Different Demand for Health Care by Gender

Evidence from Canada

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ABSTRACT

Compared with men, women on average use more medical care services. This paper examines three possible reasons for women's higher health service utilization levels. The empirical results show that having children under five years of age present in the home is one of the primary factors that explains women's higher utilization. A higher utilization level is also significantly affected by women's self-reported lower average health status. The empirical results reject the hypothesis that women's higher utilization is due to men being able to more cheaply substitute home care for market care.

I. Introduction

Measured by whether visiting a general practitioner (GP) or a specialist, as well as the frequency of visits to a general practitioner, women on average use more health care services than men.

In Canada in the 1960s, the federal and provincial governments set up universal, publicly-funded health insurance programs. The programs were designed to remove economic barriers, so that each Canadian would have the same access to health care according to their needs and irrespective of income. But the question is, if there are no economic barriers, and the same amount of health care is available to men and women, why do women use more health services than men? Using the data of the National Population Health Survey (NPHS 1994), Dunlop et al (2000) found that, in Canada in 1994, women are 11.03 percentage points more likely than men to have at least one visit to a GP, and 8.80 percentage points more likely than men to have six or more visits to a GP in a given year. For utilization of at least one and at least six visits to a specialist, women are 11.85 percentage points and 3.75 percentage points more likely than men in a given year respectively.[1]

Why do women use health care more frequently? There are many hypotheses suggested in the literature. Sindelar (1982a) mentions four hypotheses that can explain these differences in the demand for health service between men and women: (1) Opportunity cost of time is different between men and women, which influences their demands for health care: women have higher health service utilization because

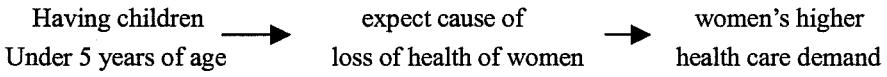
[1] Note that there are other possible measures of health services utilization not considered in this paper. Some examples are hospitalizations, emergency room visits, and expenditure on prescribed medicine.

the opportunity cost of their time is lower. (2) Men substitute home care for market care, which leads both men and women to have different demands for health care: women use greater medical care while men can more cheaply substitute home care for market care. (3) Externalities to the use of medical care of women increase women's health service utilization: as family size increases, women use more health services because other family members can benefit from women's higher utilization. (4) Expected cause of loss of health is different between men and women: women's higher demand for medical care is the result of more interactions with young children at home. In addition to these four hypotheses, Hunt and Ying (1995) also propose that (5) biological differences between men and women influence their use of medical care: women need more medical care than men, both because they have longer lives, and because some diseases are gender specific, and (6) institutional arrangements lead men and women to have different demands for medical care: women's health care demands are more likely to be "supplier induced".

The objective of my paper is to investigate the reasons for different levels of demand for health care between the genders using, for the first time, Canadian data. Because of dataset limitations, in this paper I will test three hypotheses: (1) Men substitute home care for market care, which increases women's health care demand; (2) Having children under the age of five years at home, which is the expected to reduce the quality of health of women, influences their use of medical care; and (3) Biological differences between men and women, which leads men and women have different levels of health care demand.

Through my empirical research, I found that the increased probability of women's demand for medical care is due to their expected cause of loss of health associated with more interaction with young children at home.

The graph below shows this causality:



Therefore, the results support the hypothesis that women's higher health service utilization level can be explained by their expected cause of loss of health, a result of interacting with young children.

Women's higher health service utilization level is also in part due to their self-reported lower average health status. The empirical results support the hypothesis that biological differences between men and women lead to their having different levels of demand for medical care. My empirical results do not support the hypothesis that women's higher utilization is partly due to men substituting home care for market care.

The paper is divided into five sections. Section two consists of a review of the literature, introducing opinions and hypotheses on gender differential of demand for health care. Section three is the methodology. Section four is the empirical results and section five is the conclusion.

II . Background And Literature Review

i. Demand For Health Care

In order to understand how and why people use health services, Anderson (1995)

uses a behavioural model to show that individuals' utilization is determined not only by their own characteristics, but also by economic and organization determinants. For individuals, the use of health care is a function of predisposing characteristics, enabling characteristics, and needs for care. The author shows that individuals' predisposing characteristics, such as age, gender, education, occupation, income and ethnicity, lead to their different attitudes, values and knowledge about health and health care; individuals' enabling characteristics are decided by the resources available, and their illness level determines their need for medical care. All these factors can determine how and why people use health services.

Grossman (1972) introduces the concept of demand for health care in his model of demand for health. Grossman's model sets health as a durable capital stock which determines individuals' productivity and how long the individual can stay in the labor market to make money and goods. Health is desired both because it makes each individual feel better and also because it can increase the number of healthy days available to work and thus earn more income. He assumes that investing in health care can lead to good health. Health capital suffers depreciation with age over the life cycle and appreciation with investment.

Grossman assumes that individuals want to maximize their utilities, which include health and other commodities. To get the maximum utilities, individuals allocate available resources, such as time and money, subject to a set of production functions, budget constraints, and predetermined prices.

The allocation of total resources depends on the relative price of individuals'

own time, the price of health care and the prices of other goods. To have efficient allocation, individuals would have to change the use of time and money according to the change in prices.

Demand for health care is a function of income and price. Since the demand curve for health care is downward sloping, the quantity of health care demand is negatively related to price. If the opportunity cost of time is the "time price", a higher opportunity cost leads to lower quantity demanded for health care, and vice versa. On the other hand, higher income would lead to higher demand for health care.

Other facets of demand for health care are physical health status and cause of loss of health, which are important issues discussed by many economists. Illness and reproductive events make individuals demand more medical care regardless of "time price" and income. Therefore, if men and women have different time prices, social economic status, health status, and expected loss of health, we would expect different level of demand for health care.

Here I will outline six hypotheses that can explain the differences in demand for health care between men and women.

ii. Six Hypotheses for Gender Different Use of Medical Care

(1)Opportunity Cost of Time Differences Between Men and Women, Which Leads to Their Having Different Health Service Utilization Levels

It has been observed that on average women have more flexible schedules than men, so they have more chance to access medical care services. Sindelar (1982a) used

the data of a 1-year retrospective self-reported survey of 1,550 families in the U.S. in 1973-1974 to show that women on average use 50 percent more medical care than men. One explanation could be that women have a lower opportunity cost of time.

Hunt and Ying (1995) used the data of the 1977-1978 the U.S. National Care Expenditure Survey to estimate the different levels of demand for medical care between men and women. The authors used "time required to get to usual source of medical care" and "employment status" as two key variables to measure the opportunity cost of time. "Employment reflects the flexibility in scheduling care and constraints on time which may affect the usage of health services" (P.489). The researchers investigated whether the differences in expenditures between men and women for medical care was due to differences in the mean of "time required to get to usual source of medical care" and "employed status."

Hunt and Ying used a women sub-sample to run regressions in which budget share expenditures (expenditures on visits to physician offices, hospital inpatient care, physician emergency room visits and prescribed medicine) were the dependent variables. The regressions included all the independent variables believed to affect women's demand for medical care, such as time required to get to usual source, employment status, age, marriage status, income, education, family size, and insurance. The authors calculated predicted expenditures by using women's mean values of these independent variables, then plugged men's mean values of "time required to get to usual source" and "employment status" into women's health demand equations, holding other variables constant to calculate new predicted

expenditures of women with men's opportunity cost of time. There were two sets of expenditures of women, according to the different opportunity costs of time. The authors concluded that there were no significant differences between these two sets of expenditures, and that the opportunity cost of time did not explain women's higher expenditures for medical care.

Sindelar (1982a) used "dollars per hour" and "paid sick leave" to measure opportunity costs of time. Using the same method as Hunt and Ying, Sindelar obtained the same conclusion, that women's higher utilization was not due to their relatively lower value of time.

Coffey (1983) used 1977 U.S. Women's Community Health Care Survey to estimate the impact of "time price" on demand for medical care and used wage rate to measure the opportunity cost of time. Coffey elaborates that after the expansion of public coverage insurance, medical care costs are determined not by the money price, but by the time price, rationing occurring at fixed price. If medical care is treated as a consumption good, "time price" explains the larger part of cost of this consumption. The author used wage rate to measure the value of time and argues that "the time price is the value of time multiplied by the total minutes required to obtain care: travel, waiting and treatment minutes" (P.413).

