Preventive screening utilization in nurses and in the general population: a Taiwan study

By

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Abstract

Purpose:

The growing incidence of cancer in middle-aged and elderly populations has increased the importance of preventive measures such as cancer screening programs. In 1996, the National Health Insurance Bureau in Taiwan launched a breast cancer screening program that included breast examinations by physicians, mammograms, educational programs for breast cancer self-examination, and Pap smear tests. This study focuses on the utilization of the two main breast cancer screening measures: breast examination (including breast examination by physicians, by mammograms, and by self-examination) and Pap smear testing. Ten-year trends in utilization of breast cancer screening programs by female nurses and medical personnel were compared with those in females in the general population.

Methods:

Reimbursement data for all outpatients and inpatients diagnosed with major occupational cancers during 1997-2010 were collected from the National Health Insurance Research Database (NHIRD). For the secondary data analysis, 2002-2010 data for reimbursement claims from the Taiwan Bureau of National Health Insurance for breast cancer screening services were collected from the NHIRD. A conceptual framework based on the "behavioral model of utilization" was used to analyze the breast cancer screening service utilization from the perspectives of nurses.

Results:

Objective 1

The triennial coverage rate of Pap smear for 30-60 years old women in 2004 was 50.00% in non-medical personal group, 39.09% in physician, 49.88% in pharmaceutist, and 47.36% in nursing staff. Until 2010, the triennial coverage rate

was 52.69% in non-medical personal group, 40.61% in physician, 49.35% in pharmaceutist, and 53.29%. Additionally, the Pap smear was significantly increasing in Nurse but not in Physician and Pharmaceutist group. The Biennial year coverage rate of mammography screening are as follow: year 2003 general population 5.51%, physicians 7.41%, pharmacist 12.68%, nurse 13.43%, in year 2010 respectively are 24.94%、25.6%、25.18% and 34.4%, The mammography screening rates were increasing significantly except for pharmaceutics group.

Objective 2

The RR of first visit of cervical carcinoma in situ with Triennial utilization of Pap smear screening are greater than cervical cancer, the RR of cervical carcinoma in situ was 28.87 (95% C.I.= 21.45-38.85) and RR of cervical cancer was 7.39 (95% C.I.=6.03-9.05) in all participations . But the RR of first visit of breast cancer with biennial mammographic screening was higher than benign breast tumor or Benign breast tumor, the RR of breast cancer was 25.06(95% C.I.= 22.01-28.54) and RR of benign breast tumor was 16.72(95% C.I.=15.82-17.67) in all participations .

Objective 3

I found that in nurses, Pap smear screening was most common in that younger age, and those in high income groups. In contrast, mammography was most common in nurses being older, and with a high education level. In addition, nurses with working experience in primary healthcare setting were more likely to utilize mammography.

Conclusion:

This study provides data that health care providers and public health policy makers in Taiwan can use to increase utilization of breast cancer screening services by nurses , including Pap smear screening and mammography. Improved understanding of the health risks of cervical and breast cancer would also encourage

women to undergo Pap smear screening and mammography by increasing their awareness of the importance of early detection and prevention.

The factors that affect utilization of cancer screening programs by nurses must be clarified not only to guide health policy decision making, but also to provide an evidentiary basis for designing health promotion and disease prevention interventions in individual clients.

Advisor: Leiyu Shi, DrPH, MBA, MPA

Keywords: Preventive screening utilization; breast cancer; cervical cancer; mammogram; Pap tests.

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Chapter 1 Introduction

1.1 Female Cancer and screening

The importance of preventive screening services has grown because of the increased incidence of cancer in middle-aged and elderly populations. Because the prevalence of a disease tends to vary over time, the most effective preventive screening services emphasize adoption of a healthy overall lifestyle in addition to early detection of specific diseases (Autier et al 2009, Steele et al 2008, and Lomalisa et al 2000). The importance and benefit of preventive screening services are well documented in the literature (McGrath et al 2012; Dalton et al 2011). Such services can be classified as primary, secondary and tertiary and include early diagnosis of disease, discovery and identification of people at risk for developing specific problems, counseling, and other interventions needed to avert health problems. Screening tests, health education, and immunization programs are common examples of preventive care (McGrath et al 2012) and are important for improving utilization of cancer prevention programs.

Medical technology and living standards are improving annually in Taiwan; achieving good health has become the optimal health care goal. According to recent Department of Health (DOH) statistics, the development and use of antibiotics have changed the most common fatal disease types and have improved longevity in Taiwan.

The average life expectancy has increased to 76.2 years for males and to 82.7 years for females (2012). Statistical data released by the Health Promotion Administration of the ROC Ministry of Health and Welfare indicate that 92,682 new cancer cases were reported in Taiwan in 2011, which is an average of one new case every 5 minutes and 40 seconds of that year and an average of one new case per 251 people (DOH,2015). For example, the ten most common causes of death in 2013 in Taiwan were, in descending order, cancer, heart disease, cerebrovascular disease, diabetes, pneumonia, accidents, chronic respiratory disease, hypertensive disease, chronic liver disease and cirrhosis, and kidney disease. The study from Shen C-C et al (2013) also demstromate that compared with general population, female nurses have a higher overall cancer risk, especially nurses aged between 40–59 years. The cancer risks specifically were higher in female RNs were as fowl: the risks of breast, thyroid, lung and mediastinum, and uterine cancers. Cancer is another leading cause of death worldwide. According to World Health Organization (WHO) estimates, 7.6 million people died of cancer in year 2005 (WHO, 2012), and 84 million people will die during 2010-2020 if they do not receive proper preventive care and treatment for cancer (WHO, 2010). In 2010, global medical costs associated with cancer reached US$124.6 billion. In the U.S., an analysis of population growth and aging trends performed by the National Cancer Institutes of Health projected that, by 2020,

medical expenditures for cancer will increase by at least 27 percent to US$158 billion (2010 dollars) (Mariotto et al 2011). The increased prevalence of cancer is notable because cancer is a leading cause of death and can generate substantial medical expenses (DOH, National Health Expenditures, 2010). For example, the national health expenditure for cancer in Taiwan was an estimated NT$80 billion in 2010 (approximately US$4.7 billion based on the average exchange rate in year 2011). However, the economic burden of health care is becoming a critical issue (DOH, National Health Expenditures, 2010). The goals of epidemiology are to prevent, control, and, whenever possible, eradicate disease and associated injuries. Prevention implies the inclusion of planning and action needed to prevent or forestall the occurrence of an undesirable event. Measures to prevent and control diseases can be classified as primary, secondary, and tertiary. Primary preventive care includes examinations and screening tests tailored to the age, health, and family history of the individual patient (Smith et al, 2007). For example, a person with a family history of certain cancers or other diseases would be advised to undergo earlier and/or more frequent screening compared to those with no such family history.

Nursing is a profession within the health care system focused on the care of individuals, families and communities. For the past decade, a lot of hospitals around the world have to dealing with nurse shortage problem, leading not only to a stressful

working environment but also to numerous problems concerning the quality of patient care and cost (Chan, Z. C.Y., et al, 2013, KUNAVIKTIKUL W., et al. 2015). In Taiwan, nursing shortage also has led lots of hospitals to close wards and reduce bed numbers, which implies insufficient manpower to satisfy the personal standards of care. Therefore, nurses are frequently asked to work overtime, causing them to feel frustrated. Nurses who work longer hours can potentially threaten patient safety it also affects the health and well-being of the nurse (Reed, Kimra.2013; Lin CF et al 2013). Aiken et al. (2014) demonstrated that "a one patient increase in the nurses' workload caused an increase of 7% in the chance of patient mortality within 30 days of admission". To work day-night rotating schedules are the norm for nurses in Taiwan. The finding from previous study, suggest that there are an associated between night work and excessive risk of breast cancer in women (J.A. Lie 2006; Anjoeka P. et al 2010; Akerstedt T. et al 2015). The current studies found that overall cancer risk among nurses were higher than in the general femoral population (Langley AR et al. 2012; Dickerman B, Liu J 2012). Nurses have important roles in cancer prevention and in health education (Van LW 2002) because they serve as role models for their patients, compared to the general population, nurses also tend to place a higher value on human life; additionally, nurses have experience and skills in connecting with and listening to patients and in providing caring, support, love, and

comfort. This study investigated the extent to which nurse's care for their own health, the expectation was that, given the constant focus on health promotion and restoration in professional nursing practice, the health behaviors and health status of nurses should be somewhat better than those of the overall population.

1.2 Breast Cancer and Mammography Screening

According to the National Cancer Institute in USA，cancers that can be diagnosed early through screening include cancers of the breast, colon, rectum, cervix, prostate, oral cavity, and skin (National Cancer Institute 2012). Secondary preventive care includes quick and inexpensive disease screenings performed in groups rather than individually. The potential benefits of screening include early detection of disease, prevention of serious illness or disability, and improvement of survival (Valanis, 1999). Therefore, cancer research is important not only for advancing medical knowledge and treatment, but also for reducing the economic and social burdens of cancer. Monitoring cancer trends in terms of incidence and mortality is essential. Although many studies of such trends have been performed in the USA, the European Union, and Asia (Habbema et al 2012; Jung et al 2012; Eheman et al 2012), this study is the first to explore trends in the utilization of preventive screening services in Taiwan. Notably, preventive screening recommendations may substantially change over time. For example, in November,

2009, the US Preventive Services Task Force (USPSTF) modified its recommended mammography screening frequency for specific age groups. The recommended age range for biennial mammography screenings was also increased from 40-69 years to 50-74 years For women aged younger than 50 years, the decision was left to individual patients and their physicians since clinical evidence indicates that regular, biennial mammographic screening has a relatively larger harm and smaller benefit in this age group compared to women in older age groups. For women aged 75 years or older, the USPSTF concluded that the current evidence is insufficient to make a recommendation (Cancer Trends Progress Report – 2009/2010 Cancer Update).

This study focused on the utilization of the two main preventive screening measures: breast examination (including breast examination by physicians, mammograms, and educational programs for breast self-examination) and Pap smear testing. Ten-year trends in the utilization of breast examination and Pap smear testing were compared in female nurses, in medical personnel and in the general population.

1.3 Cervical Cancer and Pap smear Screening

A literature review shows that few studies have compared health care utilization between female nurses and women in the general population (Awodele et al 2011; Ratner & Sawatzky 2009). A Canada study that compared health care utilization between these two groups found that female nurses were more likely to undergo a Pap

smear test compared to women in the general population (Ratner & Sawatzky 2009). Danish, Nurses who worked rotating shifts after midnight had a significantly increased OR (1.8; CI 1.2–2.8) for breast cancer compared to nurses with permanent day work. No association was found in a small group of nurses with evening work and no night work (OR = 0.9; 0.4–1.9). The subgroup of nurses with periods of permanent night shift in addition to rotating night and day shifts experienced an OR of 2.9 (1.1–8.0). For nurses working after midnight compared to nurses never ending work before midnight, OR in the third tertile of cumulative number of shifts was 2.2 (1.5–3.2). In an analysis of different rotating shift systems, the highest OR (2.6; 1.8–3.8) was observed for long-term day–night rotating shifts (Hansen J, Stevens RG.2012). A recent study of professional nurses in Taiwan measured rates of Pap smear testing and breast examination, but only for a short-term period, e.g., 1-3 years (Chung et al 2011). Therefore, the available empirical evidence is insufficient for evaluating actual medical utilization by nursing personnel. Identifying the factors affecting the decision by female nurses to undergo preventive health care is also extremely important. This study used a nationwide population-based dataset to compare rates of Pap smear testing among female nurses, female medical workers, and the general population of women in Taiwan. Additional objectives were to analyze the health status of nurses and to analyze actual cases of medical and health

service utilization by female nurses to determine whether the health status and medical and health service utilization in female nurses and other female medical personnel differ from those observed in women in the general population.

1.4 Research Objectives/Specific Aims

The 2005 Longitudinal National Health Insurance Database (LNHID) was used to investigate Taiwan nurses who had received Pap smears and mammography and to compare changes in screening over time. The aims were to determine whether nurses older than 30 years had received Pap smear screening within the past 3 years, to determine whether nurses older than 50 years had received mammography screening within the past 2 years, and to analyze factors in the decision to undergo screening. These data are expected to useful to health agencies in Taiwan when formulating health policies for improving the health of women.

This study analyzed 2005 data in the Taiwan LNHID, which contained data for 1 million beneficiaries randomly sampled from the 2005 insurance registry list. This database included the medical claims of these beneficiaries from 2002 to 2010. The Andersen Behavioral Model of Health Service was used as the conceptual framework. The objectives of this research were as follows:

1-1 To estimate trends in the rate of cancer screening participation by women in Taiwan, including females in the nursing profession, in other medical professions, and in the general population. To estimate the rate of participation in annual Pap smear screenings by women aged 30-69 during 2002-2010.

1-2 To estimate the rate of participation in annual mammography screenings by women aged 50-69 (2002-2008) and by women aged 45-69 (2009-2010).

2. To estimate the effectiveness of cancer screening of women in Taiwan.

2-1 to estimate the cervical cancer and cervical carcinoma in situ initial Attendance Rate according to participation in triennial Pap smear screening by Women aged 30-69 years (2004-2010).

2-2 Investigated breast cancer, benign breast initial treatment rate, according to the analysis whether to participate in biennial mammography in women aged 50-69 years-old (2004-2008) and in women aged 45-69 years-old (2009-2010).

3. To identify factors that affected the decision to undergo Pap smear and mammography screening during year 2004-2010.

3-1 Analysis of women in general population.

3-2 Analysis of female medical personnel.

Chapter 2 Literature Review

To rationalize this study and to contextualize its purpose, this section discusses the current literature on several issues related to this research topic. Preventive care utilization in Taiwan is briefly overviewed in terms of its importance for disease prevention and in terms of the factors affecting the utilization of specific preventive screening services, e.g., breast cancer and cervical cancer screening services, by nurses in Taiwan. The purpose of the literature review was to establish a conceptual framework for the proposed study.

2.1 The Importance of Preventive Screening Services

The importance of preventive screening services has grown because of the increased incidence of chronic diseases (including hypertension and diabetes) in middle-aged and elderly populations. Because the most prevalent disease types tend to vary over time, the preventive screening services established in many countries emphasize promotion of a healthy overall lifestyle in addition to prevention and early detection of specific diseases (Autier et al 2009, Steele et al 2008, and Lomalisa et al 2000). The importance and benefit of preventive screening services are well documented in the literature (McGrath et al 2012; Dalton et al 2011). Such services, which can be classified as primary, secondary and tertiary, include early diagnosis of disease, discovery and identification of people at risk for developing specific

problems, counseling, and other interventions needed to avert health problems. Screening tests, health education, and immunization programs are common examples of preventive care (McGrath et al 2012). In the United States, the use of these services reduced the rate of death from breast cancer by 74% from 1955 to 1992. Cervical cancer incidence and mortality have declined in the United States since the introduction of cervical cancer screening in the 1950s and 1960s. Cervical cancer mortality rates declined steadily from 1975 to 2003 due to the increased use of Pap tests for prevention and early detection (American Cancer Society, 2014). According to the American Cancer Society (ACS), the Pap smear is an extremely cost-effective and beneficial method of detecting changes in cervical cells, including changes caused by cervical cancer, which may be asymptomatic in its early stages. Therefore, the Pap smear is the primary cervical cancer screening method and the most effective screening method in terms of reducing cervical cancer mortality (ACS, 2002).

In both developed and less developed countries, breast cancer is the most common cancer in women. In 2011, an estimated 508,000 women worldwide died of breast cancer (Global Health Estimates, WHO 2013). In 2014, an estimated 232,670 new cases of breast cancer and 40,000 deaths from breast cancer were reported in the United States (ACS, 2014). However, improved treatments and early detection methods have decreased breast cancer mortality in the US (ACS, 2012)

2.2 Preventive Screening Program for Women in Taiwan

In March, 1995, Taiwan implemented a compulsory National Health Insurance (NHI) program. The Taiwan health care system is organized at both national and local levels. The Taiwan DOH is the national health authority responsible for planning, supervising, and coordinating health care policies and programs. Local health authorities include county (or city) health bureaus. Health centers and health clinics, which are the primary health care providers in rural townships and remote areas, are under the direct supervision of the local health bureaus. In 2002, the NHI program covered nearly 21.6 million people and contracted with more than 93% of all health care providers. All beneficiaries receive comprehensive health care services with small copayments from contracted health care providers. The NHI program offers free and low-cost services for diagnosing and treating breast and cervical cancers. According to the Bureau of National Health Insurance (BNHI), the program was also specifically designed to address the disproportionately low screening rates observed in women in minority and low-income groups and in women who are uninsured or inadequately insured (2004). Since 1996, the BNHI has provided the following free preventive health services once every 3 years for individuals aged 40 years or older and once a year for those aged 65 years or older: (1) review of personal and family medical history and physical examination of height, weight, hearing, eyesight, oral

health, blood pressure, etc.; (2) free consultations regarding nutrition, cessation of tobacco use and betel nut use, safe sexual behavior, exercise, prevention of accidental injury, psychological adjustment, etc.; and (3) blood and urine testing (BNHI, 2004). In 2004, the overall rate of adult preventive health service utilization was 42% in adults aged 40-64 years old and 38% in adults aged 65 years and older. After implementation of the NHI, the number of people using publicly provided adult preventive health services substantially increased from 1.21 million in 1999 to 1.63 million in 2006 (DOH, 2008). According to the Taiwan DOH cancer registry, liver and lung cancer comprise approximately one third of all cancers in men. In women, liver, lung, breast and cervix uteri cancers comprise approximately half of all cancers (DOH, 2010). Of these, breast cancer is the most common cancer in women. Although it can occur at any age, the risk of breast cáncer is highest after age 40 and progressively increases with age. Although certain factors may cause a higher breast cancer risk in some women than in others, every woman should be knowledgeable about breast cancer and its treatment (Centers for Disease Control, 2005).

