive Medicine, 20, 350-363.

Bausell, B. (1986). Health seeking behavior among the elderly. The Gerontologist, 26(5), 14.

Becker, M. H., & Rosenstok, I. M. (1989). Health promotion, disease prevention, and program retention. Handbook of Medical Sociology. Englewood Cliffs, NJ: Prentice Hall.

Belloc, N. B., & Breslow, L. (1972). Relation of physical health status and health practices. Preventive Medicine, 1, 409-421.

Bennett, W., Goldfinger, S., & Johnson, G. (1987). Your good health: How to stay well, and what to do when you've not. Cambridge, MA: Harvard University Press.

Berkman, L. F., & Breslow, L. (1983). Health and ways of living: The Alameda county study. Fairlawn, NJ: Oxford University Press.

Boss, L. P., & Guckes, F. H. (1992). Medicaid coverage of screening for breast and cervical cancer. American Journal of Public Health, 82(2), 5-6.

Breslow, L., & Somers, A.R. (1977, March 17). The lifetime health monitoring program. North England Journal of Medicine, 296, 601-608.

Bridges, J.D., Killip, T., & Krane, N.K. (1983). Recommendations for care of the asymptomatic patient. Henry Ford Hospital Medical Journal, 31, 95-100.

Brooks, C. (1980). Social, economic, and biologic correlates of infant mortality in city neighborhoods. Journal of Health and Social Behavior, 21, 2-11.

Brown, P. (1989). Perspectives in medical sociology. Belmont, CA: Wadsworth.

Calnan, M. (1987). Health and illness: The lay perspective. London: Tavistock.

Canadian Task Force on the Periodic Health Examination. (1979). The periodic health exam. Canada Medicine Association Journal, 121(9), 1193.

Coburn, D., & Pope, C. (1974a). Socioeconomic status and preventive health behavior. Journal of Health & Social Behavior, 13, 50-51.

Coburn, D., & Pope, C. (1974b). Socioeconomic status and preventive health behavior in the Black community. American Journal of Health and Social Behavior, 15, 67-78.

Cockerham, W. (1986). Medical sociology. Englewood Cliffs, NJ: Prentice-Hall.

Cockerham, W. (1992). Medical sociology (5th ed.). Englewood Cliffs, NJ: Prentice Hall.

Cockerham, W., Kunz, G., & Lueschen, G. (1988). Social stratification and health lifestyles in two systems of health care delivery: A comparison of the United States and West Germany. Journal of Health and Social Behavior, 29, 113-126.

Cockerham, W., Kunz, G., Lueschen, G., & Spaeth, J. (1986). Social stratification and self-management of health. Journal of Health and Social Behavior, 27, 1-14.

Collen, M. (1986). The cost-effectiveness of health checkups: An illustrative study. Disease Prevention and Health Promotion. Handbook for Physicians. New York: Praeger.

Commission on Chronic Illness. (1957). Prevention of chronic illness. Cambridge: Harvard University Press.

Council on Scientific Affair. (1983). Medical evaluation of healthy person. JAMA, 249(12), 1626-1633.

Craig, K. D., & Weiss, S. M. (1986). Health enhancement, disease prevention, and early intervention: Biobehavioral perspectives. New York: Springer.

Croog, S.H. (1961). Ethnic origins, educational level, and responses to a health questionnaire. Human Organization, 20, 65-69.

Dales, L. G., Griedman, G. D., & Collen, M. F. (1979). Evaluating periodic multiphasic health checkups: A controlled trial. Journal of Chronic Disease, 32(5), 385.

Dixon, D., & Wilfrid, J. (1983). BMOP statistical software. Berkley, CA: University of California Press.

Dutton, D. B. (1986). Social class, health, and illness. In L. Aiken & D. Mechanic (Eds.), Applications of social science to clinical medicine and health policy, (pp. 31-61). New Brumswick, NJ: Rutgers University Press.

Estes, C. L., & Lee, P. R. (1989). Health problems and policy issues of old age. In P. Brown (Ed.), Perspectives in Medical Sociology, (pp. 29-52). Belmont, CA: Wadsworth.

Estes, C., & Rundall, T. (Eds.). (1992). Social characteristics, social structure, and health in the aging population. Aging, Health and Behavior, (pp.110-119). Newbury Park, CA: Sage.

Estes, C., & Wood, J. B. (1988). Organizational and community responses to medicare policy: Consequencces for health and social services for the elderly. San Francisco CA: University of California Press.

Featherstone, M. (1987). Lifestyle and consumer culture. Theory of Culture and Society, 4, 55-70.

Fielding, J. E. (1979). The preventive services for the well population: The surgeon general's report on health promotion and disease prevention. (DHEW-PHS Publication No. 79-55071A, pp. 277-206). Washington, DC: U.S. Government Printing Office.

Frame, P. S., & Carlson, S. J. (1975). A critical review of periodic health screening using specific screening criteria. Journal of Family Practice, 2, pp. 29-36.