Coffey tested the impact of the "time price" effect on three regressions of medical care decisions: (i) the regression of type of provider choice: the regression estimated the probability of individuals choosing public provider or private provider; (ii) the regression of entry demand: the regression estimated the probability of making

decision to enter the medical care system; and (iii) the regression of quantity demand for services given entry: the regression tested the number of visits given at least one visit to a physician. The author concluded that in the U.S., "time price" only had a very small effect on medical care demand. The choice of provider was determined more by socio-economic status. Individuals would choose public health care by 5 percent more if the opportunity cost declined by 10 percent in public care relative to private care. Further, the author found that time price did not have a significant effect on entry demand and visit demand since these were more likely to depend on health status than social-economic status.

So far I have used the U.S. based studies to illustrate that the opportunity cost of time does not appear to have significant effects on men's and women's different levels of demand for medical care.

(2) Men Substitute Home Care For Market Care, Which Leads Men and Women to Have Different Demands for Medical Care:

Sindelar (1982a) argues that health care used by women can benefit other members of the family because of the role of women in the family. Women use information that they get from clinics and hospitals to provide health care for their husbands and children. Married men are more likely to substitute home care for market care. Sindelar (1982a) argues that on the one hand, women's higher health service utilization is partly due to a large part of married women being out of labor market, and that for women, home medical care is part of their usual home activities;

on the other hand more women work in health-related fields relative to men, hence they can provide home care more efficiency at home. Sindelar (1982a) used 1975 data of the U.S. Department of Labor to show that the ratio of women to men working as physicians, registered nurses, health technicians was 2.7:1 in 1973. Therefore married men could get home care more cheaply.

(3) Externality To the Use Of Medical Care of Women, Which Leads to Men And Women Having Different Levels of Demand for Medical Care:

The term externality here means the benefits that women get from the medical care can be transferred to the other family members. As family size increases, there are more people can benefit from mothers' higher medical utilization. Sindelar (1982a) argues that, in most families, mothers act as health care providers at home. If family size increases, women's externality to the use of medical care will increase. Women's health service utilization will go up, since they can transfer their medical knowledge to more people.

(4)Expected Cause of Loss of Health of Women, Which Leads Men and Women to Have Different Levels of Demand for Medical Care

The different lifestyles of men and women may account for the observed differences in morbidity and mortality. Verbrugge (1985) argues that women's risk of illness and injury are likely to arise from two factors. One is related to interacting with young children. "Mothers generally have more contact with their children than fathers

do, and this heightens women's risks of developing infectious diseases transmitted by children." (P.165) The second is related to emotional distress. Women tend to have more stress-related illness, since they suffer more psychological distress in their lifetimes than men. Therefore, women's higher health care utilization is partly explained by their having more interaction with young children at home and emotional duress.

As for men's risk of illness and injury, Verbrugge (1985) argues that it is more related to jobs, health habits, self-imposed stress, reaction to stress, and recreational pursuits. Men are more likely to choose higher risk hobbies and sports than women. They tend to smoke and drink more, and place more pressure on themselves, such as the achieve, as well as impatience and other tension. These factors increase the likelihood of injury and fatal illness. Verbrugge (1985) shows that the motor vehicle accident ratio of men to women is 2.91:1. The ratio of heart disease and liver disease in men and women are 1.80:1 and 2.61:1, respectively.

(5) Biological Differences Between Men and Women, Which Lead to Their Having Different Levels of Demand for Medical Care

Biological differences may substantially affect men and women's levels of demand for health services.

Verbrugge (1985) used 1980 U.S. Monthly Vital Statistics Report to analyze health status, therapeutic health behaviours, and longevity differences between sexes. He argues that, generally, women's life expectancy is 7 years longer than that of men.

Thus, women need to use more medical care during their entire life times. Further, the author demonstrates that men on average report themselves to be in better health compared to women. However, women suffer greater morbidity, nonfatal chronic disease and short-term illness than men, and they report 40 percent more in bed days per year relative to men. Higher levels of illness require women to make more visits to physicians and incur drugs expenses. Typically, women use twice as much medical care as men do between the ages of 17-44, though this gap narrows at older age categories.

Reproductive physiology is one of the most important factors that make women need more medical care. Women have many birth related illnesses that increase the risk of morbidity, and raise their demand for health care. Cleary et al. (1986) used a survey of 17,000 residents in Central Wisconsin in U.S. to show that "after removing a small group of women who were pregnant either before and after the interview from the medical care utilization test, aggregate utilization rates were reduced among women from 3.3 to 2.9 visit per year in the year before the interview and from 3.1 to 2.9 visits in the year following in the interview" (P.108). Verbrugge (1985) also argues that short-term illnesses due to reproductive behaviour account for about 10 percent of women's demand for medical care.

Hunt and Ying (1995) illustrate that biological differences are the main reasons that lead men and women to have different levels of demand for medical care. They used individuals' responses of excellent health condition, poor health conditions, chronic limited activities and no chronic limited activities to proxy for health status.

The authors estimated four sub-sample regressions of women based on individual level data. The dependent variables were the four measures of health care services utilization: the share of household expenditures on visits to physician, hospital inpatient care, emergency room visits and prescribed medicine. The independent variables were age, marital status, health status, income, education, insurance, employment, family size and region. They calculated predicted expenditures at the mean based on women, then, for the women's demand regressions, substituted the mean of men's health status, holding other variables constant to get the revised expenditures for women if they had men's heath status. They found that the different health status between men and women is an important factor which leads to their levels of different demand for health care. If women had the same health status as men, the expenditures for hospital inpatient care and emergency visits would be lower by 10 percent and 9 percent, respectively.

(6) Institutional Arrangements Lead Men and Women to Have Different Levels of Demand for Health Care:

Hunt and Ying (1995) argue that "supplier-induced demand affects women more frequently than men. Since women engage in more routine visits to health care providers, their own demand for services is compounded by the ability of physicians to impose their preferences for treatment of women." (P.484). However, they did not test this hypothesis. The authors noted indirect evidence from their regression results that could support their argument: when women used one service, such as visits to

physicians' offices, the other services, such as hospital inpatient care, physician emergency room visits and prescribed medicine were often complementary. However, men seemed to treat different health services as independent goods. This is consistent with women's health service utilization being influenced not only by their own preferences, but also by those of their physicians'.

To summarize, this section presents six hypotheses that can most likely give the reasons for the different levels of medical care demand between men and women.

I will now turn to the methodology which I am using to test the reasons for different levels of demand for medical care between men and women. Based on the previously mentioned six hypotheses, I will test three hypotheses: (1) Men substitute home care for market care, which leads their different levels of health care demand, (2) Having under five years old children at home, which is one expected cause of loss of health for women, leads men and women to have different levels of medical care demand, and (3) biological differences lead men and women to have different levels of health care demand.

III Methodology

i. Data

This analysis is based on data from the 1996-1997 National Population Health Survey (NHPS), which collects information about Canadians' health and socio-economic status. The survey covers residents in all provinces except those on Indian reserves, in remote areas of Quebec and Ontario, on Canadian force bases, and

in other remote areas.

Questions were designed to include (1) socio-demographic information such as age, sex, education, ethnicity, household income, personal income, and labour force status, and (2) health related status, such as use of health services, health determinants, physical activity, self-assessed health, chronic conditions, and activity restrictions.

The NHPS (1996-1997) is composed of two files: a general social file and a health information file. There are a total of 210,377 respondents who answered the general social questions. The health information file contains more in-depth information. There are 81,804 respondents who provided detailed health information. I use only the health information file in this paper in order to have general and detailed information for each respondent. Where the response is missing or not applicable, the data are treated as missing. The probit specification is adapted for the regressions. In the tables, I report the marginal probability effects of the estimated coefficients. The econometric software is STATA.

ii. Dependent Variables

To understand the reasons for the different levels of demand for medical care between men and women, I test four measures of utilization of general practitioner (GP) care and specialist care. In Canada, there is a two- step process for an individual who needs medical care: first, the patient self-refers to a GP, and second, the patient is referred by the GP to see a specialist who provides specialty medical care.

The four dependent variables are the four measures of utilization that are

generated from these two events. The first two dependent variables reflect the first event, which is utilization of GP visits. The first dependent variable is an indicator of whether an individual visited a GP at least one time in the previous year. It is based on responses to the question of how many times the individual consult family doctors (GP) in a year. It assumes a value of one if the individual visited a GP in the previous year, and zero if individual did not. The second dependent variable is an indicator of high frequency of use of GP care. It is equal to one if the individual went to see a GP more than six times in the past year, or zero otherwise.

The next two dependent variables reflect the event of specialist visits. The first is whether an individual visited a specialist at least one time in the previous year. It is equal to one if individual went to see a specialist in the given year, and zero if individual did not. The last dependent variable indicates the frequency of using specialist care. It is equal to one if individual went to see specialists more than six times a year, and zero if individual did not. These two dependent variables are determined by the question of "how many consultations with medical doctors," which is based on the sum of "number of times consultations with family doctors" and "other medical doctors." I use the data of "consultation with medical doctors" minus "consultation with family doctors," making the result equivalent to "consultation with other medical doctors," which consists of the visits to specialists, including allergists, gynaecologists, surgeons, and psychiatrists.