Cervical cancer can affect any woman who is or has been sexually active. It occurs in women who have had the human papilloma virus. History of smoking, HIV, AIDS, and poor nutrition are risk factors for cervical cancer in women who do not receive regular Pap smear tests. The U.S. Centers for Disease Control also

reports that the incidence, mortality, and morbidity of cervical cancer tend to be higher among women who do not undergo regular cervical cancer screening (2005). A Pap smear test can reveal treatable changes in the cervix before they progress to cancer. The Pap smear test is also highly effective for identifying cervical cancer in early stages when it is still curable (ACS, 2012).

According to the Bureau of Health Promotion (BHP) in Taiwan, about 603,000 women aged 50-69 years old underwent mammography during the period from July, 2002 to December, 2009. Of these, 2,325 were diagnosed with breast cancer. Additionally, 53% of these breast cancer cases were in stages 0-1, which is strong evidence of the effectiveness of mammography for early diagnosis of breast cancer. In 2008, however, the BHP reported that, according to 2006-2008 Cancer Registry data, only 18% of breast cancer cases aged 50-69 had received mammograms in the previous 2 years, and 82% of breast cancer cases had not received mammograms for more than 2 years. Therefore, regular mammography screenings are highly recommended for all women. Of women in breast cancer stages 0-1, the percentage who had received mammograms in the past 2 years (53%) was significantly larger than the percentage of women who had not received mammograms in the past 2 years (37%).

The NHI system allows citizens to choose hospitals and physicians without a

gatekeeper and without considering waiting lists. The comprehensive benefit package provided by the NHI system includes preventive health services, prescription drugs, dental services, Chinese medicine, and home nurse visits. The system provides equal access to health care for all citizens. Since the advent of the Pap smear test, the incidence and mortality rate of cervical cancer have declined by approximately 75% in Taiwan (ACS, 2005). Although the free cancer screenings offered by the NHI for women in Taiwan have decreased the incidence and mortality rate of cervical cancer, the approximate rate of participation in the annual Pap smear screening program is only 30%, and the cervical cancer screening rate is much lower in Taiwan than in the USA and other developed countries (Juon et al, 2003; Breen et al, 2001). Governmental agencies involved in cancer prevention programs in Taiwan include the National Department of Health, Taiwan Provincial Health Department, Taipei City Health Department, and Kaohsiung City Health Department, health departments at the county level, and health centers at the township level. Non-governmental organizations include academic societies, Tung's Foundation, S. Y. Dao Memorial Foundation, Taiwan Cancer Foundation, Liver Disease Control Foundation, Breast Cancer Foundation and Nan-Hai Foundation.

2.3 Preventive Screening Utilization

Both demographic characteristics and the availability of community and

individual resources are strongly associated with preventive care utilization. Preventive screening utilization is highest when the healthcare system provides adequate facilities that are easily accessible to everyone in the community. However, as noted by Andersen (1995), the community must have sufficient knowledge of facility services and how to use them as well as a means of accessing the services, especially since the perceived need for health care has a strong association with personal beliefs, attitudes, and knowledge about health and the use of health care services. The Pap smear test has been actively implemented in several countries and is considered one of the most effective cervical cancer prevention tools. For example, the use of Pap smear test in the United States beginning in 1940 has reduced cervical cancer mortality by at least 70% since 1950 (Autier et al 2009, Mahboobeh et al, 2007). In contrast, underutilization of cervical cancer screening has been observed in many ethnic groups and underserved populations (Shi et al 2011). Specifically, the literature shows that women who are living at the poverty level and women who are ethnic minorities, older, or uninsured do not undergo screenings at the recommended intervals, if at all (Lin S-J, 2008, Ackerson et al, 2007). For minority women and those of low socioeconomic status, the prevalence of Pap smear testing remains relatively low at 64.1% (ACS, 2005). A study of Taiwan women aged 20 years and older by Lin et al (2003) showed that the rate of Pap smear testing has gradually

increased from 13% in 1991 to 18.5% in 1995 and to 48.4% in 2000.

2.4 Contributing Factors in the Utilization of Preventive Screening Services

Clearly identifying contributing factors in the decision by a woman to use preventive health care services is essential. A clear understanding of these factors can improve the control and effectiveness of intervention programs for improving utilization of preventive health care services. Some of the factors that reportedly affect utilization of preventive health care services include expertise of health professionals in administering screening tests, gender differences in the use of health care services, gender differences in education and access to information, ethnic and cultural differences in the access to health care services, behavioral barriers, and income (Shi et al, 2011; Neeraja et al 2008; Owens, 2008; Singh et al., 2004). Specifically, women with limited knowledge of cervical cancer and its prevention are unlikely to access screening services. Knowledge of cervical cancer also affects screening uptake. For example, most studies agree that women with low education levels have a lower than average likelihood of undergoing cervical cancer screening. Uptake of cervical screening in women with learning disabilities is also much lower than that in women without learning disabilities (Watts 2008). Education is another factor in the utilization of preventive care services. Several studies agree that women with high screening rates tend to have a high education level (Abotchie PN & Shokar

NK 2009; Liao et al, 2006). Another factor reported in the literature is accessibility. For example, the need to travel long distances to access cervical cancer screening services reduces the likelihood of undergoing screening (Jo et al, 2009). In a U.S. study of disparities in cancer screening, Shi and colleagues reported that, compared to Whites, Asians are less likely to undergo Pap smear tests. Possible explanations include the relatively poorer access of Asians to regular health care and their poorer knowledge of cervical cancer, cancer prevention services, and the overall health care system (Shi et al 2011). Gender differences in health care utilization have also been reported (Mustard et al 1998; Deeks et al 2009). Compared to males, for example, women tend to assume greater responsibility and tend to show greater concern for their health conditions. Women also tend to visit their physicians and to utilize primary care services relatively more frequently (Vegda et al 2009).

A Taiwan study found that preventive screening utilization by women depends on many factors, including age, marital status, income level, education, and health status (Lin, 2008), researcher also found that, compared to women in western countries, women in Taiwan are more conservative in their utilization of preventive care services (Lin, 2008). One proposed explanation is cultural differences. For example, the relatively greater reluctance of Asian women to expose the body may discourage them from undergoing screening (JRSH, 2008).

Table 2-4-1. Description of the NHI Preventive Screening Services for Women

. **Eligibility**	**Breast examination (mammogram)** All women enrolled in the NHI system and aged 50-69 years in 2002-2008 and aged 45-69 years in 2009-2010
	Pap smear test All women enrolled in the NHI system and aged 30-69 years in 2002-2010
2. **Scope of services**	**Breast examination** Annual or biennial checkup including breast examination, mammogram, or educational program for breast self-examination
	Pap smear test Annual or triennial

Chapter 3 Research Methodology

3.1 Conceptual Framework

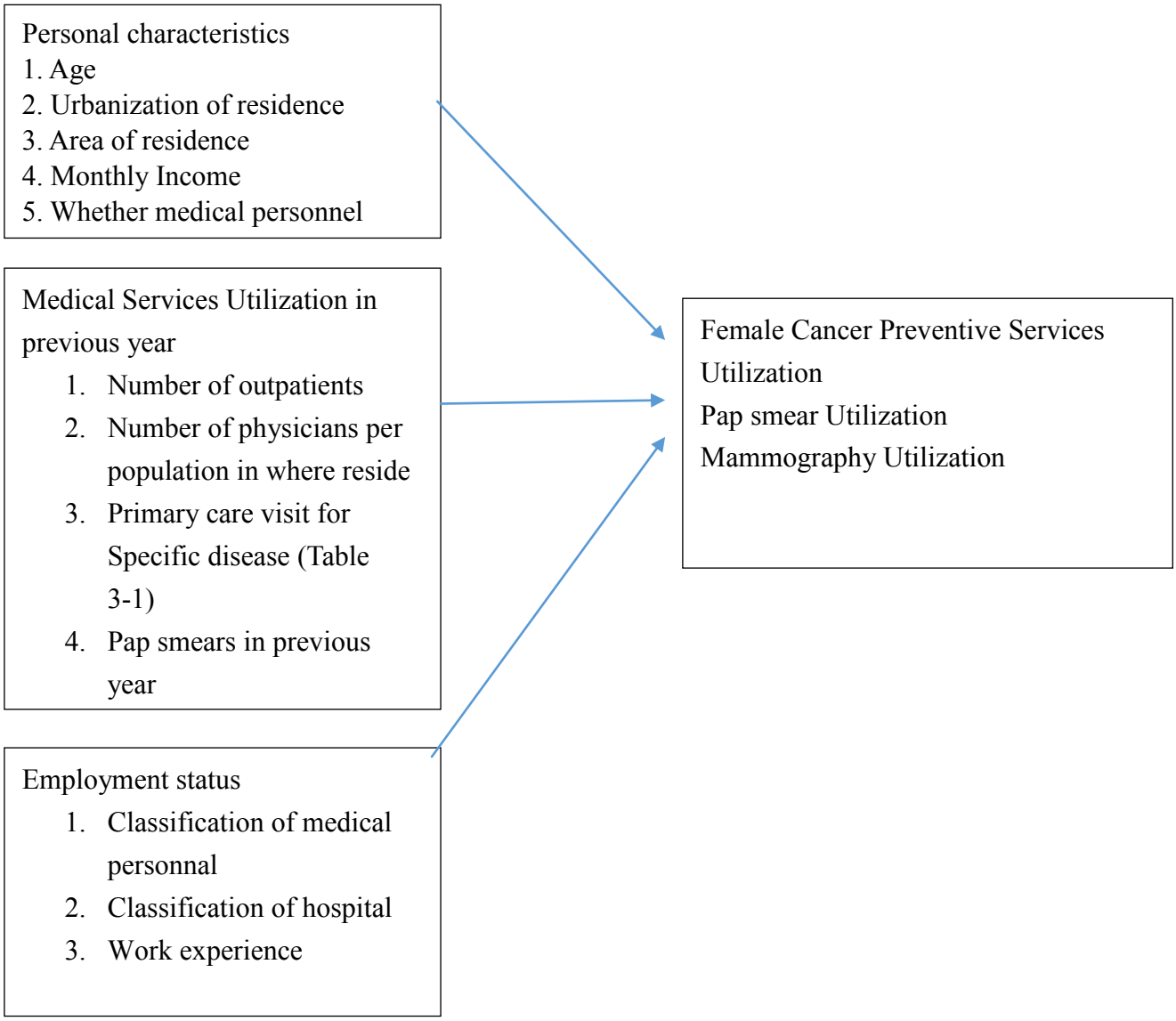


Table 3-1-1

Group	Disease (site)	ICD-9-CM
G1	Carcinoma (breast)	174.xx
G2	Carcinoma (cervix)	180.xx
G3	Benign neoplasm (skin)	216.9
G4	Benign neoplasm (breast)	217.xx
G5	Myoma (uterus)	218.9
G6	Benign tumor (uterus)	219.9
G7	In situ carcinoma (cervix uteri)	233.1
G8	Tumor (breast)	239.3
G9	Fibroadenosis (breast)	610.2
G10	Other disorder (breast)	611.xx
G11	Inflammatory disease (uterus)	615.9
G12	Inflammatory disease (ectocervix or vulva)	616.xx
G13	Noninflammatory disorder (cervix)	622.xx
G14	Noninflammatory disorder (vagina)	623.xx
G15	Menstrual disorder or other abnormal bleeding (genital tract)	626.xx
G16	Pruritus (genital organs)	698.1
G17	Other symptoms (abdomen or pelvis)	789.xx

The Taiwan NHI established preventive health services for citizens who met certain criteria. This study investigated two major preventive screening services received by women in Taiwan: **1)** breast cancer preventive screening, including

examination by a physician, examination by mammography, and educational programs for performing breast self-examination, and 2) Pap smear test. The objective was to explore issues in the provision of preventive screening services in the context of the Taiwan NHI system.

3.2 Hypotheses

To achieve the three aims of the study, three research questions were addressed:

Research Question 1: What is *the trend in the cancer screening participation rate in Taiwan women? Does preventive health care utilization differ between women who are health care professionals and women in the general population?*

Hypothesis 1: The factors that negatively affect utilization of preventive health care services by Taiwan nurses are similar to those observed in studies of the general female population, including limited understanding of the screening test and its guidelines, limited availability and accessibility of preventive health care services, insufficient health care information, and cultural and behavioral barriers. Generally, nurses are expected to have better health behaviors and better overall health compared to the overall population because of the strong emphasis on health promotion and restoration in nursing practice.

Research Question 2: *Is preventive health care utilization higher in female medical personnel than in the general female population?*

Hypothesis 2: Preventive health care utilization is higher in female medical personnel because they have relatively more health-related knowledge.

Research Question 3: *What factors affect utilization of cancer screening services by Taiwan nurses?*

Hypothesis 3: The factors that affect utilization of cancer screening services by Taiwan nurses include personal characteristics, work experience, and characteristics of the health care facilities where they work.

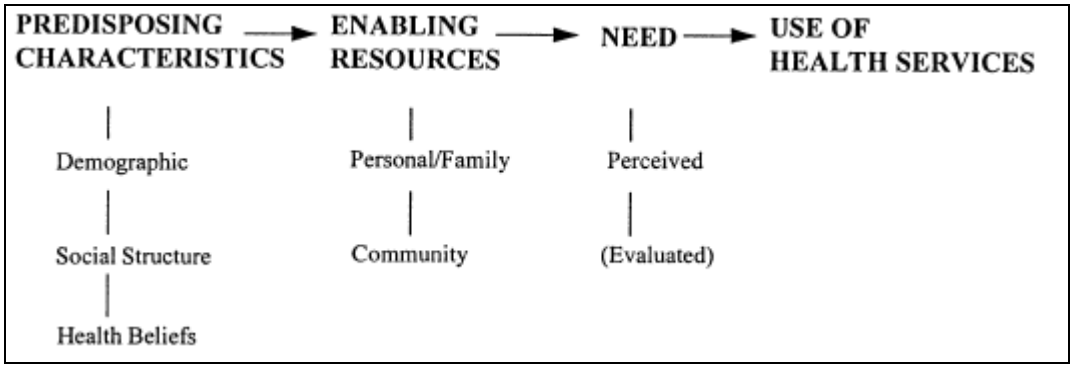
3.3 Behavioral Model of Utilization

In this study, the conceptual framework used to analyze the important predisposing, enabling, and need components that affect preventive health care utilization was the "behavioral model of utilization" developed by Andersen (1995).

This model is among the most complete and most widely used theoretical frameworks for analyzing factors associated with patient utilization of health care services. In this model, a systems perspective is used to evaluate whether variables related to the individual, the environment, and the provider are associated with the decision to seek health care. In studies of health care utilization, this conceptual framework is often used to guide the formulation of hypotheses and to guide the collection and analysis of data. The Andersen model measures physician contacts in terms of three factors: predisposing factors, enabling factors and need factors.

Andersen et al (1974) defined **predisposing factors** as the components of predisposing characteristics of individuals that may have a higher than average propensity to use health services. Potential predictors of health care utilization include age, gender, parental education and occupation, public assistance, and adolescent health beliefs and attitudes. Medical service utilization depends on individual differences in age, gender, marital status, race, education level, profession, and health beliefs. **Enabling factors:** The enabling component refers to the effects of family and community resources on medical resource utilization. Factors that affect medical resource utilization include family income, health insurance, access to regular hospitals, availability of medical staff and medical facilities in proportion to the population, cost of medical services, and the characteristics of urban and rural environments. One important factor in health service utilization is the origin of resources (i.e., personal resources or community resources) available to a person for health care. **Need factors:** Perceptions of illness were examined to determine when services required to meet perceived medical needs were unobtainable. The need component includes factors that determine the capacity of an individual to utilize medical services, including health awareness, disease status, and the clinical evaluation of diseases (Andersen, 1995)

Fig. 3-3-1 Analytical framework based on the Anderson health services utilization model



3.4 Study Design and Methods

The aim of this study was to identify issues related to preventive screening service utilization by nursing staff. The analysis included secondary data obtained from the 2005 LNHID, which is updated annually by the BNHI. Retrospective cohort data were used to achieve the following three aims of this study:

1. Research objective 1: To perform a panel study (repeated cross-sectional study) to estimate trends in the rate of cancer screening participation by Taiwan women in the general population (in comparison with different classifications of medical personnel) during 2002-2010, to calculate the rate of participation in cancer screening programs during 2002-2010, to calculate the triennial coverage ratio for Pap smear screening, and to calculate the biennial coverage rate for mammography; to use Poisson regression to identify temporal trends in cancer screening participation.