Gemson, D.H., & Elinson, J. (1986). Prevention in primary care: Variability in physician practice patterns in New York City. American Journal of Preventive Medicine, 2, 226-234.

Gochman, D. S. (Ed.). (1988). Health behavior: Emerging research perspectives. New York: Plenum Press.

Green, L. W. (1971). Status identity and preventive health behavior. Pacific Health Education Reports. Number One, University of California, Berkeley, and University of Hawaii, Honolulu.

Greene, S. B. (1981). Frequency of hospitalization among hospital employees and their families. The American Journal of Public Health, 71(9), 1021-1025.

Grundy, S.M. (1987). Cardopvascular and risk factor evaluation of healthy adults: A statement for physicians by an ad hoc committee appointed by the steering committee. American Heart Association Circulation, 75, 1340A.

Harris, D., & Guten, S. (1979). Health-protective Behavior: An explorative study. Journal of Health and Social Behavior, 20, 17-29.

Hochbaum, G. (1958). Participation in Medical Screening Programs: A Sociopsychological Study. U.S. Public Health Service Publication. No. 572.

Hudson, T. W., Reinhart, M., Rose, S. D., & Stewart, G. K. (Eds.). (1988). Clinical preventive medicine: Health promotion and disease prevention. Printed in the United States of American.

Health Promotion and Disease Prevention. (1985). Data from the National Health Survey, Series 10, No. 163.

Holbrook, J. H. (1986). Disease prevention and health promotion: A handbook for physicians. New York: Praeger.

Institute of Medicine. (1985). Assessing Medical Technologies. Washington, DC: National Academy Press.

Jepson, C., Kessler, L. G., Portnoy, B., Gibbs, T., (1991). Black-white differences in cancer prevention knowledge and behavior. American Journal of Public Health, 81(4), 100-110.

Kanrack, M., Grant, K., & Segall, A. (1991). Gender differences in health related behavior: Some unanswered questions. Social Science and Medicine, 32(5), 579-590.

Kasl, S., & Cobb, S. (1966). Health behavior, illness behavior, and sick role behavior. Arcives of Environmental Health, 12, 246-266, 531-541.

Keeler, E.B., Solomon, D.H., & Beck, J.C. (1982). Effect of patient age on duration of medical encounters with physician. Medical Care, 20, 1101-1108.

King, J. (1982). The impact of patients' perceptions of high blood pressure on attendance at screening: An extension of the health belief model. Social Science and Medicine, 16, 1079-1091.

Kirscht, J. P. (1988). The health belief model and predictions of health action. Health Behaviors: Emerging Research Perspectives. New York: Penum Press.

Knowles, J. H. (1977). The responsibility of the individual. Doing better and feeling worse: Health in the United States, (pp. 57-80), New York: Norton.

Kronenfeld, J. J., Jackson, K. L., Davis, K. E., & Blari, S. N. (1988). Changing health practices: The experience from a worksite health promotion project. Social Science and Medicine, 26, 515-523.

Kulik, J. A., & Mahler, H. I. M. (1987). Health status, perceptions of health and nonhealth problems. Health Psychology, 6, 15-27.

Langlie, J. K. (1977). Social network, health beliefs, and preventive health behavior. Journal of Health and Social Behavior, 18, 244-60.

Lave, J.R., Lave, L.B., Leinhardt, S., & Nagin, D. (1979). Characteristics of individuals who identify a regular source of medical care. American Journal of Public Health, 69, 261-267.

Lawrence, R.S., & Mickalide, A.D. (Eds.). (1987, April 24). Preventive services in clinical practice: Designing the periodic health examination. JAMA, 257, 16.

Leventhal, H., Zimmerrman, R., & Gutmann, M. (1984). Compliance: A self-regulation perspective. In D. Gentry (Ed), Handbook of Behavioral Medicine (pp.369-436). New York: Guilford Press.

Long, S.H. (1987). Public versus employment-related health insurance: Experience and implications for black and nonblack Americans. Millbank Quarterly, 65, 200-210.

Mason, J., & Tolsma, D. (1986). Personal health promotion. Disease Prevention and Health Promotion, Handbook for Physicians. New York: Praeger.

Mechanic, D. (Ed.). (1983). Handbook of Health, health care, and the health profession. New York: The Free Press.

Michigan Department of Public Health. (1992). Health risk behaviors (edited). Michigan Department of Public Health.

Mumford, E. (1983). Medical sociology: Patients, providers, and policies. New York: Random House.

National Center for Health Statistics. (1973). Examination and Health History Findings among Children and Youths 6-17 Years, United States. Series 11, No, 129. Public Health Service.

National Health Interview Survey (NHIS) (1985). Health Promotion and Disease Prevention, United States, Series 10, No. 163. DHHS Publication No. 88-1591.

Neighors, H. W., & Jackson, J.J. (1984). The use of informal and formal help: Four patterns of illness behavior in the black community. American Journal of Community Psychology, 12, 629-644.

Office of Surveillance and Analysis, Center for Chronic Disease Prevention and Health Promotion (1989). BRFSS Operation Manual 1989. Atlanta, GA: Center for Disease Control.