I use six visits to GPs or specialists to indicate a high level of health service utilization, because in my dataset, the percent of population who visits 6 GPs and

specialist in the past year is higher than those who make 5 visits and those who make 7 visits.

Generally the decision to visit a GP is made entirely by the patient, whereas the decision to see a specialist depends on the GP visit. These four dependent variables can capture the use of GP and specialist care and intensity of GPs and specialists use. First of all I compare the different use of health care services between men and women, then I give the three possible reasons which can explain these differences. Table 1 contains the definitions of dependent variables.

On average, women use more health care services than men. In order to show that men and women have different levels of demand for medical care, I first compare the unconditional means of the four measures of utilization between men and women to demonstrate that men and women use health care services differently. Table 2 contains the unconditional mean of men's, women's and the whole samples' four measures of utilization. It shows that the unconditional means of the four measures of utilization of the whole samples are higher than the unconditional means of men, and lower than unconditional mean of women. Women's unconditional means of the four measure of utilization are higher than that of men's. This indicates that women use health care services more than men.

Second, I compare conditional means of four measures of utilization between men and women. I estimate four utilization regressions with the female dummy and other related independent variables to show different health care utilization levels between men and women. I will give definitions of the independent variables and

discuss them in the next part. The independent variables include age, the event of having a regular doctor, education, income, work activity, marital status, health status (chronic conditions, excellent, good, fair, and poor health), insurance coverage, number of types of insurance, place of residence (urban versus rural), and province of residence. The regression specification is as follows:

$$P = \beta_0 + \beta_1 female + \sum_{\alpha} \beta_\alpha X_\alpha + \varepsilon \qquad (1)$$

Where P denotes the four measures of utilization, *female* is the dummy variable, X is all the covariates, and ε is the residual.

The results in Table 3 show that conditioned on these covariates, women are 0.1116, 0.0593, 0.0915 and 0.0103 percentage points more likely to have GP (0/1), GP (6+), Specialist (0/1) and Specialist (6+) visits relative to men in a given year. These results represent the marginal probability effects of the estimated coefficients, and they are all significantly different from zero. Therefore, I conclude that gender does play an important role in the demand for these measures of medical care. Men and women have different health care utilization levels and women on average use more health services than men.

To sum up, the four measures of health service utilization are GP (0/1), GP (6+/), Specialist (0/1) and Specialist (6+). Men and women use health care services differently. Women on average have higher health service utilization relative to men.

iii. Independent variables

According to Anderson's behavioural model (1995), an individual's health care

demand is a function of the individual's predisposing, enabling and need factors. Predisposing characteristics include the factors of age, gender, education, income, marital status, work, medical insurance, number of types of insurance and provincial of residence; enabling characteristics include factors such as the level of resources available and locations, such as urban versus rural areas; needs for care includes factors such as the individual's chronic conditions, and overall health status.

To test the reasons why men and women have different levels of demand for medical care, I estimate the probability of GP visits and specialist visits as a function of the age, the event of having a regular doctor, education, income, work activity, marital status, the existence of a chronic condition, the status of health, the level of health insurance, urban residence, and provincial of residence. Respondents under the age of 14 are excluded from the data. Ignoring the missing data, there are 19089 observations in my dataset. Table 4 contains the definition of independent variables

All of the independent variables are related to the individual's demand for medical care. I use the indicator "Married" dummy to test the first hypothesis that men substitute home care for market care. And I use the variable "Under 5" which is indicate the event of having under five years old children at home to test the second hypothesis that the effect of women's exposure to children causes women's higher level of health care utilization. Finally I use the indicators chronic condition and health status to test the third hypothesis that biological differences between men and women cause their having different levels of utilization. I will explain these hypotheses related variables in the next part. Here I will briefly explain the other

variables

"Age" is an important factor that can affect individuals' demand for health care. Illness, morbidity, and mortality rates increase with age, so as age rises, the demand for health care increases.

Dunlop et al (2000) argue that "having a regular doctor" (regd) is a very important factor that can affect the demand for health care for both men and women. The frequency of GP visits and specialist visits is higher for individuals who have a regular doctor than for those who do not.

"Work" indicates employment status. It proxies for the time constraints for individuals' demand for medical care. If an individual has a full-time job, his/her activities are constrained by his/her work schedule, and this limits the time available for health care services.

Insurance (insu and nuinsu) refers to whether or not an individual has insurance and, if they do, how many types of insurance they have. Since all legal Canadian residents are covered by the national medical insurance plan, there should be no financial barrier for them to access medical care services. However, drug expenses and some special services are not covered by the plan, which limit the individual's effective demand for medical care. Stabile (2001) found that individuals who have one or more types of insurance will ignore these expenses and will be more likely to visit a GP or specialist. Stabile also found that half of the additional increase of public health care services can be explained by moral hazard[2].

[2] Moral hazard in this case refers to when individuals have health insurance and face zero prices, they have the incentive to use more physicians services than they otherwise would if they faced the true prices of the services.

Income (incoma) and education (edu) are the two primary socio-economic-status factors that affect demand for health care. Since implementation of national health insurance plan, all Canadians can access physicians equally. Beck (1973) argues that the gap of accessibility was reduced between lower and higher income people after the introduction of universal health coverage in Canada. However, Dunlop et al (2000) show that higher socio-economic-status people benefits more from the health care system. They may have a better ability to express their need for health care and they may have positive attitudes and more knowledge about the benefit of health care system. And in turn, they may realize greater benefits of accessing specialist care and may request more specialist visits than poor people.

The indicator for rural versus urban residence is the variable that indicates the different levels of demand for medical care between rural and urban residents. Rivest et al (1999) for example argue that since the implementation of the national medical insurance plan in Canada, geography is another barrier which affects the demand for medical care. Since low medical staffing levels in the rural area create more difficult conditions for medical practitioners, less newly trained physicians are attracted to these areas. Thus people who live in rural areas have lower access to GPs and specialists relative to people who live in urban areas.

Table 5 is the mean table of independent variables for men and women as well as for the whole samples.

Thus far, I have presented all the covariates that relate to demand for health services. Next, I will turn to the strategies for testing the hypotheses.

iv. Empirical Strategy

The goal of this paper is to evaluate three propositions regarding women's higher demand for medical care relative to men. I have mentioned six hypotheses, and I will study three in particular: (1) Men substitute home care for market care, which leads women to have higher demand for health service; (2) The child exposure effect--having children under the age of five years old at home, which is one of the expected cause of loss of health of women, increases women's demand for health services; and (3) Women's self-reported lower average health status, which is related to the biological differences between men and women, leads women to have higher demand for heath services utilization.

I use two steps to test the hypothesis of "Men substitute home care for market care." First, I use the female sub-sample to estimate regressions of four health services utilization, with the Femarri dummy (among females who married) to discern the different use of health services between married women and single women. Also I use the male sub-sample to estimate regressions with Mmarri dummy (among males who married) to discern the different use of health services between married men and single men.

Second, I use a pooled regression- men pooled with women. This allows me to discern effects of gender on utilization, using a gender dummy by itself and interact with a marital status dummy. I use the key variable "Married" of this hypothesis to interact with the female dummy, and estimate utilization regression based on full

samples, including the interaction term and all the covariates. Only the key variable is allowed to vary differentially between sexes, and the interaction term indicates how much stronger or weaker the effect of the key variable is for women. All of the other coefficients are constrained to be the same for both men and women.

I use two methods to test the hypothesis regarding the cause of loss of health of women. The first one is to use a pooled regression. I use the key variable "Under 5" to interact with dummy female, and estimate the regressions based on full samples, including interaction term and all the covariates, which is similar to the specification above.

Second I use the Hausman Test. The Hausman Test tests whether the effects of an indicator, for example the "Under 5"indicator, are the same for the male and female sub-sample. Using this method, it shows whether or not the effects of the key variable "Under 5" are consistent between the sexes. I use the male and female sub-samples to estimate the utilization regressions separately, allowing all the covariates to have different effects for the two sexes, and obtaining the differences in the coefficients of each covariate. I use the Hausman test t statistic to test if the difference in the coefficient of the key variable between sexes is significantly different from zero.

My strategy for testing the validity of the proposition regarding "biological differences which lead men and women to have different health care utilization levels" is using mean measurements. I estimate four full sample regressions, and calculate the predicted probability of health service demand at the mean based on women, then substitute the means of men's health status and chronic condition into

the female's demand equation, holding other female's characteristic constant in order to get a new predicted probability of health service demand of female. In this way, I can investigate if the changes in health service demand of women are resulting from mean gender differences in health status and chronic conditions.