2. Research objective 2: (To estimate the effectiveness of cancer screening programs for Taiwan women during 2004-2010. To perform a panel study to analyze associations between cervical cancer and cervical carcinoma in situ or breast cancer, benign breast onset rate with cancer screening involvement.
3. Research objective 3: To apply a case control study design to identify factors that may affect participation in Pap smear screening and mammography screening during 2004-2010, based on whether the annual cancer screening for women participating in the event, estimate the personal characteristics, medical use of the previous year, and to use a logistic regression analysis to present the odds ratio of who suffering from cancer use preventive screening services. To use the GEE model to analyze a data set contains the concept of repeated measurements of year 2004-2010.

3.5 Data Source and Data collection

Secondary data were used for comparisons within and between groups, nations, and societies. This section describes how secondary data sources were used to address the research questions (Lockwood, S. 2006). The NHI database contains registration files and original data for reimbursement claims, including comprehensive data for demographics, dates of clinical visits, diagnostic codes, medical expenditures, and treatment details such as examinations, procedures, and prescriptions. Since the NHI

program requires physicians and hospitals to apply for reimbursement after providing various health services such as cervical cancer screening, medical claims data are a reliable indicator of preventive health care utilization. Any secondary data obtained from the NHIRD that could potentially be used to identify patients or care providers, including medical institutions and physicians, were scrambled before being sent to the National Health Research Institutes for database construction and then scrambled again before being released to each researcher. Theoretically, this procedure prevented all possible levels of individual identification based on information contained in this database. All researchers who use the NHIRD and its data subsets are required to sign a written declaration that they have no intention to obtain information that could potentially violate the privacy of patients or care providers. For study objective 1 and objective 2, the dependent variables were the numbers of Pap smears and breast examinations. For study objective 3, the dependent variable differed by age group. In the group aged 30-69 years, the dependent variable was whether the subject had received at least one Pap smear covered by NHI during each 3-year period from January, 2002 to December, 2010. In the group aged 50-69 years, the dependent variable was whether the subject had received at least one breast examination during each 2-year period from January, 2002 to December, 2008. In the group aged 45-69 years, the dependent variable was whether or not the subject had

received at least one breast during each 2-year period from January, 2002 to December, 2010. Potential confounding factors considered in regression modeling included age, monthly income, and the residence of the subject in terms of its urbanization level and geographic location, and the number of ob. /gym ambulatory care visits by the participant during the period in question.

3.6 Population and sampling

Professional standards for nurses in Taiwan are well developed. Since 1982, a competency-based nursing clinical ladder system has been implemented in more than 100 hospitals. Hospitals usually implement a four-level clinical ladder system for nursing staff: N1 (entry level; qualified to provide care for general patients); N2 (qualified to provide care for critical patients); N3 (qualified to provide nursing care integrated with clinical teaching activities); and N4 (qualified to act as nursing administrator and to assist in research/survey activities) (Kaohsiung Veterans General Hospital, 2000).

This study included a study group and a comparison group. The target population comprised female nurses, female medical personnel, and the general population of Taiwan females aged 30 years and older. The study analyzed female nurses and female medical personnel who were aged 30-69 years and who were listed in the 2002-2010 Registry of Medical Personnel of the LNHID2005. Participants

who met the initial screening requirements were enrolled in the study, and their medical records were reviewed for utilization of cancer screening services performed by Pap smear or mammography. Since screenings can be performed annually for each insured, Pap smear or mammography screening was investigated for the period from January 1 to December 31 of each calendar year of the study (2002-2010). Therefore, a subject aged 30-69 during 2002-2005 received screenings in 2003 and in 2004 but not in 2002 or in 2005. Thus, four events were recorded: two utilization records were implied in 2003 and 2004 and two non-utilization were recorded in 2002 and 2005.

The comparison group was selected from the 2006 Registry of Beneficiaries in the 2005 LNHID, excluding subjects currently employed as nurses. The subjects were limited to an age range of 30-69 years. The categories of medical personnel included in this analysis were physician, pharmacist, nurse, and other. In some cases, however, the groups were reconstituted due to the small number of subjects.

3.7 Sample size determination

A power analysis was used to estimate the sample size needed to determine the magnitude of difference in preventive care utilization (Suresh & Chandrashekara, 2012). The sample size was sufficiently large for additional within-group analysis.

3.8 Measurements

To address the questions of interest, a literature review was performed to select the dependent and explanatory variables used to analyze the LNHID data. Preventive screening service utilization by women was categorized as breast examination (including breast examination by physician, by mammogram, and educational programs for breast self-examination) and Pap smear test.

Dependent variables

For objective 1, the dependent variable was the number of Pap smears or mammograms received by the participant during 2002-2010. The numbers of triennial Pap smears and biennial mammograms were also calculated.

For objective 2, the dependent variable was the time of the first diagnosis of cervical cancer or cervical carcinoma in situ. For objective 3, the dependent variable was whether the individual had received a Pap smear test in the current year, and the dichotomous variable was whether the individual had received a mammogram during 2004-2010。

Independent variables

For Objectives 1 and 2, the independent variables were: medical personal group, Year and age.

For Objective 3, the independent variables were: medical personal group, year, age, degree of urbanization of residence area, number of physicians per 10,000

population in residence area, income, outpatient visits in previous year, charlson comorbidity index in previous year, disease diagnosed in previous year, cancer screening in previous year, and medical personal work experience.

3.9 Statistical analysis

For different subject characteristics, the descriptive statistical analysis of LNHID will include frequency distributions and percentages. Generalized estimation equations will also be used to analyze predisposed components, enabling components, and need components that influence annual screening. In the analysis of the year **2002-2010** preventive health care and health insurance medical claims data obtained from the Bureau of Health Promotion and the National Health Research Institutes, the effects of outcome variables will be measured by adjusted odds ratio with 95% confidence intervals.

For Objectives 1 the annual or biennial coverage rate of breast examination and annual or triennial coverage rate of Pap smears in different groups were estimated by the formula:

Coverage rate = utilization population number / eligibility participations

And I used Poisson generalized linear model and max likelihood methods to estimate the 95 % confidence interval of coverage rate and test the temporal trend.

For Objectives 2 diseases (included cervical cancer and cervical carcinoma in situ or breast cancer and benign breast) onset rate was calculate by cancer screening utilization group and stratified medical personal group, and we compare the screening efficiency between groups.

For Objectives 3 percentage differences in each variable will be tested for statistical significance by performing chi-square tests and continue variable was tested by student t test. Finally, the GEE regression will be used to compare receipt of preventive screening services among female nurses, female medical worker and general population enrolled in NHI after adjusting for covariates. The adjusted odds ratios (ORs) and 95% confidence intervals (95% CIs) for NHI enrollees in each group having that preventive screening service, using general population as the referent group.

The analyses will include covariates such as year, age, residence area, urbanization status, number of physicians per 10,000 population in where reside, monthly income, outpatient visit in previous year, Charlson comorbidity index in previous year, disease diagnosed in previous year, utilization of cancer screening in previous year, and employment status,. The analyzed age groups will be 30–69 years (for Pap tests from 2002-2010) and 50-69 years (for mammogram cancer screenings from 2002-2008) and 45-69 years (for mammogram cancer screenings from

2009-2010). Monthly income will be categorized as dependent, ≤ NTD20, 000, NTD 20, 000–40,000, and > NTD 40,000.

The SAS software package will be used for all statistical analyses. To achieve the first study objective, preventive health care utilization by female nurses will compare with general population based on data in the NHIRD. The second study objective will be achieved by 2002-2010 data from the NHIRD to represent cancer screening related disease onset proportion in different groups. The third study objective will be achieved by using 2004-2010 NHIRD data to explore the potential factors of Pap smear testing and utilization of other preventive health services in female medical personnel and RNs.

3.10 Variables and Description

Variables and Definitions

The study contained 3 major purposes, the variable definitions for each study objectives are: Table 3-10-1 is the variable definitions for study objective 1. In study objective 1 the dependent variables are number or rates of Pap smear screening participations in each year or specific duration, the major independent variable is health care personnel groups, and covariate variables are time period, age, urbanization and region. Table 3-10-2 is the variable definitions for study objective 2. In study objective 2 the dependent variables are number or rates of first time

diagnosed of specific disease (included cervical cancer or cervical carcinoma in situ, and breast cancer or breast carcinoma in situ) in each year, the major independent variables are health care personnel groups and specific cancer screening in recently, and covariate variables is time period. Table 3-7-3- is the variable definitions for study objective 3. In study objective 3 the dependent variables are utilization of Pap smear screening within three years and utilization of mammography screening within two years, the major independent variable is health care personnel groups, and covariate variables included time period, age, urbanization, region, number of physicians per 10,000 population in where reside, income, number of outpatient visits in previous year, disease diagnosed in previous year, number of Pap smear screening during previous 2 years, participate mammographic screening in previous year and medical personal characteristics

Table 3-10-1 Variables and definitions

Variables	Code	Type of Variables
Dependent Variables		
Number or rate of Pap smear screening partications for each year or triennial period	The cumulative number or rate of Pap smear screening involvement for each year or triennial period	Continuous Variable
Number or rate of mammography screening partications for each year or biennial period	The cumulative number or rate of mammography screening involvement for each year or triennial period	Continuous Variable
Major Independent variable		
Health care personnel	(1) Not medical personal (2) Physicians (3) Pharmaceutics (4) Nurse (5) Others	Categorical Variable
Covariate Variables		
Time period	From 2002 to 2010, to calculate each time point screening user number or rate, and estimated the time trends.	Categorical Variable
Age	From the birth of the research subject to 31 December of each time period	Continuous Variable
Urbanization	(1) Urban (2) Sub-urban (3) Rural	Categorical Variable
Region	(1) Taipei area (2) Northern (3) Central (4) Southern (5) Kaohsiung area (6) Eastern	Categorical Variable

Table 3-10-2 Variables and definitions

Variables	Code	Type of Variables
Dependent Variables		
Number or rate of first time diagnosed of cervical cancer or cervical carcinoma in each year	The cumulative number or rate of first time diagnosed of cervical cancer or cervical carcinoma for each year	Continuous Variable
Number or rate of first time diagnosed of breast cancer or breast carcinoma in situ in each year	The cumulative number or rate of first time diagnosed of breast cancer or breast carcinoma in situ for each year	Continuous Variable
Major Independent variable		
Health care personnel	(1) Not medical personal (2) Physicians (3) Pharmaceutics (4) Nurse (5) Others	Categorical Variable
Whether involved with Pap smear screening within 3 years	(0) No (1) Yes	Dichotomous Variable
Whether involved with mammography within 2 years	(0) No (1) Yes	Dichotomous Variable
Covariate Variables		
Time	From 2002 to 2010, to calculate cumulative number or rate of first time diagnosed of specific cancer, and estimated the time trends.	Categorical Variable

Table 3-10-3 Variables and definitions

Variables	Code	Type of Variables
Dependent Variables		
Utilization of Pap smear screening within 1 year	(0) Never (1) Yes	Dichotomous Variable
Utilization of mammography screening within 1 year	(0) Never (1) Yes	Dichotomous Variable
Major Independent variable		
Health care personnel	(1) Not medical personal (2) Physicians (3) Pharmaceutics (4) Nurse (5) Others	Categorical Variable
Covariate Variables		
Time	From 2002 to 2010, to calculate each time point screening user number or rate, and estimated the time trends.	Categorical Variable
Age	From the birth of the research subject to 31 December of each time period	Continuous Variable
Urbanization	(1) Urban (2) Sub-urban (3) Rural	Categorical Variable
Region	(1) Taipei area (2) Northern (3) Central (4) Southern (5) Kaohsiung area (6) Eastern	Categorical Variable
Number of physicians per 10,000 population in where reside	(1) <25 (2) 25-75 (3) ≧75	Categorical Variable
Income	(1) Dependent on other (2) 0-20000 (3) 20001-40000 (4) >40000	Categorical Variable
Number of outpatient visits in previous year	(1) 0 (2) 1-2 (3) ≧3	Categorical Variable
Disease diagnosed in previous year		
Benign neoplasm of skin	(0) No (1) Yes	Dichotomous Variable
Myoma uterine	(0) No (1) Yes	Dichotomous Variable
Benign uterine tumor	(0) No (1) Yes	Dichotomous Variable
Breast tumor	(0) No (1) Yes	Dichotomous Variable
Breast fibroadenosis	(0) No (1) Yes	Dichotomous Variable
Other disorders of breast	(0) No (1) Yes	Dichotomous Variable
Inflammatory disease of uterus	(0) No (1) Yes	Dichotomous Variable

Variables	Code	Type of Variables
Inflammatory disease of cervix vagina and vulva	(0) No (1) Yes	Dichotomous Variable
Noninflammatory disorders of cervix	(0) No (1) Yes	Dichotomous Variable
Noninflammatory disorders of vagina	(0) No (1) Yes	Dichotomous Variable
Disorders of menstruation and other abnormal bleeding from female genital tract	(0) No (1) Yes	Dichotomous Variable
Pruritus of genital organs	(0) No (1) Yes	Dichotomous Variable
Other symptoms involving abdomen and pelvis	(0) No (1) Yes	Dichotomous Variable
Number of Pap smear screening during previous 2 years	(0) 0 (1) 1 (2) 2	Categorical Variable
Participate mammographic screening in previous year	(0) No (1) Yes	Dichotomous Variable
Medical personnel characteristics		
Hospital Classification	(1) Medical Center (2) Regional Hospital (3) District Hospital (4) Clinic (5) Others	Categorical Variable
Working Experience	(1) 0-1 (2) 1-2 (3) >2	Categorical Variable

Table 3-10-4. Analysis per each Research Question and Study Hypothesis

Research Question and Study Hypothesis	**Independent variable**	**Outcome variable**	**Statistical Model**
R1: **What is *the trend of Taiwanese women's cancer screening participation rate, according to medical personnel classification? Does preventive health care utilization differ between female nursing staff and the general population?*** H1: Generally, nurses would be expected to have better health behaviors and better overall health compared to the overall population because of the strong emphasis on health promotion and restoration in nursing practice.	Primary independent variable: Health care personnel or general population Other covariate: - Time period - Age - Urbanization where the subject reside - Region where the subject reside	(1) Number or rates of Pap smear screening in each year or specific duration (2) Number or rates of breast examination as recommended in each year or specific duration	(1) Coverage rate (2) Poisson generalized linear model
R2: *Was preventive health care utilization more effectiveness in female medical personnel?* H2: Preventive health care utilization was more effectiveness in female medical personnel because they have more health	Primary independent variable: (1) Health care personnel or general population (2) Specific cancer screening in recently Other covariate: - Time period	Number or rates of first time diagnosed of specific disease (included cervical cancer or cervical carcinoma in situ, and breast cancer	(1) Disease incidence rate (2) Poisson generalized linear model

knowledge.		or breast carcinoma in situ) in each year	
R3: *What factors affect preventive screening utilization by nurses in Taiwan?* H3: Female nurses' personal characteristics, experience, and characteristics of health care facilities where they work associated with utilization were associated with cancer screening.	Primary independent variable: Health care personnel or general population Other covariate: - Time period - Age - Urbanization where the subject reside - Region where the subject reside - Number of physicians per 10,000 population in where reside - Income - Number of outpatient visits in previous year - Disease diagnosed within 1 year - Number of Pap smear screening during previous 2 years - Participate mammographic screening in previous year - Medical personnel characteristics	Pap smear as recommended or not Breast examination as recommended or not	GEE with binary outcome variable

3.11 Protection of Human Subject

Secondary datasets from LNHID of Taiwan was adopted in this study, neither of which contained any name or personal identification, so to keep the identities of study subjects confidential I kept the datasets from misuse by unauthorized investigators during the whole study period. The approved IRB was obtained from the Johns Hopkins University (Number FWA #00000287, dated November 7, 2013).

Chapter 4 The Results

Objectives 1 (To estimate the trend of Taiwanese women's cancer screening participation rate from 2002-2010, according to Registry for medical personnel)

Table 4-1-1 presented the number and proportion of 30-69 years old female in year 2002-2010, (for Pap smears target population), this table indicated that the number of medical personnel have been increased from 1519(0.68%) in year 2002 to 6567(2.42%) in year 2010. Table 4-1-2 medical personnel and then subdivided into physicians, pharmaceutics, nursing staff and other in year 2002-2010, proportion of nursing staff have been increased from 50.10 percent in 2002 to 76.02 percent in 2010 among medical personnel.

Table 4-2-1 presented number and proportion of female population of 50-69 years old in 2002-2008 and 45-69 year old in year 2009-2010(for mammography target population), this table also showed the number (proportion) of nursing staff rapidly increase from 139(0.19%) to 1801(1.21%). Table 4-2-2 According to the medical personnel classification presented in line with the proportion of medical personnel distribution of mammography screening in year 2002-2010, where the proportion of Nursing Staff have increased from 34.53% in year 2002 to 69.57% in year 2010 among medical staff.