Ory, M. G., Abeles, R. P., & Lipman, P. D. (1992). Aging, health and behavior. Newbury Park, NY: Sage Publications.

Polednak, A. P. (1989). Racial & ethnic difference in disease. New York: Oxford University Press.

Povar, G. J., & Riegelman, R. K. (1988). Tools for implementation. Putting prevention into practice: Problem solving in clinical prevention. Boston: Little, Brown and Company.

Ransford, H. E. (1986). Race, heart disease worry, and health protective behaviors. Social Science and Medicine, 12, 1355-1362.

Report of the U.S Preventive Services Task Force (1989). Guide to clinical preventive services: An assessment of the effectiveness of 169 interventions. Baltimore, MD: Williams & Wilkins.

Riegelman, R. K., & Povar, G. J. (Eds.). (1988). Putting prevention into practice: Problem solving in clinical prevention. Boston: Little, Brown and Company.

Rosenstock, I. (1966). Why people use health service. Milbank Memorial Fund Quarterly, 4, 94-127.

Rosenstock, I. (1990). Personal responsibility and public policy in health promotion. The Handbook of Health Behavior Change. New York: Springer.

Rundall, T., & Wheeler, J. (1979b). Factors associated with utilization of the swine flu vaccination program among senior citizens. Medical Care, 17, 191-200.

Scheff, T. J., & Silverman, A.C. (1966). Users and non-users of a student psychiatric clinic. Journal of Health and Human Behavior, 7(2), 114-121.

Segal, B., & Weiss, R. (1965). Emotional adjustment social organization and psychiatric treatment rates. American Sociological Review, 30(4), 548-556.

Shumaker, S. A. Schron, E., & Ockene, J. (Eds.). (1990). The handbook of health behavior change. New York: Springer.

Smelser, N. J. (1988). Handbook of Sociology, Newbury Park, CA: Sage.

Srole, L., Langnor, T., Michael, S., Opler, M., & Rennier, T. (1962). Mental health in the metropolis, New York: McGraw Hill.

Stahl, S. M. (Ed.). (1990). The legacy of longevity: Health and health care in later life. Newbury Park, CA: Sage.

Strernback, R. A., & Tursky, B. (1965). Ethnic differences among housewives in psychophysical and skin potential responses to electric shock. Psychophysiology, 1(3), 241-246.

Stults, B. M. (1986). Preventive health care for the elderly. In J. H. Holbrook (Ed.), Disease prevention and health promotion: Handbook for physicians, (pp. 127-158). New York: Praeger.

Sussell, L. B. (1986). Is prevention better than cure? Washington, DC: The Brookings Institution.

U.S. Department of Health, Education, and Welfare (DHEW) (1979). Health People: The Surgeon General's Report on Health Promotion and Disease Prevention. DHEW Publication No. 79-55071.

U.S Public Health Service (1979). Health People: The Surgeon General's Report on Health Promotion and Disease Prevention. Washington, DC: Government Printing Office, Summary Report and Background Papers.

Vanderschmdt, H.F., Kock-Weser, D., & Woodbury P. (1987). Handbook of clinical prevention. Baltimore, MD: Williams & Wilkins.

Verbrugge, L. M. (1985). Gender health: An update on hypotheses and evidence. Journal of Health and Social Behavior, 26, 156-82.

Verbrugge, L. M. (1989). The twain meet: Empirical explanations of sex differences in health and mortality. Health and Social Behavior, 30, 282-304.

Verbrugge, L. M., & Madans, J. H. (1988). Social roles and health trends of American women. Milbank Memorial Fund Quarterly/ Health and Society, 63, 691-735.

Villers Foundation. (1987). On the other side of easy street. Washington, D.C: Author.

Vladeck, B. C. (1983). Equity, access, and the costs of health services. Securing Access to Health Care. Vol. 3, President's Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research, (p. 9). Washington, DC: U.S. Government Printing Office.

Waksberg J. (1978). Sampling methods for random digit dialing. Journal of the American Statistical Association, 73(361), 40-46.

Waldron, I. (1983). Sex differences in illness incidence, prognosis and mortality: Issues and evidence. Social Science and Medicine, 17, 1107-1123.

Waldron, I. (1988). Gender and health-related behavior. Health Behavior: Emerging Research Perspective. New York: Plenum Press.

Weidman, H. H. (1988). A transcultural perspective on health behavior. In D. S. Gochman (Ed.), Health behavior: Emerging research perspective (pp. 221-276). New York: Plenum Press.

Wiley, J. A., & Camacho, T. C. (1980). Life-style and future health: Evidence from the Alameda county study. Preventive Medicine, 9, 1-21.

Woolhandler, S., & Himmelstein, D. U. (1988). Reverse targeting of preventive care due to lack of health insurance. JAMA, 259(19), 56-59.

Zola, I.K. (1973). Pathways to the doctor-from person to patient. Social Science and Medicine, 7, 677-689.