The following is the in-detail discussion of strategies of testing the three hypotheses:

(1) Men Substitute Home Care For Market Care, Which Leads Men and Women to Have Different Levels of Demands for Medical Care

Sindelar (1982a) argues that women's higher health service utilization is partly due to men substituting home care for market care. Marriage thus has a direct effect on health care utilization for both men and women. Being married means that there is someone to provide home care for the ones who are sick, so in general married people seek less health care services. By virtue of being female, married females should use more services ceteris paribus, because the information they obtain permits them to provide home care for other family members. Also a significant proportion of married females are out of the labour market, and thus they have more free time to access medical care. They use the information that they get from clinics and hospitals to provide home care for other family members. Hence among married people, females should be expected to use more services. Thus, for certain types of health care services, men can obtain it more cheaply through the home.

First I use female sub-sample to estimate four health care utilization regression

equations including the dummy variable "Femarri" and all the other covariates to see if the "Married" women and the "Single women" use health care differently. (I drop "Married" to avoid the dummy variable trap). Using the same method of male sub-sample with the dummy variable "Mmarri" to see if there are different levels of health care demand between the "Married men" and the "Single men". The regression specifications are:

$$P = \alpha_0 + \alpha_1 femarri + \sum_{\delta} \alpha_\delta X_\delta + \varepsilon \qquad \text{(female sub-sample)} \quad (2)$$

$$P = \beta_0 + \beta_1 mmarri + \sum_{\delta} \beta_\delta X_\delta + \eta \qquad \text{(male sub-sample)} \quad (3)$$

Where P denotes the four measures of utilization, and X denotes all the covariates. Femarri is the dummy variable that indicates who is married among females. Mmarri is the dummy variable that indicates who is married among males. α_1 and β_1 are the key coefficients of interest.

Since in most families, married women play an important role in home care, I expect "Married women" to have a higher utilization than "Single women", and "Married men" to have a lower utilization than "Single men." This means that men might substitute home care for market care, and women can provide home care at home.

Second, I estimate the pooled regression. I use the binary variable "Married" to interact with the dummy variable "female" and estimate four utilization regressions based on full samples, including the "female" dummy, and the interaction term, and the covariates listed in Table 4, Only the key variable "Married" is allowed to vary differently between sexes. The interaction term indicates how much stronger or

weaker the effect of "Married" is for women.

The regression specification is as follows:

$$P = \beta_1 + \beta_2 X + \beta_3 married + \beta_4 female + \beta_5 married \cdot female + \varepsilon \quad (3)$$

The interpretation of the coefficients is taken from the following expressions:

$$\frac{\partial E[p]}{\partial married}\Big|_{female} = \beta_3 + \beta_5 female = \beta_3 + \beta_5 \quad (4)$$

Where the female dummy is equal to one.

$$\frac{\partial E[p]}{\partial married}\Big|_{male} = \beta_3 \quad (5)$$

Where the female dummy is equal to zero.

In these equations, P denotes the four measures of utilization, X is all the covariates. β_3 is the effect of being "Married" on males' utilization, and $\beta_3 + \beta_5$ is the effect of being "Married" on females' utilization. β_5 shows how much stronger or weaker the effect of "Married" is for female. If β_5 is significant, the effect of the indicator "Married" will be larger for females utilization.

I expect $\beta_3 + \beta_5$ is positively significant different from zero. This means that married women significantly increase their use of health services relative to single women all else constant. Also I expect β_3 is negatively significant different from zero. This means that married men significantly decrease their health service utilization relative to single men, all else constant. Therefore married men have greater recourse to home care and less recourse to their use of market care service than single men. Hence women's higher health care utilization can be explained partly by men substituting home care for market care.

(2) Expected Cause Of Loss of Health of Women Which Leads Men and

Women to Have Different Levels of Demands for Medical care

Verbrugge (1995) argues that men's and women's different health care utilization levels can be explained by their different expected causes of loss of health. He suggests that women's higher health service utilization is the result of more exposure to young children at home, since it is easier for them to catch diseases from their sick children. Thus, I expect that having children under the age of five at home would have a positive effect on women's health service utilization, and would not have a significant effect on men's utilization. The key discriminating variable is "Under 5."

First, I use the pooled regression. I use the "Under 5" indicator to interact with the "female" dummy and estimate four utilization regressions based on full samples, including the female dummy, all the covariates and the interaction term. The specification is as follows:

$$P = \beta_1 + \beta_2 X + \beta_3 under5 + \beta_4 female + \beta_5 under5 \cdot female + \varepsilon \qquad (7)$$

The interpretation of the coefficients is taken from the following expression;

$$\frac{\partial E[p]}{\partial under5}\Big|_{female} = \beta_3 + \beta_5 female = \beta_3 + \beta_5 \qquad (8)$$

Where dummy female is equal to one.

$$\frac{\partial E[p]}{\partial under5}\Big|_{male} = \beta_3 \qquad (9)$$

Where dummy female is equal to zero.

P denotes four measures of utilization, X is the related covariates, β_3 is the effect of being "Under5" on males' utilization, and $\beta_3 + \beta_5$ is the effect of being "Under5" on females' utilization. If the values of β_5 are significant, this will mean that the "Under5" had significantly different effects on both sexes.

Second I use the Hausman test. I estimate four utilization regressions separately based on sub-sample of both sexes:

$$P_{female} = \gamma_1 + \gamma_2 X + \gamma_3 under5 + \varepsilon \quad (10)$$

$$P_{male} = \lambda_1 + \lambda_2 X + \lambda_3 under5 + \eta \quad (11)$$

where P denotes the four different measures of utilization, the *"under 5"* is the key variable, and the same independent variables are used for men's and women's sub-sample.

I use the Hausman test t statistic to test for differences in the coefficient of "Under 5" of four measures of utilization between men and women. A significant Hausman test indicates that γ_3 and λ_3 are significantly different.

These two method can test whether or not having children under the age of five years at home have different effects on men's and women's health service utilization levels.

(3) Biological Differences Between Men and Women Lead Them to Have Different Health Service Utilization Levels

Health status and chronic conditions are important factors which reflect the biological differences between men and women. Generally, men report better health status relative to women at all ages, though they have higher mortality rates than women. The gender-based breakdown for the means reported in Table 5 shows that the mean of men's "self-reported-health-status" is 2.302, which is better than that of women, 2.3119 (excellent is 1, poor is 5). However, women suffer a higher incidence

of chronic illness and morbidity than men. It is shown in table 5 that the mean of women's chronic conditions is 0.5843, which is higher than that of men, 0.4888. Also women have a longer life expectancy. Thus women need more health care throughout their whole lives. I use the statistic of sample means to test whether women's higher health service utilization is partly due to their on average relatively lower health status.

I estimate four utilization regressions for women:

$$P_{female} = \beta_1 + \sum_{\alpha} \beta_\alpha Health_\alpha + \sum_{\delta} \beta_\delta X_\delta + \varepsilon \qquad (11)$$

Where $health_\alpha$ denotes healthrelated variables including the self-reported health indictors. X_δ denotes all the other variables, and P reflects the four measures of utilization.

I obtain four groups of estimated marginal effects from these regressions, and then multiply them by the women's mean values of all the covariates, to obtain the expected probabilities of women's demands for GP visits and specialist visits in a year. Then, I plug men's means of the self-reported health status indicator and mean of indicator for chronic conditions into the women's health service demand equation, holding other women's characteristics constant, to calculate women's new expected medical service utilization given men's health status. I compare the results of these two groups of utilization to see how women will change their utilization pattern if they have the same health characteristics of men.

Thus far I have discussed the strategies for testing the hypotheses of men substituting home care for market care, exposure to young children at home which is

the expected cause of loss of health of women, and biological differences between men and women. Using my dataset, it is hard to test the hypotheses that the "opportunity costs of time differences between men and women lead to different demands for medical care" and "institutional arrangements effect on men and women". Hunt and Ying (1995) use "time required to get to the usual source of medical care" and "employment status" to proxy for the opportunity cost of time. However the NPHS (1996-1997) does not include any questions related to the cost of time. "Employment status" is the only possible variable that could explain opportunity cost of time, but it is not enough to test this hypothesis.

As for the hypothesis of the "institutional arrangements' effect on women's medical care demand," Hunt and Ying (1995) did not test it in their empirical work. They only observed that "when women use services, diverse services are often complementary. Men, however, treat different services as independent goods. Thus, women may be influenced by the preferences of their physicians as well as their own preferences" (P.494).