Table 4-3-1 demonstrated that 30-69 years old in year 2002 the general public and the medical staff of the demographics and characteristics, the nursing staff were youngest among the study population, Mean ± SD age was 37.47 ± 6.49; maximum age for the general population is 45.67 ± 10.53. In addition to medical personnel insured location general population is relatively high degree of urbanization, the regional distribution of the insured are also different. Table 4-3-2 shows the general population and the medical staff of year 2002 aged 50-69 year-old demographics and characteristics, age, medical personnel of the general population is relatively low, and there is a larger proportion living in urban areas.

Table 4-4 demonstrated that Pap smear coverage rate in 30-69 years old general population, physicians, pharmacy and nursing staff from 2002 to 2010. Number of Pap smear participants (single year coverage rate) in 2002 were 58701(26.47%) in non-medical personal group, 31(15.27%) in physician, 98(26.7%) in pharmaceutics, and 191(25.1%) in nursing staff, respectively. And the number (rate) in 2010 changed to 77001(29.12%) in non-medical personal group, 81(22.38%) in physician, 139(25.79%) in pharmaceutics, and 1550(31.05%) in nurse. The triennial coverage rate of Pap smear in 2004 was 50.00% in non-medical personal group, 39.09% in physician, 49.88% in pharmaceutics, and 47.36% in nursing staff. Until 2010, the triennial coverage rate was 52.69% in non-medical personal group, 40.61% in

physician, 49.35% in pharmaceutics, and 53.29% in nursing staff. The Figure 4-1 shows the triennial coverage rate of Pap smear from 2004 to 2010 by medical personal group.

Table 4-5-1 presented the coverage rate relative difference, the relative ratio was estimated based on coverage rate in previous year, and tested the time linear trend from year 2002-2010. Pap smear coverage rate from non-medical personal have been increased to 1.2% ($p<0.0001$) compared with the previous year, Physician and Pharmaceutics the average annual coverage rate of relative change is not reached statistical significance. Nurse group every year coverage rate relative change for the previous year was 3% ($p<0.0001$)。Table 4-5-2 is presented the triennial coverage rate, the results also show that only non-medical personal and nurse group have gradual increasing trend, respectively are non-medical personal group 0.8%($p<0.0001$) and nurse group 2.4%($p<0.0001$).

Table **4-6** demonstrated that from year 2002 to 2010 mammography screening coverage ratio in single year and biennial year, year 2002 coverage ratio in single year are as follow: general population 2593(3.46%)、physicians 1(4.35%)、pharmacist 5(8.93%)、nursing staff 2(4.17%), year 2010 the coverage ratio (%) are show as below: general population 24209(16.50%)、physicians 20(16.00%)、pharmacist 46(16.55%) and nurse 308(24.58%). Biennial year coverage ratio of mammography screening

are as follow: year 2003 general population 5.51%、physicians 7.41%、pharmacist 12.68%、nurse 13.43%, year 2010 respectively are 24.94%、25.6%、25.18% and 34.4%, Figure 4-2 shows the biennial coverage rate of mammography screening from 2003 to 2010 by medical personal group.

Table **4-7** indicated that year 2002-2010 in each single year the results relative to the rate of change and the time trend of verification coverage ratio of mammography screening, the results show that no matter what group，a significant increase in the rate of mammography screening age, increasing rate (annual screening rate above baseline) in each of the general population 22.4%(p<0.0001)、physicians 20.2%(p= 0.0053)、pharmacist 7.9%(p= 0.0277)、Nurse 17.5%(p <.0001)。In addition to the rate of increase in the biennium pharmaceutics are not reached statistical significance but which have a significant increase in the other groups. In addition to pharmaceutics are not statistically significant, others are significantly increase, respectively are general population 21.6%(p<0.0001)、physicians 18.1% (0.0034)、Nurse 12.9% (p<0.0001).

Objectives 2 (Taiwanese women's cancer screening effectiveness from 2004-2010)

Table 4-8 indicated that from year 2002 to 2010 the first time diagnosed cervical cancer or cervical carcinoma in situ the number and incidence of the year, excluded year 2002 and year 2003 is difficult to define the initial diagnosis portion, year 2004

the incidence of cervical cancer or cervical carcinoma in situ (per 100 person year) are show as below: non-medical staff 0.17、physician and pharmaceutics 0.47 and Nurse 0.00, year 2010 respectively are Non-medical staff 0.09、physician and pharmaceutics 0.22 and Nurse 0.06. Table 4-9 showed that year 2004-2010 female with 30-69 years old cervical cancer or cervical carcinoma in situ first visit, according to the analysis of triennial utilization of Pap smear screening analysis, whether or not medical personnel, participating in three years Pap smear screening compared to the participants did not have higher cervical cancer or cervical carcinoma in situ attendance rate for the first time, the RR of first visit in the group of all participations are 13.19(11.13-15.63)、Non-medical Personnel is 13.32(11.22-15.81)、Physician and Pharmaceutics is 4.09(0.85-19.70)、Nurses 13.49(1.77-102.61) and the value of RR in cervical carcinoma in situ are greater than cervical cancer. Table 4-10 showed that year 2002-2008 50-69 years old and year 2009-2010 45-69 years old female population breast cancer, benign breast initial treatment rate initial treatment rate, according to observation in year2004, the incidence of breast cancer or benign breast tumor in female population(per 100 person year) are Non-medical staff 1.24、Physician And Pharmaceutics 0.9 and Nurse 4.88, in year 2010 respectively are Non-medical staff 1.09、physician and pharmaceutics 2.99 and Nurse 1.72. Table 4-11 showed that in year 2002-2008 50-69 years old and year 2009-2010 45-69 years

old the analysis of female population breast cancer, benign breast initial treatment rate，whether or not medical personnel, had participated mammographic screening in two years have higher first time visit for breast cancer or benign breast, the RR of first time visit (95% C.I.) respectively, in all participations is 16.69(15.84-17.58) 、16.72 (15.87-17.62) for Non-medical personnel、12.24 (4.89-30.66) for Physician and Pharmaceutics and Nurse are 11.71(5.17-26.54). But the RR of breast cancer is greater than benign breast tumor in Non-medical personnel group, there is no such phenomenon in medical personnel groups.

Objective 3 (Analysis of the potential factors impacted on Pap smear and mammography screening involvement in women from 2004 to 2010)

If any participation meet the eligibility screening, each person could have free screening services every year, so each case is calculated eligibility screening per person in every year, if the person to participate in the screening, the calculation for an inspection trips. Therefore the study design is repeated analysis for the annual observation. If there were a total of four times a chance to check in 2004-2010, the participation of two times, the record is 2 times been screening and 2 times not screening, which will be in depends on the characteristics of the person when the statistical properties of the corresponding year.

Table 4-12-1 is presented year 2004-2010 the number of participant and non-participant of Pap screening, and characteristics and distribution. Compare with Pap screening and without Pap screening medical personal proportion significantly low (1.65% vs. 1.70%, p=0.0086)、higher age (45.03±9.04 vs. 44.79±9.57, p<.0001)、there are differences in residence area、higher rural population(7.65% vs. 6.66%, p<.0001)、≧75 physicians per 10,000 population in where reside the fraction is low(1.17% vs. 1.23%, p=0.0051)、higher income、higher scores of Charlson comorbidity index in last year 、have higher proportion of disease diagnosed in last year(including Carcinoma of breast、Carcinoma of cervix…etc.)、participating in free Pap screening more in previous two years 2 year(participating one time are 37.85% vs. 25.83%；participating two times are26.31% vs. 6.42%, p<.0001). Table 4-12-2 analysis the participant of medical personnel, according to their medical services or job data and other relevant information, the result showed that the nursing staff have higher proportion with Pap screening With Pap screening (73.01% vs. 68.97%, p<.0001) 、there are significant differences in Hospital Classification、no significant related to work seniority.

Table 4-13 are used GEE model analysis the factors which affect participant characteristics of Pap screening, the result of Multiple regression model showed that the factors relative with Pap screening including age 、residential areas、Urbanization

of residence place、Income、No. of outpatient visits in last year、Charlson comorbidity index in last year、Disease diagnosed in last year and the times of participate of Pap smear from previous year. The result of table 4-14 showed that when control other covariate, compared with physicians and Pharmaceutics, nursing staff have higher utilization of Pap screening, which is OR=1.243(95% C.I. = 1.15-1.343). Table 4-15 the result showed that workplace and hospital grade and seniority of the medical personnel were irrespective of the use of Pap screening.

Table 4-16-1 is presented the number of participant、 non-participant、 characteristics and distribution of mammographic screening in year 2004-2010. mammographic screening medical personal significantly higher proportion (1.25% vs. 0.68%, p<.0001)、younger age (55.75±5.80 vs. 56.34±6.05, p<.0001) 、There are significant differences in residence area、A higher proportion living in urban area (65.82% vs. 63.17%, p<.0001)、higher proportion of ≧75 physicians per 10,000 population in where reside(0.85% vs. 0.45% p<.0001)、higher income、higher proportion of >10 time of outpatient visits in last year (77.24% vs. 63.84%, p<.0001) 、high scores of Charlson comorbidity index in last year、the higher proportion of disease diagnosed in last year、and has been involved in mammographic screening in last year(12.75% vs. 6.5%, p<.0001). Table 4-16-2 showed that further analyzed characteristics of medical personnel, nursing staff have higher proportion of

mammographic screening utilization (67.73% vs. 62.99%, p<.0001) 、service organizations favor larger hospital.

Table 4-17 indicated that use GEE model analysis affect mammographic screening related characteristics, and utilization of mammographic screening whether the relevant factors including medical personnel、age、residence area、live in rural、income、No. of outpatient visits in last year、Charlson comorbidity index in last year、Disease diagnosed in last year and participate mammographic screening in last year.

Table 4-18 indicated that Nursing staff have higher utilization of mammographic screening compared with physicians and Pharmaceutics, OR=1.343(95% C.I. = 1.081-1.668). Table 4-19 indicated that for Nursing staff, the people who work in the Medical center have higher utilization of mammographic screening，and length of service indicated that 0-1year have lower utilization of mammographic screening compared with 1-2 years or more than 2 years.

Table 4-1-1
Number and proportion of 30-69 year old female from 2002 to 2010, (for Pap smears target population)

Year	Non-Medical personnel	Medical personnel
2002	221766(99.32%)	1519(0.68%)
2003	234986(99.24%)	1811(0.76%)
2004	238279(99.13%)	2085(0.87%)
2005	249540(99.00%)	2517(1.00%)
2006	255244(98.85%)	2959(1.15%)
2007	256494(98.73%)	3311(1.27%)
2008	259527(98.01%)	5272(1.99%)
2009	260532(97.73%)	6054(2.27%)
2010	264429(97.58%)	6567(2.42%)

Table 4-1-2

The distribution of 30-69 years old female medical personnel from 2002 to 2010

Year	Physicians	Pharmaceutics	Nursing Staff	Other
2002	203(13.36%)	367(24.16%)	761(50.10%)	188(12.38%)
2003	223(12.31%)	392(21.65%)	972(53.67%)	224(12.37%)
2004	243(11.65%)	403(19.33%)	1174(56.31%)	265(12.71%)
2005	265(10.53%)	419(16.65%)	1511(60.03%)	322(12.79%)
2006	281(9.50%)	446(15.07%)	1841(62.22%)	391(13.21%)
2007	291(8.79%)	458(13.83%)	2138(64.57%)	424(12.81%)
2008	320(6.07%)	484(9.18%)	3905(74.07%)	563(10.68%)
2009	339(5.60%)	509(8.41%)	4583(75.70%)	623(10.29%)
2010	362(5.51%)	539(8.21%)	4992(76.02%)	674(10.26%)

Table 4-2-1

Number and proportion of female population with aged **50-69** years old from 2002 to 2008 and **45-69 years old from 2009 to 2010** (for Mammography target population)*

Year	Non-Medical personal	Medical personal
2002	74919(99.81%)	139(0.19%)
2003	81367(99.78%)	178(0.22%)
2004	84599(99.74%)	221(0.26%)
2005	90396(99.68%)	291(0.32%)
2006	94800(99.61%)	367(0.39%)
2007	97281(99.58%)	412(0.42%)
2008	101116(99.27%)	742(0.73%)
2009	142588(98.85%)	1654(1.15%)
2010	146682(98.79%)	1801(1.21%)

*In response to changes in mammography screening policy in year 2009 is intended for over 45-69 years old, so the choice for the participant in 2002-2008 were 50-69 years old , but in 2009-2010 it is calculated based on 45-69 years old.

Table 4-2-2

The distribution of female medical personnel with aged 50-69 years old from 2002 to 2008 and 45-69 years old from 2009 to 2010.

Year	Physicians	Pharmaceutics	Nursing Staff	Other
2002	23(16.55%)	56(40.29%)	48(34.53%)	12(8.63%)
2003	27(15.17%)	71(39.89%)	67(37.64%)	13(7.3%)
2004	31(14.03%)	84(38.01%)	83(37.56%)	23(10.41%)
2005	36(12.37%)	99(34.02%)	130(44.67%)	26(8.93%)
2006	44(11.99%)	112(30.52%)	180(49.05%)	31(8.45%)
2007	46(11.17%)	118(28.64%)	210(50.97%)	38(9.22%)
2008	49(6.6%)	130(17.52%)	497(66.98%)	66(8.89%)
2009	119(7.19%)	258(15.6%)	1145(69.23%)	132(7.98%)
2010	125(6.94%)	278(15.44%)	1253(69.57%)	145(8.05%)

Table 4-3-1
The characteristics of 30-69 years old general population, physicians, pharmacist and nursing staff in 2002

Variables	general population	physician	pharmacist	nursing staff	p-value
N	221766	203	367	761	
Age in 2002	45.67±10.53	39.88±7.52	41.35±7.23	37.47±6.49	<.0001
Region					<.0001
Urban	144029(64.95%)	167(82.27%)	284(77.38%)	589(77.4%)	
Sub-urban	61310(27.65%)	31(15.27%)	63(17.17%)	134(17.61%)	
Rural	16427(7.41%)	5(2.46%)	20(5.45%)	38(4.99%)	
City					<.0001
Taipei area	89837(40.51%)	101(49.75%)	141(38.42%)	248(32.59%)	
Northern	23757(10.71%)	17(8.37%)	25(6.81%)	151(19.84%)	
Central	40628(18.32%)	33(16.26%)	87(23.71%)	143(18.79%)	
Southern	28579(12.89%)	24(11.82%)	41(11.17%)	120(15.77%)	
Kaohsiung area	35352(15.94%)	23(11.33%)	69(18.8%)	67(8.8%)	
Eastern	3613(1.63%)	5(2.46%)	4(1.09%)	32(4.2%)	

Table 4-3-2
The characteristics and utilization of mammography in general population and medical personnel with aged 50-69 years old in 2002

Variable	Non-Medical personnel	physician	Pharmaceutics	Nursing Staff	p-value
N	74919	23	56	48	
Age in 2002	58.02±5.86	54.78±5.58	53.3±3.63	53.94±4.18	<.0001
Region					0.0152
Urban	46232(61.71%)	18(78.26%)	45(80.36%)	34(70.83%)	
Suburban	21210(28.31%)	5(21.74%)	9(16.07%)	13(27.08%)	
Rural	7477(9.98%)	0(0%)	2(3.57%)	1(2.08%)	
City					0.6836
Taipei area	27993(37.36%)	9(39.13%)	24(42.86%)	17(35.42%)	
Northern	7969(10.64%)	2(8.7%)	2(3.57%)	3(6.25%)	
Central	13774(18.39%)	7(30.43%)	13(23.21%)	9(18.75%)	
Southern	11134(14.86%)	2(8.7%)	7(12.5%)	12(25%)	
Kaohsiung area	12588(16.8%)	3(13.04%)	9(16.07%)	6(12.5%)	
Eastern	1461(1.95%)	0(0%)	1(1.79%)	1(2.08%)	

Table 4-4
Pap smear coverage rate in 30-69 years old general population, physicians, pharmacy and nursing staff from 2002 to 2010

Variable	Non-Medical personal	physician	Pharmaceutics	Nursing Staff	p-value
2002					
Number of participant (%)	58701(26.47%)	31(15.27%)	98(26.7%)	191(25.1%)	0.0032
2003					
Number of participant (%)	60717(25.84%)	42(18.83%)	102(26.02%)	238(24.49%)	0.0847
2004					
Number of participant (%)	69610(29.21%)	54(22.22%)	109(27.05%)	331(28.19%)	0.0651
Triennial coverage (%)	119133(50.00%)	95(39.09%)	201(49.88%)	556(47.36%)	0.0020
2005					
Number of participant (%)	69571(27.88%)	59(22.26%)	103(24.58%)	402(26.6%)	0.0550
Triennial coverage (%)	126752(50.79%)	113(42.64%)	200(47.73%)	719(47.58%)	0.0021
2006					
Number of participant (%)	69516(27.24%)	53(18.86%)	117(26.23%)	483(26.24%)	0.0114
Triennial coverage (%)	131180(51.39%)	116(41.28%)	222(49.78%)	902(49%)	0.0011
2007					
Number of participant (%)	72751(28.36%)	63(21.65%)	123(26.86%)	581(27.17%)	0.0383
Triennial coverage (%)	130783(50.99%)	122(41.92%)	224(48.91%)	1039(48.6%)	0.0017
2008					
Number of participant (%)	74455(28.69%)	66(20.63%)	118(24.38%)	1138(29.14%)	0.0019
Triennial coverage (%)	133741(51.53%)	132(41.25%)	235(48.55%)	1963(50.27%)	0.0005
2009					
Number of participant (%)	76401(29.32%)	74(21.83%)	138(27.11%)	1406(30.68%)	0.0024

Triennial coverage (%)	137127(52.63%)	141(41.59%)	256(50.29%)	2436(53.15%)	0.0004
2010					
Number of participant (%)	77001(29.12%)	81(22.38%)	139(25.79%)	1550(31.05%)	0.0002
Triennial coverage (%)	139340(52.69%)	147(40.61%)	266(49.35%)	2660(53.29%)	<.0001

Table 4-5-1

Annual Pap smear crude coverage rate for female aged 30-69 from 2002 to 2010*

		2002	2003	2004	2005	2006	2007	2008	2009	2010
Non-Medical personnel	Coverage rate	0.265	0.258	0.292	0.279	0.272	0.284	0.287	0.293	0.291
	(95% C.I.)	(0.263-0.267)	(0.256-0.26)	(0.29-0.294)	(0.277-0.281)	(0.27-0.274)	(0.282-0.286)	(0.285-0.289)	(0.291-0.295)	(0.289-0.293)
	Relative Ratio	-	0.976	1.131	0.954	1.017	1.041	1.011	1.022	0.993
	(95% C.I.)		(0.965-0.987)	(1.118-1.143)	(0.944-0.964)	(1.007-1.028)	(1.031-1.052)	(1.001-1.022)	(1.012-1.033)	(0.983-1.003)
	Test linear trend	exp(Beta)= 1.012, Wald chi-square= 602.82, p<0.0001								
Physician	Coverage rate	0.153	0.188	0.222	0.223	0.189	0.217	0.206	0.218	0.224
	(95% C.I.)	(0.107-0.217)	(0.139-0.255)	(0.17-0.29)	(0.173-0.287)	(0.144-0.247)	(0.169-0.277)	(0.162-0.263)	(0.174-0.274)	(0.18-0.278)
	Relative Ratio	-	1.233	1.18	1.002	0.972	1.148	0.953	1.058	1.025
	(95% C.I.)		(0.775-1.962)	(0.788-1.766)	(0.693-1.449)	(0.682-1.387)	(0.797-1.654)	(0.675-1.346)	(0.759-1.475)	(0.748-1.405)
	Test linear trend	exp(Beta)= 1.025, Wald chi-square= 2.04, p= 0.1536								
Pharmaceutics	Coverage rate	0.267	0.260	0.271	0.246	0.262	0.269	0.244	0.271	0.258
	(95% C.I.)	(0.219-0.326)	(0.214-0.316)	(0.224-0.326)	(0.203-0.298)	(0.219-0.314)	(0.225-0.321)	(0.204-0.292)	(0.23-0.32)	(0.218-0.305)
	Relative Ratio	-	0.974	1.04	0.909	1.093	1.024	0.908	1.112	0.951
	(95% C.I.)		(0.738-1.286)	(0.794-1.362)	(0.694-1.19)	(0.841-1.419)	(0.795-1.319)	(0.705-1.169)	(0.87-1.422)	(0.752-1.204)
	Test linear trend	exp(Beta)= 0.998, Wald chi-square= 0.03, p= 0.8742								

Nursing Staff	Coverage rate	0.251	0.245	0.282	0.266	0.262	0.272	0.291	0.307	0.311
	(95% C.I.)	(0.218-0.289)	(0.216-0.278)	(0.253-0.314)	(0.241-0.293)	(0.24-0.287)	(0.251-0.295)	(0.275-0.309)	(0.291-0.323)	(0.295-0.326)
	Relative Ratio	-	0.976	1.151	0.944	1.021	1.036	1.072	1.053	1.012
	(95% C.I.)		(0.806-1.18)	(0.975-1.36)	(0.816-1.091)	(0.899-1.16)	(0.918-1.169)	(0.97-1.185)	(0.974-1.138)	(0.942-1.088)
	Test linear trend	exp(Beta)= 1.03, Wald chi-square= 27.77, p <.0001								

* The Relative Ratio is this year's coverage rate compare to it in last year.

Table 4-5-2

Triennial Pap smear crude coverage rate from 2004 to 2010*

		2004	2005	2006	2007	2008	2009	2010
General female population	Coverage rate	0.500	0.508	0.514	0.510	0.515	0.526	0.527
	(95% C.I.)	(0.497-0.503)	(0.505-0.511)	(0.511-0.517)	(0.507-0.513)	(0.513-0.518)	(0.524-0.529)	(0.524-0.53)
	Relative Ratio	-	1.016	1.012	0.992	1.011	1.021	1.001
	(95% C.I.)		(1.008-1.024)	(1.004-1.020)	(0.985-1.000)	(1.003-1.018)	(1.014-1.029)	(0.994-1.009)
	Test linear trend	exp(Beta)= 1.008, Wald chi-square= 248.00, p <.0001						
physician	Coverage rate	0.391	0.426	0.413	0.419	0.413	0.416	0.406
	(95% C.I.)	(0.32-0.478)	(0.355-0.513)	(0.344-0.495)	(0.351-0.501)	(0.348-0.489)	(0.353-0.491)	(0.346-0.477)
	Relative Ratio	-	1.091	0.968	1.016	0.984	1.008	0.976
	(95% C.I.)		(0.830-1.433)	(0.747-1.254)	(0.788-1.309)	(0.769-1.258)	(0.795-1.278)	(0.775-1.23)
	Test linear trend	exp(Beta)= 1.001, Wald chi-square= 0.00, p= 0.9487						
Pharmaceutics	Coverage rate	0.499	0.477	0.498	0.489	0.486	0.503	0.494
	(95% C.I.)	(0.434-0.573)	(0.416-0.548)	(0.436-0.568)	(0.429-0.558)	(0.427-0.552)	(0.445-0.569)	(0.438-0.557)
	Relative Ratio	-	0.957	1.043	0.983	0.993	1.036	0.981
	(95% C.I.)		(0.787-1.164)	(0.861-1.262)	(0.816-1.183)	(0.827-1.192)	(0.868-1.237)	(0.827-1.165)
	Test linear trend	exp(Beta)= 1.002, Wald chi-square= 0.02, p= 0.8827						

Nursing Staff	Coverage rate	0.474	0.476	0.490	0.486	0.503	0.532	0.533
	(95% C.I.)	(0.436-0.515)	(0.442-0.512)	(0.459-0.523)	(0.457-0.516)	(0.481-0.525)	(0.511-0.553)	(0.513-0.554)
	Relative Ratio	-	1.005	1.03	0.992	1.034	1.057	1.003
	(95% C.I.)		(0.899-1.122)	(0.934-1.136)	(0.907-1.084)	(0.96-1.115)	(0.996-1.122)	(0.949-1.059)
	Test linear trend	exp(Beta)= 1.024, Wald chi-square= 17.85, p <.0001						

* The Relative Ratio is this year's coverage rate compare to it in last year.

Triennial Pap smear coverage rate in 30-69 years old general population, physicians, pharmacy and nursing staff from 2002 to 2010

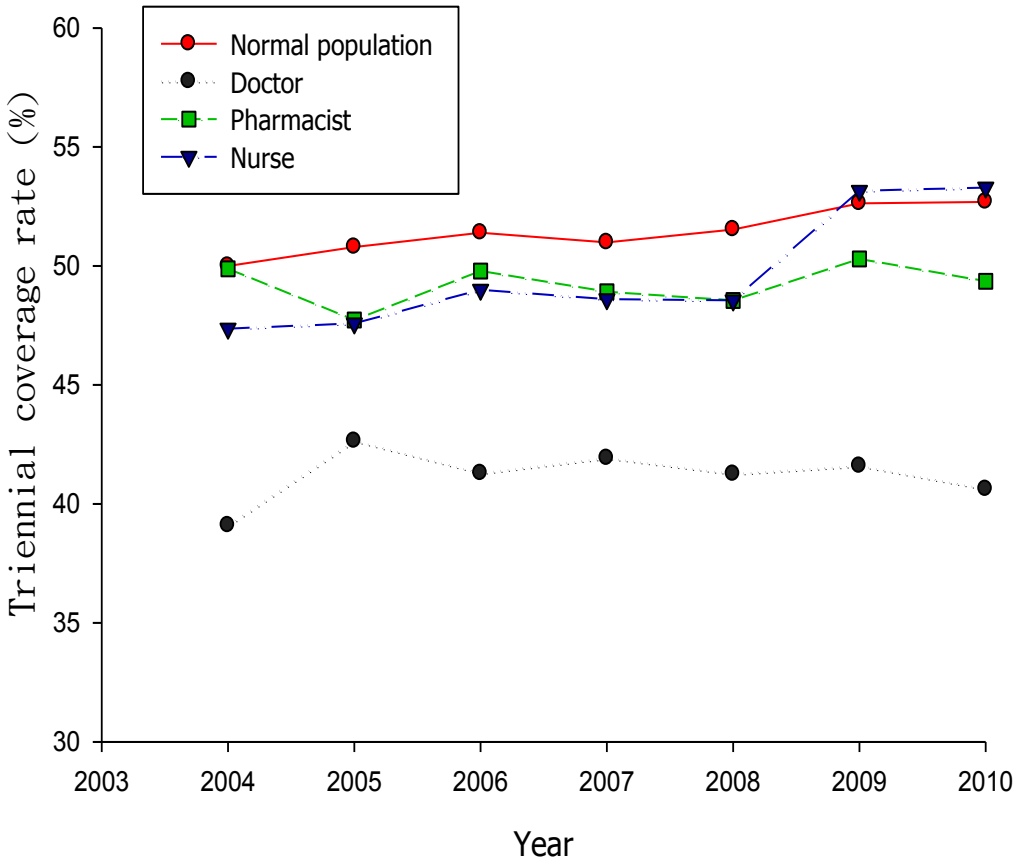


Table 4-6
The utilization of mammography in general population and Medical personnel with aged 50-69 years old from 2002 to 2008, and with aged 45-69 years old in 2009 and 2010

Variable	general population	physicians	pharmacist	nursing staff	p-value
2002					
Number of participant (%)	2593(3.46%)	1(4.35%)	5(8.93%)	2(4.17%)	0.1630
2003					
Number of participant (%)	2331(2.86%)	1(3.7%)	4(5.63%)	5(7.46%)	0.0692
Biennial coverage (%)	4487(5.51%)	2(7.41%)	9(12.68%)	9(13.43%)	0.0017
2004					
Number of participant (%)	3439(4.07%)	2(6.45%)	7(8.33%)	7(8.43%)	0.0384
Biennial coverage (%)	5237(6.19%)	3(9.68%)	10(11.9%)	9(10.84%)	0.0379
2005					
Number of participant (%)	5415(5.99%)	2(5.56%)	18(18.18%)	19(14.62%)	<.0001
Biennial coverage (%)	8249(9.13%)	4(11.11%)	23(23.23%)	24(18.46%)	<.0001
2006					
Number of participant (%)	7287(7.69%)	3(6.82%)	10(8.93%)	29(16.11%)	0.0004
Biennial coverage (%)	11867(12.52%)	5(11.36%)	28(25%)	45(25%)	<.0001
2007					
Number of participant (%)	8476(8.71%)	5(10.87%)	16(13.56%)	26(12.38%)	0.0638
Biennial coverage (%)	14611(15.02%)	8(17.39%)	25(21.19%)	54(25.71%)	<.0001
2008					
Number of participant (%)	9392(9.29%)	7(14.29%)	19(14.62%)	69(13.88%)	0.0004
Biennial coverage (%)	16600(16.42%)	11(22.45%)	31(23.85%)	123(24.75%)	<.0001
2009					

Number of participant (%)	14692(10.3%)	18(15.13%)	33(12.79%)	156(13.62%)	0.0004
2010					
Number of participant (%)	24209(16.5%)	20(16%)	46(16.55%)	308(24.58%)	<.0001
Biennial coverage (%)	36584(24.94%)	32(25.6%)	70(25.18%)	431(34.4%)	<.0001

* In response to changes in mammography screening policy in 2009 is intended for over 45-69 years old, so the choice for the **participant from** 2002 to 2008 were 50-69 years old , but in 2009 and 2010 they were 45-69 years old.

Mammographic screening crude coverage rate of female with aged 50-69 years old from 2003 to 2008 or with aged 45-69 years old from year 2010

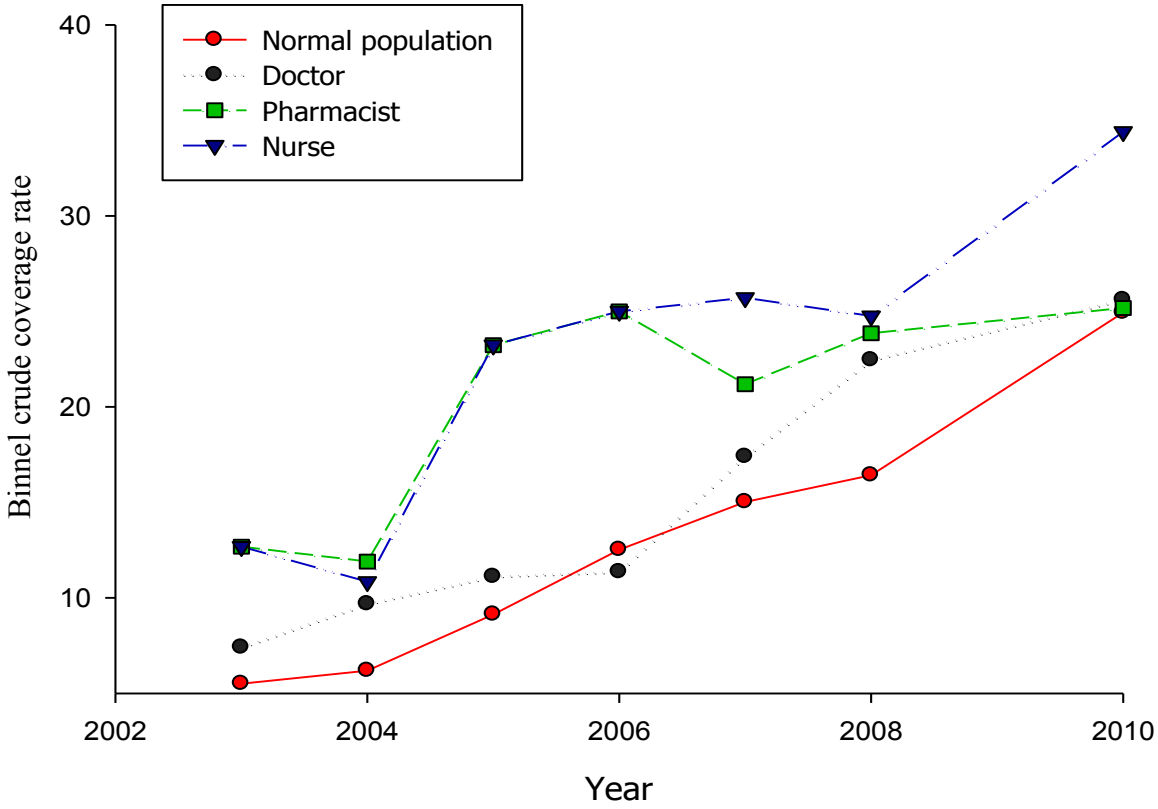


Table 4-7

Annual mammographic screening crude coverage rate of female with aged 50-69 years old from 2002 to 2008 or with aged 45-69 years old from 2009 to 2010*

		2002	2003	2004	2005	2006	2007	2008	2009	2010
General population	Coverage rate	0.035	0.029	0.041	0.060	0.077	0.087	0.093	0.103	0.165
	(95% C.I.)	(0.033-0.036)	(0.028-0.03)	(0.039-0.042)	(0.058-0.062)	(0.075-0.079)	(0.085-0.089)	(0.091-0.095)	(0.101-0.105)	(0.163-0.167)
	Relative Ratio	-	0.828	1.419	1.474	1.455	1.134	1.066	1.109	1.602
	(95% C.I.)		(0.783-0.875)	(1.346-1.496)	(1.412-1.538)	(1.406-1.505)	(1.099-1.17)	(1.035-1.098)	(1.081-1.138)	(1.569-1.635)
	Test linear trend	exp(Beta)= 1.224, Wald chi-square=16148.4, p<0.0001								
physicians	Coverage rate	0.043	0.037	0.065	0.056	0.068	0.109	0.143	0.151	0.160
	(95% C.I.)	(0.006-0.309)	(0.005-0.263)	(0.016-0.258)	(0.014-0.222)	(0.022-0.211)	(0.045-0.261)	(0.068-0.3)	(0.095-0.24)	(0.103-0.248)
	Relative Ratio	-	0.852	1.742	0.861	1.957	1.594	1.314	1.059	1.058
	(95% C.I.)		(0.053-13.618)	(0.158-19.209)	(0.121-6.112)	(0.38-10.085)	(0.381-6.671)	(0.417-4.141)	(0.442-2.535)	(0.560-2.000)
	Test linear trend	exp(Beta)= 1.202, Wald chi-square= 7.79, p= 0.0053								
Pharmaceutics	Coverage rate	0.089	0.056	0.083	0.182	0.089	0.136	0.146	0.128	0.166
	(95% C.I.)	(0.037-0.215)	(0.021-0.15)	(0.04-0.175)	(0.115-0.289)	(0.048-0.166)	(0.083-0.221)	(0.093-0.229)	(0.091-0.18)	(0.124-0.221)
	Relative Ratio	-	0.631	1.479	2.182	0.746	1.519	1.078	0.875	1.294
	(95% C.I.)		(0.169-2.35)	(0.433-5.053)	(0.911-5.225)	(0.38-1.462)	(0.689-3.347)	(0.554-2.096)	(0.498-1.539)	(0.827-2.023)
	Test linear trend	exp(Beta)=1.079, Wald chi-square= 4.84, p= 0.0277								

Nursing staff	Coverage rate	0.042	0.075	0.084	0.146	0.161	0.124	0.139	0.136	0.246
	(95% C.I.)	(0.01-0.167)	(0.031-0.179)	(0.04-0.177)	(0.093-0.229)	(0.112-0.232)	(0.084-0.182)	(0.11-0.176)	(0.117-0.159)	(0.22-0.275)
	Relative Ratio	1.791	1.13	1.733	0.847	0.768	1.121	0.981	1.804	1.791
	(95% C.I.)	(0.347-9.234)	(0.359-3.561)	(0.728-4.122)	(0.469-1.53)	(0.453-1.305)	(0.714-1.761)	(0.739-1.303)	(1.488-2.187)	(0.347-9.234)
	Test linear trend	exp(Beta)= 1.175, Wald chi-square= 33.65, p <.0001								

* The Relative Ratio is this year's coverage rate compare to it in last year.