In this section, I have discussed data, dependent variables, independent variables, and empirical strategies. Next, I will discuss the empirical results of the three hypotheses.

IV. Empirical Results

i. Men Substitute Home Care For Market Care

This hypothesis is that women's greater health service utilization is partly due to

the fact that men can substitute home care for market care. Sindelar (1982a) argues that since a substantial married women are out of labour market, they have more chances to access medical services. They use health care information that they receive from the clinics and hospitals to provide home care for other family members. Married women's health service utilization should be higher than single women, since the information they obtain permits them to provide home care for other family members. As a result married men can substitute home care for market care.

In order to test the hypothesis that "Men substitute home care for market care," I expect that married women use more health services than single women; and married men significantly decrease their level of use of health services relative to single men.

I use the female-sample to estimate four utilization regressions with the "Femarri" dummy and the other related covariates to show whether there is different levels of use of health care services between "Married female" and "Single female." (equation (2)). I also estimate the same regressions with the "Mmarri" dummy to show whether there are different levels of use of health services between "Married male" and "Single male" (equation (3)). Table 6 contains the result.

The first column of Table 6 shows the different levels of use of health services between married and single women. The marginal effects of Married female's GP (0/1) visits and GP (6+) visit are positive and significantly different from zero. They are 0.0264 and 0.0821, respectively. This means that married women significantly increase the probability of their visits to GPs relative to single women in the given year. On the other hand, there is no significant difference in the probability of visits to

specialists, reflected in the estimated marginal effects of Specialist (0/1) visits and Specialist (6+).

The second column of Table 6 shows the different levels of use of health services between married and single men. For "Married men", the marginal effect of GP (0/1) visits is 0.0658. It is positive and significantly different from zero. This means that being married male significantly increases the probability of GP (0/1) visits. However there is no significant difference in the probability of visit to GP (6+), and specialist, reflected in the estimated marginal effect of GP (6+), Specialist (0/1), and Specialist (6+). The results above imply that married women significantly increase their probability of visit to GPs relative to single women. And the mean table reported in Table 2 shows that women have higher utilization levels for all the medical services. These results are consistent with the proposition that women can provide home care at home. However, I find no evidence that among males, married males decrease their health care utilization relative to single males. This means home care may not have impact on men's health care demand if home care exists. Therefore, there is no evidence in my dataset that men substitute home care for market care.

I use a second method--pooled regression--to test whether or not married women use more health services than single women; and married men significantly decrease their level of use of health service relative to single men.

I estimate four health service utilization regressions based on full samples' (equation (4)), and the interaction term "married*female" is one of the independent variables. (the full sample regression results are presented in Appendix A). β_3 is the

effect of being "Married" on men's utilization. The effects of the indicator "Married" on women's utilization are the sum of the coefficients of the indicator "Married" and the coefficients of interaction term ($\beta_3 + \beta_5$). Table 7 shows the result of "Married" effect on both sexes.

The first column of Table 7 shows that the effect of the indicator "Married" on women's GP (0/1) visits is positive and significant, reflected in the estimated marginal effects of GP (0/1). This means that the married women making at least a one time visit to a GP is 0.0324 percentage points more than a single women, all else constant in a year. These is no significant difference in the GP(6+), Specialist(0/1) and Specialist(6+) visits.

The second column of Table 7 shows that the indicator "Married" has a significantly positive (0.0550) effect on men's GP (0/1) visits. This means that the married men making at least a one visit to a GP is 0.0550 percentage points more than that of single men, all else constant in a year. The "Married" indicator has no significant effects on the probability of male's GP (6+) and specialist visits, reflected in the estimated marginal effects of GP (6+), Specialist (0/1), and Specialist (6+).

The results of these two methods imply that married men do not decrease their use of health care services relative to single men. Therefore, married men may not substitute home care for market care. These results do not support the hypothesis that women's high medical care demand can be explained in part by men substitute home care for market care.

I include the marginal effects of the interaction term in Table 7 for the interest of

the reader. These marginal effects are never significant for any of the four measures of utilization. This means that the "Married" indicator's effects on women's four measurements of health care utilization are not greater than that of men's.

ii. Expected Cause Of Loss Of Health of Women, Which Leads Women to Have Higher Health Service Utilization

Since women have greater chances to interact with children at home, relative to men, the probability of their getting illnesses transmitted from children is higher. Hence, women's higher health service utilization may in part be due to their expect cause of loss of health, a result of having children under the age of five at home. I expect that the indicator "having children under the age of five years at home" will have a positive effect on women's demand for health services.

First, I use the pooled regression. I use the key variable "Under 5" (5 years old or younger) to interact with the dummy female, and estimate four utilization regressions based on full samples (equation (7)), and including the interaction term as one of the independent variable (the full regression results are presented in Appendix B). β_3 is the effect of the indicator "Under 5" on men's utilization. The effects of the indicator "Under 5" on women's utilization are the sum of the coefficients of the "Under 5" and the coefficients of the interaction term ($\beta_3 + \beta_5$). Table 8 shows the results of the effect of the indicator "Under 5" on men and women.

The first column of Table 8 shows that the effects of the indicator "Under5" on women's utilization are estimated to be 0.0393, 0.0780, 0.0604, and 0.0305,

respectively. They are all positive and significant. This means that having children under the age of five at home significantly increases women's probability of GPs and specialists visits. However, the marginal effects of the indicator "Under 5" on men's health service utilization are estimated to be 0.0008, -0.0188, -0.0070 and –0.0047, respectively. They are all insignificant. Therefore, having children under the age of five at home does not have significant effect on men's probability of demands for health services.

The marginal effects of the coefficient of the interaction term in column 3 are for the interest. They show that having children under the age of five at home has a large (positive) impact on women's demand for medical care relative to men's. These results support the hypotheses that women's higher demand for health services is partly due to the presence of children under five years of age at home.

Second I use the Hausman test to test whether the effects of indicator "Under 5" on both sexes are consistent. I estimate four utilization regressions based on men and women separately (equation (10) and (11)) to get the differences in the coefficients of the indicator "Under 5" between the sexes of four measures of utilization, and use the Hausmen test t statistic to test for the significant of these discrepancies. Table 9 shows the results of the Hausman test.

Table 9 shows that the effects of the indicator "Under 5" on women's four measures of utilization are all positive and significant (0.1212, 0.3221, 0.1799 and 0.4224). The effects of the indicator "Under 5" on men's utilization are all insignificant.

I use the Hausmsn test t statistic to see if the indicator "Under5" has similar effects on both sexes. The t statistics of the four measures of utilization are 5.08, 8.6, 4.9 and 5.5, respectively. The absolute values are all bigger than the critical value of 2 for 5% level of significant. This means that the effect of the indicator "Under 5" are significantly greater for women. The result is consistent with the result of using the pool regression.

Therefore, having children under the age of five at home significantly increases women's health care demand, but it does not have a significant effect on men's health service utilization. This supports the hypothesis that the expected cause of loss of health of women, a result of having children under the age of five at home, increases women's demand for health service.

iii. Biological Differences Between Men and Women

Women on average have a longer life span but suffer more morbidity and chronic conditions. Men on average report themselves to be in better health at all the age groups. In this part of my paper, I test whether the difference in self-reported-health status between men and women leads to their different levels of demand for medical care.

The hypothesis is that women's higher service utilization is partly due to their relative lower health status.

The statistic of the mean is used to test this hypothesis. I estimate four utilization regressions of women (equation (12)). From these regressions, I obtain four sets of

marginal effects of the coefficients of the covariates and multiply them by the mean values of the covariates of women to obtain the expected probabilities of women's health service demands. Then, I plug the means of the indicator variable for men's self-reported health (the categories are men's excellent, good, fair, poor health status and chronic condition) into women's health demand equation, holding other women's characteristics constant, and calculating the new expected probabilities of women's health service demands. I compare the results of these two sets of probabilities to find how women will change their utilization level if they have men's health status. The calculations are presented in Appendix C. Column 1 of appendix C shows the marginal effects of the coefficients of the health status of females, column 2 lists the means of women's health status and chronic condition, column 3 lists the means of men's health status and chronic condition, and column 4 lists the change in women's utilization levels if they have men's health conditions. And Table10 presents the changes in women's probabilities of demand for health care services if they have the health status of men.

Table 10 shows that women, with men's health status, will significantly decrease their demand for GP visits and specialist visits. Column (1) of Table 10 contains the results from the predicted health care utilization with men's health characteristics; holding other characteristics constant; column (2) contains results from the predicted health care utilization equation, including women's health characteristics, holding other characteristics constant; and column (3) is the utilization differences.