Table 4-8

Biennial mammographic screening crude coverage rate from 2003-2008 with aged 50-69 years old or aged 45-69 years old in 2009 and 2010*

		2003	2004	2005	2006	2007	2008	2009	2010
Non-medical personnel	Coverage rate	0.055	0.062	0.091	0.125	0.150	0.164	0.166	0.249
	(95% C.I.)	(0.054-0.057)	(0.06-0.064)	(0.089-0.093)	(0.123-0.128)	(0.148-0.153)	(0.162-0.167)	(0.164-0.168)	(0.247-0.252)
	Relative Ratio	-	1.123	1.474	1.372	1.200	1.093	1.012	1.502
	(95% C.I.)		(1.079-1.168)	(1.424-1.526)	(1.334-1.411)	(1.171-1.229)	(1.069-1.118)	(0.992-1.032)	(1.477-1.526)
	Test linear trend	exp(Beta)= 1.216, Wald chi-square= 19708.5, p<0.0001							
physicians	Coverage rate	0.074	0.097	0.111	0.114	0.174	0.225	0.210	0.256
	(95% C.I.)	(0.019-0.296)	(0.031-0.3)	(0.042-0.296)	(0.047-0.273)	(0.087-0.348)	(0.124-0.405)	(0.142-0.311)	(0.181-0.362)
	Relative Ratio	-	1.307	1.148	1.023	1.530	1.291	0.936	1.219
	(95% C.I.)		(0.218-7.819)	(0.257-5.131)	(0.275-3.808)	(0.501-4.677)	(0.519-3.209)	(0.460-1.902)	(0.722-2.056)
	Test linear trend	exp(Beta)= 1.181, Wald chi-square=8.57, p=0.0034							
Pharmaceutics	Coverage rate	0.127	0.119	0.232	0.250	0.212	0.239	0.182	0.252
	(95% C.I.)	(0.066-0.244)	(0.064-0.221)	(0.154-0.35)	(0.173-0.362)	(0.143-0.314)	(0.168-0.339)	(0.137-0.243)	(0.199-0.318)
	Relative Ratio	-	0.939	1.952	1.076	0.847	1.125	0.764	1.382
	(95% C.I.)		(0.382-2.311)	(0.929-4.1)	(0.62-1.868)	(0.494-1.453)	(0.665-1.906)	(0.485-1.202)	(0.955-2)
	Test linear trend	exp(Beta)= 1.054, Wald chi-square=3.08, p=0.0795							
Nursing staff	Coverage rate	0.134	0.108	0.185	0.250	0.257	0.248	0.220	0.344

(95% C.I.)	(0.07-0.258)	(0.056-0.208)	(0.124-0.275)	(0.187-0.335)	(0.197-0.336)	(0.207-0.295)	(0.195-0.249)	(0.313-0.378)
Relative Ratio	-	0.807	1.703	1.354	1.029	0.962	0.889	1.563
(95% C.I.)		(0.32-2.034)	(0.791-3.663)	(0.825-2.222)	(0.693-1.528)	(0.699-1.325)	(0.717-1.103)	(1.338-1.826)
Test linear trend	exp(Beta)= 1.129, Wald chi-square=28.78, p<0.0001							

* The Relative Ratio is this year's coverage rate compare to it in last year.

Objective 2

Table 4-9

The first visit rate for aged 30-69 female population with cervical cancer and cervical carcinoma situ in year 2002-2010。

		N (incidence rate, per 100 person year)								
		2002	2003	2004	2005	2006	2007	2008	2009	2010
Non-medical staff	At risk population	221736	234303	237448	248525	254096	255243	258201	259162	263024
	Group1	1204(0.54)	424(0.18)	407(0.17)	352(0.14)	362(0.14)	272(0.11)	242(0.09)	229(0.09)	240(0.09)
	Group2	652(0.29)	179(0.08)	193(0.08)	158(0.06)	156(0.06)	116(0.05)	113(0.04)	85(0.03)	94(0.04)
	Group3	603(0.27)	292(0.12)	261(0.11)	233(0.09)	239(0.09)	183(0.07)	154(0.06)	160(0.06)	163(0.06)
physician And Pharmaceutics	At risk population	570	614	645	682	725	747	801	845	898
	Group1	4(0.70)	0 (0.00)	3(0.47)	2(0.29)	0 (0.00)	1(0.13)	0 (0.00)	1(0.12)	2(0.22)
	Group2	1(0.18)	0 (0.00)	2(0.31)	0 (0.00)	0 (0.00)	1(0.13)	0 (0.00)	0 (0.00)	0 (0.00)
	Group3	3(0.53)	0 (0.00)	1(0.16)	2(0.29)	0 (0.00)	0 (0.00)	0 (0.00)	1(0.12)	2(0.22)
Nursing staff	At risk population	761	972	1174	1509	1838	2135	3898	4574	4982
	Group1	1(0.13)	2(0.21)	0 (0.00)	2(0.13)	0 (0.00)	0 (0.00)	6(0.15)	4(0.09)	3(0.06)
	Group2	0 (0.00)	0 (0.00)	0 (0.00)	1(0.07)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	1(0.02)
	Group3	1(0.13)	2(0.21)	0 (0.00)	1(0.07)	0 (0.00)	0 (0.00)	6(0.15)	4(0.09)	2(0.04)

* Group 1: first time diagnosed cervical cancer or cervical carcinoma in situ, Group 2: first time diagnosed cervical cancer, Group 3: first time diagnosed cervical cancer in situ..

Table 4-10
Cross-analysis of the triennial utilization of Pap smear screening for female with aged 30-69 years old from 2004 to 2010, and the first visit with cervical cancer and cervical carcinoma in situ.

	Triennial utilization of Pap smear screening						
	Without involvement			Involvement			
	Person-years	Case	Incidence rate (per 10^4 person years), 95% C.I.	Person-years	Case	Incidence rate (per 10^4 person years), 95% C.I.	RR, 95% C.I.
All participations	874929			920688			
Cervical cancer or cervical carcinoma in situ.		143	1.634(1.387-1.925)		1985	21.56(20.632-22.53)	13.19(11.13-15.63)
cervical cancer		105	1.200(0.991-1.453)		816	8.863(8.275-9.492)	7.39(6.03-9.05)
Cervical carcinoma in situ.		45	0.514(0.384-0.689)		1367	14.848(14.081-15.656)	28.87(21.45-38.85)
Non-medical personnel	862208			908011			
Cervical cancer or cervical carcinoma in situ.		140	1.624(1.376-1.916)		1964	21.629(20.694-22.607)	13.32(11.22-15.81)
Cervical cancer		104	1.206(0.995-1.462)		811	8.932(8.338-9.568)	7.40(6.04-9.08)
Cervical carcinoma in situ.		43	0.499(0.37-0.672)		1350	14.867(14.095-15.682)	29.81(22.01-40.39)
Physician and Pharmaceutics	2868			2453			
Cervical cancer or cervical carcinoma in situ.		2	6.974(1.744-27.884		7	28.535(13.603-59.861)	4.09(0.85-19.70)
Cervical cancer		1	3.487(0.491-24.753)		2	8.153(2.039-32.601)	2.34(0.21-25.79)
Cervical carcinoma in situ.		1	3.487(0.491-24.753)		5	20.384(8.484-48.972)	5.85(0.68-50.04)

Table 4-10 (*con*)
Cross-analysis of the triennial utilization of Pap smear screening for female with aged 30-69 years old from 2004 to 2010, and the first visit with cervical cancer and cervical carcinoma in situ.

	Triennial utilization of Pap smear screening						
	Without involvement			Involvement			
	Person-years	Case	Incidence rate (per 10^4 person years), 95% C.I.	Person-years	Case	Incidence rate (per 10^4 person years), 95% C.I.	RR, 95% C.I.
Nurse	9853			10224			
Cervical cancer or cervical carcinoma in situ.		1	1.015(0.143-7.205)		14	13.694(8.109-23.123)	13.49(1.77-102.61)
Cervical cancer		0	-		3	2.934(0.946-9.099)	-
Cervical carcinoma in situ.		1	1.015(0.143-7.205)		12	11.737(6.665-20.668)	11.56(1.50-88.93)

Table 4-11
Year 2002-2008 age 50-69year old and year 2009-2010 age 45-69years old Breast cancer, Benign breast tumor primary care visit.

		N (incidence rate, per 100 person year)								
		2002	2003	2004	2005	2006	2007	2008	2009	2010
Non-medical staff	At risk population	74847	80660	83701	89239	93370	95596	99146	101614	105217
	Group1	1929(2.58)	1026(1.27)	1034(1.24)	1115(1.25)	940(1.01)	1061(1.11)	889(0.9)	1122(1.1)	1150(1.09)
	Group2	579(0.77)	162(0.2)	193(0.23)	192(0.22)	206(0.22)	235(0.25)	221(0.22)	216(0.21)	230(0.22)
	Group3	1444(1.93)	944(1.17)	929(1.11)	1037(1.16)	844(0.90)	938(0.98)	767(0.77)	1017(1)	1046(0.99)
Physician And Pharmaceutics	At risk population	79	96	111	131	149	157	171	198	234
	Group1	4(5.06)	0(0.00)	1(0.9)	4(3.05)	3(2.01)	7(4.46)	1(0.58)	2(1.01)	7(2.99)
	Group2	2(2.53)	0(0.00)	0(0.00)	1(0.76)	0(0.00)	1(0.64)	0(0.00)	0(0.00)	1(0.43)
	Group3	3(3.8)	0(0.00)	1(0.9)	4(3.05)	3(2.01)	7(4.46)	1(0.58)	2(1.01)	7(2.99)
Nursing staff	At risk population	48	66	82	129	178	207	486	605	697
	Group1	3(6.25)	4(6.06)	4(4.88)	0(0.00)	3(1.69)	6(2.9)	5(1.03)	9(1.49)	12(1.72)
	Group2	0(0.00)	0(0.00)	0(0.00)	0(0.00)	1(0.56)	1(0.48)	1(0.21)	2(0.33)	1(0.14)
	Group3	3(6.25)	4(6.06)	4(4.88)	0(0.00)	3(1.69)	6(2.9)	4(0.82)	8(1.32)	11(1.58)

*Group 1: treatment of breast cancer or breast carcinoma in situ, Group 2: treatment of breast cancer, Group 3: treatment of breast cancer in situ

Table 4-12-1
Cross-analysis of the utilization of mammographic screening for female with age50-69 in year 2002-2008 and age 45-69 in year 2009-2010 and first visit with breast cancer, benign breast tumor，according to Cross-analysis of mammographic screening utilization before initial treatment.

	Biennial mammographic screening						
	Without involvement			Involvement			
	Person-years	Case	Incidence rate (per 10^4 person years), 95% C.I.	Person-years	Case	Incidence rate (per 10^4 person years), 95% C.I.	RR, 95% C.I.
All participations	556113			97263			
Breast cancer, Benign breast tumor		1882	33.843(32.348-35.407)		5493	564.782(550.045-579.915)	16.69(15.84-17.58)
Breast cancer		279	5.017(4.462-5.642)		1223	125.743(118.891-132.99)	25.06(22.01-28.54)
Benign breast tumor		1692	30.424(29.009-31.909)		4947	508.64(494.659-523.016)	16.72(15.82-17.67)
Non-medical personnel	553579			96388			
Breast cancer, Benign breast tumor		1869	33.762(32.266-35.328)		5442	564.613(549.805-579.82)	16.72(15.87-17.62)
Breast cancer		278	5.022(4.465-5.649)		1215	126.058(119.165-133.349)	25.1(22.03-28.59)
Benign breast tumor		1680	30.348(28.931-31.835)		4898	508.132(494.097-522.565)	16.75(15.84-17.7)
Physician and Pharmaceutics	866			224			
Breast cancer, Benign breast tumor		6	69.286(31.13-154.21)		19	848.22(541.053-1329.774)	12.24(4.89-30.66)
Breast cancer		0	-		3	133.933(43.191-415.318)	-
Benign breast tumor		6	69.286(31.13-154.21)		19	848.22(541.053-1329.774)	12.24(4.89-30.66)

Table 4-12-2 (*con*)
Year 2002-2008 aged 50-69 and year 2009-2010 aged 45-69 Breast cancer, Benign breast tumor primary care visit , Cross-analysis of mammographic screening involvement prior to primary care visit.

	Biennial mammographic screening						
	Without involvement			Involvement			
	Person-years	Case	Incidence rate (per 10^4 person years), 95% C.I.	Person-years	Case	Incidence rate (per 10^4 person years), 95% C.I.	RR, 95% C.I.
Nurse	1668			651			
Breast cancer, Benign breast tumor		7	41.965(20.005-88.034)		32	491.539(347.586-695.109)	11.71(5.17-26.54)
Breast cancer		1	5.995(0.844-42.561)		5	76.803(31.968-184.519)	12.81(1.5-109.65)
Benign breast tumor		6	35.972(16.162-80.063)		30	460.835(322.191-659.14)	12.81(5.33-30.78)

Objective 3
Table 4-13-1
The characteristics of 30-69 years old to participate in the case of Pap screening from 2004 to 2010

	Without Pap screening	**With Pap screening**	P-value
Total observation number	1206874	488558	
Characteristics of general population			
Medical personal			0.0086
No	1186323(98.3%)	480519(98.35%)	
Yes	20551(1.70%)	8039(1.65%)	
Year			<.0001
2004	158445(13.13%)	66342(13.58%)	
2005	169325(14.03%)	66285(13.57%)	
2006	174898(14.49%)	66332(13.58%)	
2007	173172(14.35%)	69543(14.23%)	
2008	175812(14.57%)	71650(14.67%)	
2009	175380(14.53%)	73980(15.14%)	
2010	179842(14.90%)	74426(15.23%)	
Age, Mean±SD	44.79±9.57	45.03±9.04	<.0001
Residence area			<.0001
Taipei area	485225(40.21%)	186170(38.11%)	
Northern	144582(11.98%)	54879(11.23%)	
Central	214194(17.75%)	92493(18.93%)	
Southern	145859(12.09%)	67410(13.80%)	
Kaohsiung area	190325(15.77%)	77029(15.77%)	
Eastern	26689(2.21%)	10577(2.16%)	
Urbanization of residence place			<.0001

Urban	788749(65.35%)	313253(64.12%)	
Sub-urban	337745(27.99%)	137941(28.23%)	
Rural	80380(6.66%)	37364(7.65%)	
Number of physicians per 10,000 population in where reside			0.0051
<25	1188624(98.49%)	481478(98.55%)	
25-75	3434(0.28%)	1375(0.28%)	
≧75	14816(1.23%)	5705(1.17%)	
Income			<.0001
Dependent insured	240350(19.92%)	94690(19.38%)	
0-20000	388311(32.17%)	131453(26.91%)	
20001-40000	414812(34.37%)	192592(39.42%)	
>40000	163401(13.54%)	69823(14.29%)	
No. of outpatient visits in previous year			<.0001
0	125245(10.38%)	9358(1.92%)	
1-5	268924(22.28%)	60677(12.42%)	
6-10	227040(18.81%)	82658(16.92%)	
>10	585665(48.53%)	335865(68.75%)	
Charlson comorbidity index in last year			<.0001
0	968832(80.28%)	356952(73.06%)	
1-2	208285(17.26%)	116116(23.77%)	
≧3	29757(2.47%)	15490(3.17%)	
Disease diagnosed in last year			

Carcinoma of breast	5886(0.49%)	4436(0.91%)	<.0001
Carcinoma of cervix	572(0.05%)	2041(0.42%)	<.0001
Benign neoplasm of skin	1717(0.14%)	1033(0.21%)	<.0001
Benign neoplasm of breast	2444(0.2%)	2453(0.5%)	<.0001
Myoma uterine	4891(0.41%)	5640(1.15%)	<.0001
Benign uterine tumor	1022(0.08%)	1170(0.24%)	<.0001
Carcinoma in situ of cervix uteri	233(0.02%)	959(0.2%)	<.0001
Breast tumor	371(0.03%)	300(0.06%)	<.0001
Breast fibroadenosis	279(0.02%)	358(0.07%)	<.0001
Other disorders of breast	5187(0.43%)	5355(1.10%)	<.0001
Inflammatory disease of uterus	1572(0.13%)	1964(0.40%)	<.0001
Inflammatory disease of cervix vagina and vulva	41505(3.44%)	50627(10.36%)	<.0001
Noninflammatory disorders of cervix	2374(0.2%)	5037(1.03%)	<.0001
Noninflammatory disorders of vagina	5785(0.48%)	5832(1.19%)	<.0001
Disorders of menstruation and other abnormal bleeding from female genital tract	51079(4.23%)	41542(8.5%)	<.0001
Pruritus of genital organs	2388(0.2%)	3210(0.66%)	<.0001
Other symptoms involving abdomen and pelvis	31475(2.61%)	26315(5.39%)	<.0001
The times of participate of Pap smear from previous two year (ref:			<.0001

0)		
0	817720(67.76%)	175118(35.84%)
1	311713(25.83%)	184919(37.85%)
2	77441(6.42%)	128521(26.31%)

Table 4-13-2
The characteristics of 30-69 years old to participate in the case of Pap screening in medical personnel from 2004 to 2010

	Without Pap screening	**With Pap screening**	P-value
Total observation number	20551	8039	
Classification of Medical personnel			<.0001
physicians+ Pharmaceutics	4025(19.59%)	1282(15.95%)	
Nursing staff	14175(68.97%)	5869(73.01%)	
Others	2351(11.44%)	888(11.05%)	
Hospital Classification			<.0001
Medical Center	3926(19.1%)	1526(18.98%)	
Regional Hospital	4465(21.73%)	1629(20.26%)	
District Hospital	3530(17.18%)	1285(15.98%)	
Clinic	5034(24.5%)	2206(27.44%)	
Others	3596(17.5%)	1393(17.33%)	
Working Experience			0.0558
0-1	4155(20.22%)	1549(19.27%)	
1-2	3442(16.75%)	1424(17.71%)	
>2	12954(63.03%)	5066(63.02%)	

Table 4-14
Using GEE model to estimate Odds Ratios of potential predict factors on Pap smear in all participations

	OR (95% C.I.)	P-value
Medical personnel (ref: no)		
Yes	0.981(0.925-1.041)	0.5273
Age (per 1 year)	0.994(0.993-0.994)	<.0001
Residence area (ref: Taipei area)		
Northern	1.023(1.011-1.036)	0.0001
Central	1.027(1.016-1.038)	<.0001
Southern	1.075(1.062-1.088)	<.0001
Kaohsiung area	1.001(0.990-1.011)	0.9045
Eastern	1.003(0.979-1.028)	0.8197
Urbanization of residence place (ref: Urban)		
Sub-urban	1.013(1.004-1.021)	0.0035
Rural	1.102(1.087-1.118)	<.0001
Number of physicians per 10,000 population in where reside (ref: <25)		
25-75	0.962(0.887-1.043)	0.348
≧75	1.007(0.943-1.075)	0.8348
Income (ref:Dependent insured)		
0-20000	0.920(0.911-0.930)	<.0001
20001-40000	1.056(1.046-1.066)	<.0001
>40000	1.031(1.018-1.044)	<.0001
No. of outpatient visits in last year (ref: 0)		
1-5	2.384(2.326-2.444)	<.0001
6-10	3.065(2.99-3.142)	<.0001

>10	3.673(3.586-3.763)	<.0001
Charlson comorbidity index in last year (ref: 0)		
1-2	1.063(1.054-1.073)	<.0001
≧3	0.937(0.916-0.957)	<.0001
Disease diagnosed in last year (ref: no)		
Carcinoma of breast	1.211(1.159-1.265)	<.0001
Carcinoma of cervix	3.13(2.786-3.517)	<.0001
Benign neoplasm of skin	1.105(1.016-1.201)	0.0192
Benign neoplasm of breast	1.337(1.259-1.421)	<.0001
Myoma uterine	1.238(1.188-1.291)	<.0001
Benign uterine tumor	1.152(1.052-1.262)	0.0023
Carcinoma in situ of cervix uteri	3.272(2.732-3.917)	<.0001
Breast tumor	1.271(1.08-1.496)	0.004
Breast fibroadenosis	1.371(1.153-1.631)	0.0004
Other disorders of breast	1.364(1.308-1.423)	<.0001
Inflammatory disease of uterus	1.266(1.177-1.362)	<.0001
Inflammatory disease of cervix vagina and vulva	1.407(1.386-1.429)	<.0001
Noninflammatory disorders of cervix	1.818(1.717-1.924)	<.0001
Noninflammatory disorders of vagina	1.163(1.116-1.211)	<.0001
Disorders of menstruation and other abnormal bleeding from female genital tract	1.177(1.16-1.195)	<.0001
Pruritus of genital organs	1.202(1.133-1.276)	<.0001
Other symptoms involving abdomen and pelvis	1.143(1.121-1.165)	<.0001
The times of participate of Pap smear from previous two year (ref: 0)		

1	3.191(3.164-3.218)	<.0001
2	8.995(8.886-9.106)	<.0001

Table 4-15
Using GEE model to estimate Odds Ratios of potential predict factors on Pap smear in Medical Personnal-1

	OR (95% C.I.)	P-value
Medical personnel (ref: physicians+ Pharmaceutics)		
Nursing staff	1.243(1.15-1.343)	<.0001
Others	1.191(1.072-1.323)	0.0011

Adjusted for Age, Residence area, Urbanization of residence place, Number of physicians per 10,000 population in where reside, Income, No. of outpatient visits, Charlson comorbidity index, Disease diagnosed and the times of participate of Pap smear within 2 years

Table 4-16. Using GEE model to estimate Odds Ratios of potential predict factors on Pap smear in Medical personnal-2

	physicians+ Pharmaceutics	Nursing staff	Others
Hospital Classification (ref: Medical center)			
Regional Hospital	0.846(0.663-1.08)	0.955(0.866-1.053)	1.04(0.821-1.317)
District Hospital	1.031(0.769-1.383)	0.842(0.755-0.938)	0.968(0.755-1.242)
Clinic	1.004(0.815-1.237)	0.981(0.881-1.091)	1.145(0.868-1.511)
Others	1.032(0.791-1.345)	0.818(0.693-0.965)	1.024(0.674-1.556)
Working exper(ref: 0-1)			
1-2	1.087(0.796-1.483)	1.101(0.988-1.226)	1.066(0.772-1.471)
>2	0.939(0.755-1.169)	1.056(0.972-1.148)	1.166(0.905-1.503)

Adjusted for Age, Residence area, Urbanization of residence place, Number of physicians per 10,000 population in where reside, Income, No. of outpatient visits, Charlson comorbidity index, Disease diagnosed and times of participate of Pap smear within 2 years

Table 4-16-1
The characteristics of female population to participate in the mammographic screening with aged 50-69 years old from 2004 to 2008and 45-69 years old year in year 2009 and 2010

	Without mammographic screening	With mammographic screening	P-value
Total observation number	667998	72425	
Characteristics of general population			
Medical personal			<.0001
No	663440(99.32%)	71520(98.75%)	
Yes	4558(0.68%)	905(1.25%)	
Year			<.0001
2004	78558(11.76%)	3404(4.7%)	
2005	82359(12.33%)	5392(7.44%)	
2006	84830(12.7%)	7195(9.93%)	
2007	86056(12.88%)	8345(11.52%)	
2008	89129(13.34%)	9303(12.85%)	
2009	126136(18.88%)	14623(20.19%)	
2010	120930(18.1%)	24163(33.36%)	
Age (Mean±SD)	56.34±6.05	55.75±5.80	<.0001
Residence area			<.0001
Taipei area	250008(37.43%)	30145(41.62%)	
Northern	75177(11.25%)	7161(9.89%)	
Central	120508(18.04%)	12713(17.55%)	
Southern	91437(13.69%)	9208(12.71%)	
Kaohsiung area	113847(17.04%)	11474(15.84%)	
Eastern	17021(2.55%)	1724(2.38%)	

Urbanization of residence place			<.0001
Urban	421951(63.17%)	47668(65.82%)	
Sub-urban	188289(28.19%)	18645(25.74%)	
Rural	57758(8.65%)	6112(8.44%)	
Number of physicians per 10,000 population in where reside			<.0001
<25	664031(99.41%)	71673(98.96%)	
25-75	937(0.14%)	133(0.18%)	
≧75	3030(0.45%)	619(0.85%)	
Income			<.0001
Dependent insured	199357(29.84%)	18963(26.18%)	
0-20000	164631(24.65%)	13066(18.04%)	
20001-40000	242344(36.28%)	30516(42.13%)	
>40000	61666(9.23%)	9880(13.64%)	
No. of outpatient visits in previous year			<.0001
0	41329(6.19%)	953(1.32%)	
1-5	100483(15.04%)	6368(8.79%)	
6-10	99740(14.93%)	9162(12.65%)	
>10	426446(63.84%)	55942(77.24%)	
Charlson comorbidity index in previous year			<.0001
0	440013(65.87%)	40893(56.46%)	
1-2	188406(28.2%)	25748(35.55%)	
≧3	39579(5.93%)	5784(7.99%)	
Disease diagnosed in previous year			

Carcinoma of breast	4005(0.6%)	3945(5.45%)	<.0001
Carcinoma of cervix	1993(0.3%)	248(0.34%)	0.0403
Benign neoplasm of skin	1097(0.16%)	181(0.25%)	<.0001
Benign neoplasm of breast	1367(0.2%)	830(1.15%)	<.0001
Myoma uterine	3190(0.48%)	741(1.02%)	<.0001
Benign uterine tumor	622(0.09%)	131(0.18%)	<.0001
Carcinoma in situ of cervix uteri	476(0.07%)	114(0.16%)	<.0001
Breast tumor	215(0.03%)	127(0.18%)	<.0001
Breast fibroadenosis	201(0.03%)	99(0.14%)	<.0001
Other disorders of breast	3108(0.47%)	1645(2.27%)	<.0001
Inflammatory disease of uterus	776(0.12%)	109(0.15%)	0.0111
Inflammatory disease of cervix vagina and vulva	22929(3.43%)	4156(5.74%)	<.0001
Noninflammatory disorders of cervix	1988(0.3%)	478(0.66%)	<.0001
Noninflammatory disorders of vagina	2559(0.38%)	380(0.52%)	<.0001
Disorders of menstruation and other abnormal bleeding from female genital tract	11556(1.73%)	1828(2.52%)	<.0001
Pruritus of genital organs	1637(0.25%)	272(0.38%)	<.0001
Other symptoms involving abdomen and pelvis	17657(2.64%)	2495(3.44%)	<.0001
Participate Mammographic screening in previous year.			<.0001
No	624577(93.5%)	63192(87.25%)	
Yes	43421(6.5%)	9233(12.75%)	

Table 4-16-2
The characteristics of female medical personnel to participate in the mammographic screening with aged 50-69 years old from 2004 to 2008and 45-69 years old year in year 2009 and 2010

	Without mammographic screening	With mammographic screening	P-value
Total observation number	4558	905	
classification			<.0001
physicians+ Pharmaceutics	1318(28.92%)	203(22.43%)	
Nursing Staff	2871(62.99%)	613(67.73%)	
Others	369(8.1%)	89(9.83%)	
Hospital Classification			<.0001
Medical center	500(10.97%)	149(16.46%)	
Regional Hospital	597(13.1%)	139(15.36%)	
District Hospital	644(14.13%)	103(11.38%)	
Clinic	1610(35.32%)	276(30.5%)	
Others	1207(26.48%)	238(26.3%)	
Working experience			0.0558
0-1	783(17.18%)	128(14.14%)	
1-2	832(18.25%)	196(21.66%)	
>2	2943(64.57%)	581(64.2%)	

Table 4-17
Using GEE model to estimate Odds Ratios of potential predict factors on in all Mammographic screening participations

	OR (95% C.I.)	P-value
Medical personnel (ref: no)		
Yes	1.482(1.288-1.705)	<.0001
Age (per 1 year)	0.988(0.987-0.99)	<.0001
Residence area (ref: Taipei area)		
Northern	0.864(0.839-0.889)	<.0001
Central	0.9(0.878-0.922)	<.0001
Southern	0.871(0.848-0.895)	<.0001
Kaohsiung area	0.843(0.822-0.864)	<.0001
Eastern	0.841(0.798-0.886)	<.0001
Urbanization of residence place (ref: Urban)		
Sub-urban	1(0.98-1.02)	0.9813
Rural	1.122(1.088-1.157)	<.0001
Number of physicians per 10,000 population in where reside (ref: <25)		
25-75	0.834(0.668-1.042)	0.1097
≧75	1.078(0.916-1.269)	0.3638
Income (ref: Dependent insured)		
0-20000	0.815(0.796-0.836)	<.0001
20001-40000	1.21(1.186-1.235)	<.0001
>40000	1.412(1.374-1.451)	<.0001
No. of outpatient visits in last year(ref: 0)		
1-5	2.371(2.222-2.529)	<.0001
6-10	3.208(3.009-3.419)	<.0001

>10	4.077(3.832-4.337)	<.0001
Charlson comorbidity index in last year (ref: 0)		
1-2	1.109(1.09-1.129)	<.0001
≧3	1.009(0.976-1.043)	0.5897
Disease diagnosed in last year (ref: no)		
Carcinoma of breast	3.797(3.587-4.019)	<.0001
Carcinoma of cervix	1.006(0.88-1.15)	0.9295
Benign neoplasm of skin	1.138(0.968-1.338)	0.1185
Benign neoplasm of breast	1.771(1.609-1.95)	<.0001
Myoma uterine	1.293(1.19-1.404)	<.0001
Benign uterine tumor	1.177(0.959-1.444)	0.1193
Carcinoma in situ of cervix uteri	1.477(1.21-1.801)	0.0001
Breast tumor	1.729(1.33-2.246)	<.0001
Breast fibroadenosis	1.416(1.103-1.817)	0.0063
Other disorders of breast	1.795(1.68-1.917)	<.0001
Inflammatory disease of uterus	0.864(0.707-1.057)	0.1563
Inflammatory disease of cervix vagina and vulva	1.218(1.175-1.263)	<.0001
Noninflammatory disorders of cervix	1.356(1.222-1.504)	<.0001
Noninflammatory disorders of vagina	0.943(0.845-1.052)	0.2918
Disorders of menstruation and other abnormal bleeding from female genital tract	1.053(1-1.11)	0.0519
Pruritus of genital organs	1.105(0.973-1.256)	0.1249
Other symptoms involving abdomen and pelvis	1.038(0.995-1.084)	0.0868
Particpate mammographic screening in last year (ref: No)		

Yes	3.729(3.659-3.8)	<.0001

Table 4-18
Using GEE model to estimate Odds Ratios of potential predict factors on Mammographic screening in Medical personnal-1

	OR (95% C.I.)	P-value
Medical personnel (ref: physicians+ Pharmaceutics)		
Nursing staff	1.343(1.081-1.668)	0.0078
Others	1.412(1.052-1.895)	0.021

Adjust other covariates，For example, Age, Residence area, Urbanization of residence place, Number of physicians per 10,000 population in where reside, Income, No. Of outpatient visits, Charlson comorbidity index, Disease diagnosed participate mammographic screening last year.

Table 4-19. Using GEE model to estimate Odds Ratios of potential predict factors on Mammographic screening in Medical personal -2

	physicians+ Pharmaceutics	Nursing staff	others
Hospital Classification (ref: Medical center)			
Regional Hospital	0.663(0.323-1.361)	0.648(0.469-0.894)	1.238(0.665-2.303)
District Hospital	0.403(0.167-0.972)	0.642(0.458-0.898)	0.397(0.177-0.89)
General Clinic	0.645(0.359-1.159)	0.625(0.452-0.864)	0.783(0.369-1.661)
others	0.753(0.364-1.557)	0.435(0.275-0.689)	0.332(0.091-1.204)
Working experience (ref: 0-1)			
1-2	0.685(0.36-1.303)	1.742(1.314-2.309)	0.635(0.247-1.634)
>2	0.608(0.372-0.994)	1.682(1.326-2.134)	0.619(0.308-1.241)

Adjust other covariates，For example: Age, Residence area, Urbanization of residence place, Number of physicians per 10,000 population in where reside, Income, No. of outpatient visits, Carlson comorbidity index, Disease diagnosed 及 and participate Mammographic screening last year.