In the table of means reported in Table 5, the mean of men's self-reported health

(category for excellent) is higher and the mean of men's "chronic conditions" and "poor health status" are lower than those of women. As for "good health" and "fair health" status, women's mean values are higher than men's. But it is hard to judge whether or not on average women possess a relatively lower health status. In table 5, The breakdown variable Self-Reported-Health-Status, which includes excellent, good, fair, and poor health status (excellent =1, poor =5; omit "very good") can indicate men and women on average have different health status levels. The mean values of "Self-Reported-Health-Status" of men and women are 2.302 and 2.3119, respectively. Thus, women on average report a lower health status than men. Women decrease their health service utilization when they have men's health characteristics.

Therefore, females' higher demand for medical service is partly due to their relatively lower self reported health status, the evidence of biological differences. They would decrease their utilization if they had men's health conditions. Biological differences do have different effects on men's and women's health care utilization rates. This result is consistent with my prediction.

V. Conclusion

Generally, women use more medical care services than men. In order to better understand the reasons for the higher health service utilization of women, I tested three hypotheses: (1) Men substitute home care for market care, which leads women to have higher health service utilization levels; (2) Expected cause of loss of health among women, the result of having children less than five years old at home, leads to

women's higher health care demand; and (3) Women's lower average health status leads them to have higher health service utilization, which is the evidence of biological differences between men and women.

The empirical results reject the hypothesis of women's higher utilization is due to men substituting home care for market care. Married men do not decrease their health care utilization relative to single men, in the case when married women have higher utilization at home.

The empirical results support the hypothesis that women's higher demand for medical care is in part due to their expected cause of loss of health, a result of interacting with young children at home.

The empirical results support the hypothesis that women's higher utilization is resulting from their relatively lower levels of self-reported-health and a higher level of chronic conditions. Women would significantly decrease use of all the health services if they had men's health status. This is the evidence of biological differences is the reason for different demand for medical care.

The two positive results give implications for health care reform. Since interactions in the home with children less than five years old is one of the reasons leading to higher utilization rates for women, policy could aim to either: improve the health of children by increasing say, the number of routine physical checkups or increasing numbers of pediatricians available to children or, taking the children our of the home by increasing the availability to daycare for young children. In this way, women would have less chance to get illnesses transmitted from their young children.

However, it is neither realistic to think that with any amount of health care children will no longer get sick, nor is it desirable to limit the interaction of children with their mothers.

For the biological differences in the utilization rates of men and women, it is more difficult to draw implications for improving health care programs. If women have greater utilization rates because of their on average lower health status, it may be efficient to increase the specialized knowledge of physicians to more thoroughly treat women. Therefore the demand for health care services of women could be reduced through prevention and early detection of illnesses. It would be interesting to test the health care utilization rates of women in areas where physicians have more female-specific knowledge against areas where physicians do not have as great knowledge.

Since men on average use less health care services, but suffer more fatal disease, policy should target to improve preventative care for men to increase their health care utilization.

Appendix A

The Effect of the Indicator "Married" on Men's and Women's Health Service Utilization

	GP(0/1)	GP(6+)	Specialist (0/1)	Specialist (6+)
Female	.1246	.0506	.0807	.0065
	(.0099)	(.0085)	(.0106)	(.0036)
Married	.0550	-.0009	.0011	-.0027
	(.0105)	(.0090)	(.0013)	(.0040)
marri_f	-.0220	.0134	.0154	.0055
	(.0129)	(.0107)	(.0133)	(.0048)
age2	-.0245	.0312	.0409	.0068
	(.0099)	(.0084)	(.0105)	(.0035)
age3	-.0106	.0518	.0387	.0049
	(.0110)	(.0099)	(.0117)	(.0040)
age4	.0228	.0807	.0369	-.0063
	(.0139)	(.0137)	(.0147)	(.0035)
regd	.2772	.0927	.0734	.0156
	(.0115)	(.0054)	(.0088)	(.0023)
under5	.0177	.0420	.0336	.0181
	(.0083)	(.0076)	(.0090)	(.0037)
incma	.0022	-.0168	.0080	-.0013
	(.0033)	(.0026)	(.0033)	(.0010)
Iedu_2	.0022	-.0136	-.0144	.0017
	(.0033)	(.0065)	(.0087)	(.0029)
Iedu_4	.0015	-.0088	.0215	.0010
	(.0085)	(.0064)	(.0088)	(.0029)
Iedu_6	.0163	-.0210	.0358	.0085
	(.0103)	(.0077)	(.0112)	(.0041)
Iedu_7	-.0069	-.0408	.0520	.0159
	(.0189)	(.0122)	(.0204)	(.0087)
work	-.0251	-.0496	-.0387	-.0173
	(.0073)	(.0059)	(.0074)	(.0027)
insu	-.0038	-.0084	-.0214	-.0017
	(.0096)	(.0075)	(.0097)	(.0030)
nuinsu	-.0061	.0151	.0131	.0037
	(.0103)	(.0078)	(.0101)	(.0031)
chron	.1579	.1446	.1595	.0227
	(.0062)	(.0049)	(.0060)	(.0021)
Ihealt_1	-.0142	-.0071	-.0111	.0025
	(.0081)	(.0060)	(.0079)	(.0027)
Ihealt_3	-.0025	-.0074	-.0001	.0029
	(.0075)	(.0057)	(.0074)	(.0025)
Ihealt_4	-.0184	-.0062	.0034	-.0034
	(.0115)	(.0084)	(.0112)	(.0034)

Ihealt_5	.0137	-.0040	.0157	.0010
	(.0190)	(.0148)	(.0201)	(.0066)
urban	.0307	-.0045	-.0165	.0034
	(.0090)	(.0069)	(.0085)	(.0028)
Iprov_1	.0089	.0290	-.0413	-.0137
	(.0135)	(.0114)	(.0124)	(.0024)
Iprov_2	.0007	-.0125	-.0331	-.0037
	(.0143)	(.0101)	(.0130)	(.0037)
Iprov_3	-.0067	.0113	-.0409	-.0108
	(.0143)	(.0106)	(.0123)	(.0027)
Iprov_4	-.0332	-.0288	-.0192	-.0099
	(.0142)	(.0087)	(.0125)	(.0028)
Iprov_5	0.0598	-.0591	.0597	-.0085
	(.0104)	(.0061)	(.0101)	(.0024)
Iprov_7	-.0183	-.0033	-.0306	-.0059
	(-.0138)	(.0100)	(.0122)	(.0032)
Iprov_8	-.0247	.0343	.0188	-.0091
	(.0153)	(.0124)	(.0137)	(.0033)
Iprov_9	-.0186	.0119	-.0645	-.0070
	(.0127)	(.0099)	(.0105)	(.0029)
Iprov_10	-.0034	.0341	-.0416	-.0102
	(.0121)	(.0100)	(.0106)	(.0025)

Note: the full sample regressions including female dummy, the interaction term "married_f," and all the covariates.

Appendix B

The Effect of the Indicator "Under 5" on Men's and Women's Demand for Health Service

	GP (0/1)	GP (6+)	Specialist (0/1)	Specialist (6+)
Female	.1038	.0431	.0788	.0040
	(.0067)	(.0052)	(.0067)	(.0022)
under5	.0008	-.0188	-.0070	-.0047
	(.0110)	(.0099)	(.0126)	(.0040)
under_f	.0380	.1078	.0693	.0436
	(.0140)	(.0180)	(.0177)	(.0117)
age2	-.0237	.0323	.0413	.0071
	(.0098)	(.0084)	(.0105)	(.0035)
age3	-.0087	.0518	.0380	.0049
	(.0109)	(.0098)	(.0116)	(.0040)
age4	.0263	.0813	.0368	-.0062
	(.0136)	(.0135)	(.0145)	(.0035)
married	.0445	.0079	.0110	.0153
	(.0083)	(.0059)	(.0078)	(.0023)
incma	.0014	-.0170	.0080	-.0014
	(.0033)	(.0025)	(.0033)	(.0010)
Iedu_2	.0035	-.0132	-.0143	.0017
	(.0087)	(.0065)	(.0087)	(.0029)
Iedu_4	.0012	-.0096	.0209	.0007
	(.0085)	(.0064)	(.0088)	(.0028)
Iedu_6	.0164	-.0214	.0353	.0082
	(.0103)	(.0077)	(.0112)	(.0041)
Iedu_7	-.0060	-.0421	.0501	.0145
	(.0189)	(.0120)	(.0203)	(.0084)
work	-.0222	-.0465	-.0368	-.0160
	(.0072)	(.0059)	(.0074)	(.0026)
insu	-.0035	-.0086	-.0214	-.0018
	(.0096)	(.0075)	(.0097)	(.0030)
nuinsu	-.0065	.0147	.0126	.0036
	(.0103)	(.0077)	(.0101)	(.0030)
chron	.1577	.1445	.1595	.0228
	(.0062)	(.0049)	(.0060)	(.0021)
Ihealt_1	-.0145	-.0070	-.0112	.0025
	(.0081)	(.0060)	(.0079)	(.0027)
Ihealt_3	-.0028	-.0076	-.0008	.0027
	(.0075)	(.0056)	(.0074)	(.0025)
Ihealt_4	-.0187	-.0063	.0034	-.0033
	(.0115)	(.0084)	(.0112)	(.0033)
Ihealt_5	.0138	-.0039	.0155	.0011
	(.0190)	(.0148)	(.0201)	(.0066)