Chapter 5 Discussion

5.1 Preventive health care utilization in medical workers and general population

This study used the National Health Insurance database, Health Insurance Research Dataset (NHIRD) 2005 Sampling subsumed archives, and analyzed the trends of Mammographic screening and Pap smear from 2002-2010, moreover I tried to find some potential factors that affect women to attend the screening. NHIRD 2005 is a longitudinal medical claim database; the participations were random sampled from the original registry for beneficiaries (ID) list. Sample files are owned by people based National Health Research Institutes, Taiwan automated sampling design study sample selection, and whether the samples are no significant differences in the distribution of all of Taiwan's age or gender distribution (Institutes NHR). 。

This study had examined the ethnic registration files in accordance with medical personnel, for the year 2002-2010 in line with eligibility screening women aged 30-69 into: nurses, other medical personnel and the general female population. Although the study design has restriction age range between 30 to 69, but the contrast, the basic characteristic in 2002 was still statically different between study groups, in Table 4-3-1 average age of nurses were lowest (37.47±6.49) , while general population of female were the highest (45.67 ± 10.53) in 2002. Other Taiwanese population based study also found that practicing nurses have younger age distribution, which

accounted for 89.52% with aged 20-39 years old (Shen C-C et al 2013). Because caregivers need to shift directly responsible for care and the need to work with the pressure from patient's families, so Taiwanese nursing staff age and flow rate is generally low. In addition, the resulting care or other medical personnel is relatively higher than that of the general population in Taiwan, and there are serious situations a lower proportion of comorbidity. Therefore, the utilization of female population cancer preventive screenings compare nursing staff and medical personnel in Taiwan women in general, require special adjustments to differ materially on other demographic characteristics.

In year 2008, the Department of Health in Taiwan have legislated mandatory education for license renewal/re-registration as a means to demonstrating continued competence. Registered nurses in Taiwan are required by law to complete 150 credit hours of continuing education (CE) every six years, to maintain an active license. Since all practicing nurses must acquire a certain number of CE hours or credits each year. Providing CE hours or credits to nurses for taking preventive screening, for example, may help nurses who are too busy to care for their own health.

5.1.1 Utilization of Pap smears screening

The study found that Pap smear screening from 2002 to 2010 have gradually increased, Pap smear screening triennial coverage proportion was increased from

47.36% to 53.29% (fraction of 12.58%) in nursing staff from 2004 to 2010; for general women the proportion was increased from 50.00% to 52.69% (fraction of 5.38%); and for physician and Pharmaceutics the fractions of Pap smear screening triennial coverage proportion were 3.89% and -1.06%. According to Taiwan's official statistics, triennial coverage proportion of Pap smear was 50.23 percent since 2003, it was similar to our finding (Health Promotion Administration), also showed an increasing trend. In addition to the Taiwan National Health Insurance Research Database 2004-2006 also showed effective coverage (equal to triennial coverage proportion) of 55.0% (Chung S-D et al 2011); the result is similar to the coverage rate in this study. International Coverage of Cervical Cancer Screening studies indicate the developed countries, effective coverage of about 40%, and 19% in developing countries (Gakidou E et al 2008). Such results show that, Pap smear screening coverage rate in Taiwan, although still lower than in Western countries to come, but since 1995, the Taiwan National Health Department through the ongoing implementation of Pap smear screening, its effective coverage has been slowly approaching the level of developed countries.

According to Registry for medical personnel (PER) with the medical profession, the study found that triennial Pap smear crude coverage rate was increasing in general female population and nursing staff, but not in physician and pharmaceutics.

Although in year 2004 triennial coverage proportion of nursing staff were 47.36% compared with general women the proportion of 50.00%, but nursing staff coverage proportion increase ratio were 2.4%, is higher than the control group general female population(0.8%). Past studies have shown that practicing nurses in year 2004-2006 the effective coverage rate for three years was 48.9% (Institutes. NHR), and lower than the control group of women in general were 56.2% (Chung S.-D et al 2011), such outcome was similar to my earlier study findings which participation rate of nursing staff were lower than general female population is consistency, but our study further found that from year 2009 triennial coverage proportion in nursing staff and general female population is similar. One of the recent studies from F.-H. Lee et al. (2013), they found that physicians in Taiwan had the lowest participation rates among the three categories of medical personnel; Pap-test rates were highest for pharmacists (58.1%) and nurses (58.0%) and lowest for physicians (48.6%), respectively. This is not consistent with my study, we found that from year 2008-2010 participation rates among the pharmacists and nurses were apromoixly 50% and for physicians is 40%，However, we all found that in physicians have lowest triennial coverage proportion。

Table 5-1 Summary of triennial coverage of Pap smear

Authors	Time	Area	Population	Findings
General females				
This study	2002-2010	Taiwan (Eaten-South Asia)	30-69 years old	(1) Annual rate range:26.5%-29.1% (2) Triennial rate range: 50.0%-52.7%
Chung et al.	2004-2006	Taiwan (Esten-South Asia)	30-59 years old	Triennial rate: 56.2%
Green et al.	2000-2002	Eastern Massachusetts	≥ 40 years old	Triennial rate: 81.0%
Solomon et al.	2000	US	Aged 18 and older periodically since 1975	Triennial rate: 83.3%
Anttila et al.	2000	The 18 European countries	25-64	Rate range: 30%-93% within recommended interval(from 1 to 5 years)
Dowling et al.	2005	Japan	≥ 40 years old	Annual rate: 18.9%
Kim et al.	2002-2008	Korea	≥ 30 years old	Annual rate range:9.9%-15.4%
Medical personal				
This study	2002-2010	Taiwan (Esten-South Asia)	30-69 years old	Pap smear participation (1) Medical personal vs. general females OR =0.981(0.925-1.041), p=0.5273. (2) Nursing staff vs. (Physicians+ Pharmaceutics) OR=1.243(1.15-1.343), p<.0001

Lee et al.	2008-2010	Taiwan (Esten-South Asia)	≥ 30 years old	Triennial Pap smear participation rates were 58.1%, 58.0%, and 48.6% in pharmacists, nurses and physicians, respectively.
Ekine et al.	2013	Nigeria	aged 18 to 55 and above	Ever screened: Health Workers 27.8% vs. General Public 8.7%, p<0.001
Ratner et al.	2003	Canada	About 40 years old	Ever had pap smear Nurses vs. Female household population OR= 2.24(1.43- 3.50)

Most of the western developed countries cervical cancer screening mostly over 60%, and Canadian research shows there are 97.4% of nursing staff had received Pap smear, for women in general were 91.0 percent (Ratner P.A., Sawatzky R. 2009), the results are inconsistent with the findings of this study. Other studies show that nurses in developing countries is less than 20% have done Pap smear (Ayinde OA et al 2003; Udigwe GO 2006; Gharoro EP et al 2006; Urasa M et al 2011 ; Awodele O 2011; Shekhar S et al 2013), but there are few studies were compared with women in general. Most studies have found that nursing or medical personnel have a higher socio-economic status, but also for preventive screening is also more abundant knowledge (Frank E et al 1998)

On Asians, The most common reasons for non-participation in screening were lack of any symptoms (58.4%), lack of counselling (42.8%), physician does not

request (29.9%) and fear of vaginal examination (20.5%) (Thippeveeranna C. et al 2013). For objective 3 the study found that medical personal had similar participation odds with general population adjusted OR (95% CI): 0.981 (0.925-1.041). Although multivariate scale back the formula show Residence area, Urbanization of residence place, Carlson comorbidity index, Monthly income, outpatient visits and Pap smear screening from previous year related, but still less involved nurses Pap smear screening, other research indicates that nurses have a high preventive screening knowledge, but for prevention screening participation rate is still low (Thippeveeranna C. et al 2013). Another study also pointed out, rural health care for Cervical Cancer Awareness relative to urban have lower case, but basically there are no major differences between rural and urban among female health care practitioners regarding their knowledge, attitudes and practices (Tran NT et al 2011). However, my study found that screening for medical personnel cervical cancer screening are related with the degree of urbanization level hospitals in where they worked, medical personnel worked in the District Hospital prevention screening participation rate is less than the Medical center, adjusted OR was 0.842 (0.755-0.938) and 0.818 (0.693-0.965), for District Hospital and Others, there are minimal chances of screening. There may be because nurses assigned worked in Medical center with

better system working enlivenment, and increasing the possibility of screening, but this requires further study to future discussions.

5.1.2 Utilization of Mammogram

The study showed that Taiwan mammogram screening rate regardless of nurses, other medical personnel and women in general have a rising phenomenon from 2002 to 2010. Biennial coverage proportions of mammography in nurses were increasing from 11.9 % to 25.18% from 2004 to 2011, it was rise for 13.28% (fraction of 111.60%); for general population, it was rose from 6.19% to 24.94%, (fraction of 302.91%). Taiwan official statistics result of the years 2007-2009 also found that, utilization of Mammogram with aged 50-69 were 10.29%, 12.03% and 15.79% in 2007, 2008 and 2009 (Health Promotion Administration), also an increasing gradually. The study result showed that mammogram screening rate regardless of nurses, other medical personnel and women in general have a rising phenomenon from 2002 to 2010, but the participation rate was much lower than that of women in European and American countries. This demonstrated that mammography screening in Taiwan needs to be further promoted.

In this study, biennial mammogram screening coverage rate of year 2003-2011 were analyzed, covering utilization of mammogram screening for general population was 6.20% (6.00%-6.40%), in year 2004 increased to 16.40%(16.20%-16.70%), which has a relatively low in early period. This is because in year 2003-2008 free Mammogram screening only provided for women with aged 50-69, while in year 2009 and 2010 the group of 45-49 year-old was included, the Biennial coverage rates

were 16.60%(16.40%-16.80%) in year 2009 and 24.90%(24.70%-25.20%) in year 2010. Such results showed that female population in general aged 45-49 had higher utilization rates of mammogram screening.

Although International studies indicated that Western countries have a higher mammographic screening coverage ratio, research indicates that American women over the age of 45, 75% -79% at least once every two years participated in the mammographic screening in 1993-2006. Another analysis of Organization for Economic Co-operation and Development (OECD) Countries of 2000-2009 in Breast Cancer Screening Rates trend (Saika K, Sobue T. 2011), found that screening rates in America, Australia, Europe, New Zealand and USA and other countries are at 60 % or more, while South Korea Asian countries is rising since about 36 percent in 2004 to more than 60 percent in 2008, Japan has long maintained at about 20-25% of the screening rates. For race or culture may also affect breast screening participation rates, some Asians in the United States pointed out related research, 33% reported having annual mammograms in each of the past 5 years in Asian- American women(Wu T-Y, Ronis D), and Almost half (48 %) of Chinese women currently residing in the United States had not had a mammogram in the past year(Yu M-Y, Wu T-Y,), although such screening rates than in the native country of the situation of women have a higher, but still about 70 percent higher than white women in the United States screening rate.

My studied results also showed that compared with general population，medical personal have higher mammogram screening odds, OR was 1.482(1.288-1.705). In addition, residence area, urbanization of residence place, Income, visiting of primary care in the past and mammographic screening previous year is related to the mammogram screening use. Also, compared with physicians and pharmaceutics, the nursing staff mammogram screening OR is 1.343(1.081-1.668), the analysis found that nursing staff who worked in the medical center，or longer work years of service in the hospital have higher utilization of mammogram screening.

5.2 Implications of the study

Preventive cancer screening can reduce the incidence of invasive cancer, and low screening rates of nursing personnel should consider the possibility of obstruction factor, in accordance with the results of this study should provide nursing services outside of time, so that nurses can arrange matters related to screening. Strengthening nursing cervical cancer screening motivation avoid trouble or unnecessary because they feel without screening. Therefore, the relationship between the degree of urbanization and both pap smear and mammography screenings needs to be further investigated.

The study has several implications from different perspectives. For policy makers, The knowledge of preventive care utilization by nurses provide a base for recommending policy changes to enhance utilization of preventive health services by the overall population, it also can help to decide formulate policies for promoting the

utilization of preventive care in Taiwan nurses. For educators, the results of study provide the information to develop specific educational activities and strategies especially for female nurses. For researcher, the more studies should be done in term of preventive care utilization and health promotion behaviors of female nurse.

5.3 Limitations and Strengths

Strengths

1. Because secondary data is relatively easy to access, it can initially answer some of the research questions within a relatively short timescale. According to Shi (1997, p. 12), "The principal of advantage of secondary data is economy, achieved through money, time, and personnel saved in data collection and management. "Moreover, analyzing secondary data is often relatively inexpensive because the costs associated with collecting the data from its original source have already been borne. The costs of secondary data collection are usually known, although additional costs may be incurred for data conversion or re-coding. Finally, the use of secondary data analysis avoids the potential measurement bias seen in survey research.

2. Reduce recall bias; this study used medical claim data, the archives of medical institutions in the implementation of the medical or health behavior, according to the Insurance Bureau for various record insurance premiums. Its correctness than

the questionnaire asks whether the cases are engaged in preventive screening memories of respondents had much higher.

3. Secondary data analyses are also useful for comparing findings from different studies and examining trends. All researchers have some level of bias regarding the questions they investigate. Estimating an impact is always difficult, and maximizing the quantity of information analyzed obtains the most robust estimation.

4. The study used GEE model, repeated measures consideration different individuals annually, and annually in the case of some of the characteristics of the individual is subject to change, and make repeated measurements corrected regression model, which makes the estimation of the effect on the model more accurate.

5. Since the implementation of NHI, the system has covered more than 20 million people in Taiwan. The use of the considerable database now available for academic research

Limitations

The following limitations must be considered when evaluating the conclusions of this study:

1. First, the analyst did not participate in the planning and execution of the data

collection process and will not know exactly how data collection was performed. Therefore, information bias is a potential limitation. Moreover, the analyst will have no way of knowing the extent of problems such as low response rate or whether the respondents misunderstood specific survey questions.

2. Since the secondary data were not collected to answer the specific research questions in this study, valuable information such as the geographic location of the residence of the participants、family history of cancer、highest educational level attained、knowledge about the Pap、sexual activity、marital status and family history of cervical cancer will not be considered. That is, the analysis will be limited to the available data, which may not be the most important data in terms of answering the research questions.

3. Nurses may be because of different job requirements, and loading operations will be different from other profession, so medical personnel files can only be analyzed in this study for the years of service and the type of hospital practice, but cannot be related to discussions job loading.

5.4 Suggestions for future research

The Bureau of Health Promotion, in Taiwan, revised the age of free mammography screening from the age of 50 years old to 45 years old in 2009. However, the study investigated women aged over 45 in 2005, especially an

investigation of women's utilization of mammography screening from 2005-2007 and its correlation with independent variables. The scenario of the utilization of mammography screening would have been changed since 2009. It is difficult to infer the health policies after 2009 from the result of the study. It is anticipated that the futer research can work towards the utilization of mammography screening after 2009 and perform predictive factors related research. My study found that screening for medical personnel cervical cancer screening are related with the degree of urbanization level hospitals in where they worked, medical personnel worked in the District Hospital prevention screening participation rate is less than the Medical center, adjusted OR was 0.842 (0.755-0.938) and 0.818 (0.693-0.965), for District Hospital and Others, there are minimal chances of screening. There may be because nurses assigned worked in Medical center with better system working enlivenment, and increasing the possibility of screening, but this requires further study to future discussions.

In the future, the concepts of health beliefs model can be taken into consideration. These concepts can be integrated to establish a model which is more suitable to predict women's screenings. The current study also indicated using health belief model in terms of increasing knowledge, perceived susceptibility, benefits, barriers and practices of breast cancer preventive behaviors in the medical staff could be

effective (Ameneh Eskandari et al, 2014). Lack of some important factors is the limitation of research by secondary data. However, the results of the study can be combined and used to estimate large groups of developed or self- developed qualitative or quantitative questionnaire in order to track the practical use of screenings. It is believed that research results can be appropriately used in policy planning and implementation. Guidelines recommend individualizing screening decisions; particularly for younger women. For example, although they are not yet widely available for use in clinical practice, Decision aids have the potential to help patients integrate information about risks and benefits with their own values and priorities, the study also point out to maximize the benefit of mammography screening, decisions should be individualized based on patients' risk profiles and preferences. Research should also explore other breast cancer screening strategies (Pace LE, Keating NL. 2014)

5.5 Conclusion

This study found that in nurses, Pap smear screening was most common in that younger age, and those in high monthly income groups. In contrast, mammography was most common in nurses being older, and with a high education level. In addition, nurses with working experience in primary healthcare setting were more likely to utilize mammography.

The factors that affect utilization of cancer screening programs by nurses must be clarified not only to guide health policy decision making, but also to provide an evidentiary basis for designing health promotion and disease prevention interventions in individual clients.

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PROFESSIONAL EXPERIENCE

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CERTIFICATIONS and LICENSURE

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PUBLICATIONS

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