urban	.0310	-.0045	.0165	.0033
	(.0090)	(.0069)	(.0085)	(.0027)
Iprov_1	.0095	.0297	-.0408	-.0134
	(.0134)	(.0115)	(.0124)	(.0024)
Iprov_2	.0008	-.0124	-.0331	-.0037
	(.0143)	(.0101)	(.0130)	(.0036)
Iprov_3	-.0065	.0110	-.0408	-.0107
	(.0143)	(.0106)	(.0124)	(.0027)
Iprov_4	-.0329	-.0284	-.0191	-.0098
	(.0142)	(.0087)	(.0125)	(.0028)
Iprov_5	-.0601	-.0592	.0596	-.0086
	(.0104)	(.0061)	(.0101)	(.0023)
Iprov_7	-.0189	-.0040	-.0309	-.0060
	(.0139)	(.0099)	(.0122)	(.0032)
Iprov_8	-.0251	.0336	-.0190	-.0091
	(.0153)	(.0123)	(.0137)	(.0031)
Iprov_9	-.0188	.0119	-.0647	-.0069
	(.0127)	(.0099)	(.0105)	(.0028)
Iprov_10	-.0038	.0339	-.0414	-.0100
	(.0121)	(.0100)	(.0106)	(.0025)

Note: the full sample regressions including female dummy, the interaction term "under_f," and all the covariates.

Appendix C

(1) Biological Differences Effect on Female's GP(0/1) Utilization

Variable	dF/dx (1)	mean of men (2)	mean of women(3)	change of utilization (4)
Excellent health	-0.0171	0.2909	0.2890	-0.00003
	(0.0097)	(0.4542)	(0.4533)	
Good health	-0.0049	0.2487	0.2540	0.000026
	(0.0089)	(0.4323)	(0.4353)	
Fair health	-0.0048	0.0732	0.0749	0.0000082
	(0.0134)	(0.2605)	(0.2632)	
Poor health	-0.0028	0.0219	0.0215	-0.00006
	(0.0240)	(0.1465)	(0.1449)	
Chron	0.1243	0.4850	0.5856	-0.0125
	(0.0079)	(0.4998)	(0.4926)	
			Total change	-0.013**
				(0.0037)

Note: the marginal effects of female's self-reported –health multiplied by the mean differences of men and women, holding other covariates constant, the result is the change of the probability of GP (0/1) visits when women have men's means of health status and chronic conditions. ** denote significant at 5% level.

(2) Biological Differences Dffect on Female's GP(6+) Utilization

Variable	dF/dx (1)	mean of men(2)	mean of women(3)	change of utilization (4)
Excellent health	-0.0105	0.2909	0.2890	-0.00001995
	(0.0101)	0.4542)	(0.4533)	
Good health	-0.0072	0.2487	0.2540	0.00003816
	(0.0095)	(0.4323)	(0.4353)	
Fair health	0.0103	0.0732	0.0749	-0.00001751
	(0.0146)	(0.2605)	(0.2632)	
Poor health	-0.0036	0.0219	0.0215	-0.00000144
	(0.0251)	(0.1465)	(0.1449)	
Chron	0.1750	0.4585	0.5856	-0.017607
	(0.0076)	(0.4998)	(0.4926)	
			Total change	-0.018**
				(0.0032)

Note: the marginal effects of female's self-reported-health multiplied by the mean differences of men and women, holding other covariates constant, the result is the change of the probability of GP (6+) visits when women have men's means of health status and chronic conditions. ** denote significant at 5% level.

(3) Biological Differences Effect on Female's Specialist(0/1) Utilization

Variable	dF/dx (1)	mean of men (2)	mean of women (3)	change of utilization (4)
Excellent health	-0.0184	0.2909	0.2890	-0.000035
	(0.0121)	(0.4542)	(0.4533)	
Good health	0.0056	0.2487	0.2540	-0.000029
	(0.0114)	(0.4323)	(0.4353)	
Fair health	0.0148	0.0732	0.0749	-0.0000252
	(0.0172)	(0.2605)	(0.2632)	
Poor health	0.0438	0.0219	0.0215	0.000019
	(0.0318)	(0.1456)	(0.1449)	
Chron	0.1789	0.4850	0.5856	-0.017997
	(0.0090)	(0.4998)	(0.4926)	
			Total change	-0.018**
				(0.009)

Note: the marginal effects of female's self-report-health multiplied by the mean differences of men and women, holding other covariates constant, the result is the change of the probability of Specialist (0/1) visits when women have men's means of health status and chronic conditions. ** denote significant at 5% level.

(4) Biological Differences Effect on Female's Specialist(6+) Utilization

Variable	dF/dx (1)	mean of men (2)	mean of women (3)	change of utilization (4)
Excellent health	0.0003	0.2909	0.2890	- 0.00000057
	(0.0044)	(0.4542)	(0.4533)	
Good health	0.0025	0.2487	0.2540	-0.00001325
	(0.0042)	(0.4323)	(0.4353)	
Fair health	-0.0040	0.0732	0.0749	0.0000068
	(0.0058)	(0.2605)	(0.2632)	
Poor health	0.0047	0.0219	0.0215	0.00000188
	(0.0118)	(0.1465)	(0.1449)	
Chron	0.0275	0.4850	0.5856	-0.0027665
	(0.0034)	(0.4998)	(0.4926)	
			Total change	-0.028**
				(0.013)

Note: the marginal effects of female's self-reported-health multiplied by the mean differences of men and women, holding other covariates constant, the result is the change of the probability of Specialist (6+) visits when women have men's means of health status and chronic conditions. ** denote significant at 5% level.

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Table 1 Definition of Dependent Variables

Dependent Variables	Definition
GP(0/1)	use GP care at least one time a year
GP(6+)	use GP care more that 6 times a year
Specialist(0/1)	use specialist care at least one time a year
Specialist(6+)	use specialist care more than 6 times a year

Note: the four dependent variables are the four measures of utilization.

Table 2 Unconditional Mean Table of Dependent Variables

Variable	Mean (All)	Mean (Men)	Mean (Women)
GP(0/1)	0.7769	0.7075	0.8419
	(0.4163)	(0.4549)	(0.3648)
GP(6+)	0.1577	0.1132	0.1995
	(0.3645)	(0.3168)	(0.3996)
Specialist(0/1)	0.2172	0.1673	0.2638
	(0.4124)	(0.3733)	(0.4407)
Specialist(6+)	0.0278	0.0199	0.0353
	(0.1645)	(0.1399)	(0.1843)

Note: the numbers outside parenthesis are the means of whole samples, men and women. Standard errors are in parenthesis. **denotes significant at 5 % level.

Table 3 Different Use of Medical Care for Men and Women (conditional)

Utilization	df/dx of female dummy
GP (0/1)	0.1116 **
N=19008	(0.006)
GP (6+)	0.0593 **
N=19008	(0.005)
Specialist (0/1)	0.0915 **
N=19036	(0.006)
Specialist (6+)	0.0103**
N=19036	(0.002)

Note: the numbers outside parenthesis are the marginal effects of the female dummy. Standard errors are in parenthesis. **Denote significant at 5 % level. N is number of observations.

Table 4 Definition of Independent Variables

Variables	Definition
Female	Female (dummy=1 if yes, =0 otherwise)
Femarri	Among female who married (dummy=1 if yes, =0 otherwise)
Mmarri	Among male who married (dummy=1 if yes, =0 otherwise)
Age2	Persons age from 25-44
Age 3	Persons age form 45-64
Age4	Persons age over 65
Persons under the age of 14 are excluded. Persons whose age is from 15-24 are omitted.	
Regd	The event of having regular medical doctor (dummy=1 if yes, =0 otherwise)
Under 5	The event of having children under the age of 5 at home (dummy=1 if yes, =0 otherwise)
Married	Marital status (including married, common-low and partner) (dummy=1 if yes, =0 otherwise)
Incma	Including 5 income groups, such as lowest income quintile, lower middle income quintile, middle income quintile, upper middle income quintile, and highest income quintile.
Secondary	Secondary school education (dummy=1 if yes, =0 otherwise)
College	College education (dummy=1 if yes, =0 otherwise)
Bachelor	Bachelor degree (dummy=1 if yes, =0 otherwise)
Master, PHD	Master, PHD, medicine degree (dummy=1 if yes, =0 otherwise)
(the omitted education is "no schooling" and "some university" and others	
Insu	Insurance coverage—prescription medications (dummy=1 if yes, =0 otherwise)
Nuinsu	Has more than one type of insurance (dummy=1 if yes, =0 otherwise)
Chronic	Has a chronic condition (dummy=1 if yes, =0 otherwise)
Excellent health	Report excellent health (dummy=1 if yes, =0 otherwise)
Good health	Report good health (dummy=1 if yes, =0 otherwise)
Fair health	Report fair health (dummy=1 if yes, =0 otherwise)
Poor health	Report poor health (dummy=1 if yes, =0 otherwise)
(the omitted health status is "Very good health"	
Urban	Urban area (dummy=1 if yes, =0 otherwise)
Newf	Newfoundland resident (dummy=1 if yes, =0 otherwise)
PEI	Prince Edward Island resident (dummy=1 if yes, =0 otherwise)
Nova	Nova Scotia resident (dummy=1 if yes, =0 otherwise)
Newbrs	New Brunswick resident (dummy=1 if yes, =0 otherwise)
Que	Quebec resident (dummy=1 if yes, =0 otherwise)
Mani	Manitoba resident (dummy=1 if yes, =0 otherwise)

Sask	Saskatchewan resident (dummy=1 if yes, =0 otherwise)
Alb	Alberta resident (dummy=1 if yes, =0 otherwise)
BC	British Columbia resident (dummy=1 if yes, =0 otherwise)
(the omitted province is Ontario)	

Table 5 Means of Independent Variables N=19089

Variable	Mean (All)	Mean (Men)	Mean (Women)
Female	0.5128		
	(0.4998)		
Mmarri		0.6516	
		(0.4764)	
Femarri			0.6357
			(0.4812)
Age2	0.4419	0.4226	0.4603
	(0.4966)	(0.4940)	(0.4984)
Age3	0.2730	0.2825	0.2639
	(0.4455)	(0.4502)	(0.4408)
Age4	0.0901	0.0860	0.0939
	(0.2863)	(0.2804)	(0.2918)
Regd	0.8799	0.8409	0.9170
	(0.3249)	(0.3657)	(0.2758)
Under5	0.1883	0.1794	0.1968
	(0.3910)	(0.3837)	(0.3976)
Married	0.6434	0.6516	0.6357
	(0.4789)	(0.4764)	(0.4812)
Incma	3.4706	3.5356	3.4088
	(1.007)	(0.9812)	(1.0289)
Secondary	0.1512	0.1433	0.1588
	(0.3583)	(0.3504)	(0.3655)
College	0.1721	0.1739	0.1703
	(0.3774)	(0.3790)	(0.3759)
Bachelor	0.1018	0.0967	0.1066
	(0.3024)	(0.2956)	(0.3080)
Master, PHD	0.0283	0.0363	0.0206
	(0.1658)	(0.1872)	(0.1422)
Work	0.6283	0.6948	0.5651
	(0.4832)	(0.4605)	(0.4987)
Insu	0.5846	0.5847	0.5845
	(0.4927)	(0.4927)	(0.4928)
Nuinsu	0.6992	0.6986	0.6998
	(0.4585)	(0.4588)	(0.4583)
Chron	0.5377	0.4888	0.5843
	(0.4985)	(0.4999)	(0.4928)
Excellent health	0.2222	0.2233	0.2212
	(0.4157)	(0.4165)	(0.4151)
Good health	0.2787	0.2745	0.2827
	(0.4483)	(0.4462)	(0.4503)

Fair health	0.0882	0.0873	0.0890
	(0.2836)	(0.2823)	(0.2848)
Poor health	0.0248	0.0255	0.0241
	(0.1556)	(0.1579)	(0.1533)
Urban	0.8190	0.8174	0.8205
	(0.3850)	(0.3863)	(0.3837)
Newfoundland	0.0693	0.0651	0.0733
	(0.2540)	(0.2468)	(0.2607)
PEI	0.0632	0.0607	0.0655
	(0.2433)	(0.2388)	(0.2475)
Nova Scotia	0.0650	0.0643	0.0657
	(0.2466)	(0.2453)	(0.2479)
New Brunswick	0.0737	0.0743	0.0731
	(0.2613)	(0.2622)	(0.2603)
Quebec	0.1911	0.1932	0.1890
	(0.3931)	(0.3948)	(0.3915)
Manitoba	0.0670	0.0683	0.0656
	(0.2500)	(0.2524)	(0.2477)
Saskatchewan	0.0547	0.0561	0.0535
	(0.2275)	(0.2301)	(0.2250)
Alberta	0.0819	0.0837	0.0802
	(0.2743)	(0.2770)	(0.2717)
BC	0.0901	0.0919	0.0884
	(0.2864)	(0.2889)	(0.2839)
Self-reported-health	2.307	2.302	2.3119
	(0.9914)	(0.9929)	(0.9899)

Note: The numbers outside parenthesis are the means. standard errors are in parenthesis. The breakdown variable "Self-reported-health" includes excellent, good, fair and poor health status. It is not included in the regressions.

Table 6 Different Use of Health Service "Between Married and Single Female" and "Between Married and Single Men"

Utilization	df/dx of Femarri dummy(1)	df/dx of Mmarri dummy(2)
GP (0/1)	0.0264** (N=9746) (0.0090)	0.0658** (N=9262) (0.0142)
GP (6+)	0.0206** (N=9746) (0.0096)	-0.0092 (N=9262) (0.0075)
Specialist (0/1)	0.0101 (N=9758) (0.0116)	0.0080 (N=9278) (0.0108)
Specialist (6+)	0.0005 (N=9758) (0.0042)	-0.0007 (N=9278) (0.0027)

Note: the numbers outside parenthesis are marginal effects. Standard errors are in parenthesis. ** denote significant at 5% level. N is number of observations. Femarri is among females who married. Mmarri is among males who married.

Table 7 The Effect of the Indicator "Married" on Men's and Women's Health Service Utilization

	"Married" effect On female (1)	"Married" effect On male (2)	df/dx of Married*female (3)
GP(0/1)	0.0324**	0.0550**	-0.0220
N=19008	(0.0106)	(0.0105)	(0.0129)
GP(6+)	0.0122	-0.0009	0.0134
N=19008	(0.0070)	(0.090)	(0.0107)
Specialist(0/1)	0.0162	0.0010	0.0154
N=19036	(0.0093)	(0.0113)	(0.0133)
Specialist(6+)	0.0025	-0.0227	0.0055
N=19036	(0.0028)	(0.0040)	(0.0047)

Note: The numbers outside parenthesis are marginal effects. Standard errors are in parenthesis.
** denote significant at 5% level. N is number of observations.

Table 8 The Effect of the Indicator "Under 5" on Men's and Women's Health Service Utilization

	Under 5 effect On female (1)	Under 5 effect On male (2)	Coefficient of Under 5*female (3)
GP(0/1)visit	0.0392**	0.0008	0.0380**
N=19008	(0.0112)	(0.0110)	(0.0140)
GP(6+)visit	0.0780**	-0.0188	0.1078**
N=19008	(0.0098)	(0.0099)	(0.0180)
Specialist(0/1)	0.0604**	-0.0070	0.0693**
N=19036	(0.0115)	(0.0126)	(0.0177)
Specialist (6+)	0.0305**	-0.0047	0.0436**
N=19036	(0.0050)	(0.0040)	(0.0117)

Note: the numbers outside parentheses are marginal effects, the numbers within parentheses are standard errors. ** denote significant at 5% level. N is number of observations.

Table 9 Hausman Test Results of the "Under5" Effects

Variable	coefficient Of under5(female)	coefficient of under5(male)	difference	t statistic
Model 1				
GP(0/1)visit	0.1212**	0.0309	0.0902**	5.08
Under5	(0.0459)	(0.0423)	(0.0177)	
Model 2				
GP(6+)visit	0.3221**	-0.0514	0.3735**	8.6
Under5	(0.0431)	(0.0602)	(0.043)	
Model 3				
Spec(0/1)visit	0.1799**	0.0314	0.1485**	4.9
Under	(0.0381)	(0.0487)	(0.0303)	
Model 4				
Spec(6+)visit	0.4224**	-0.0499	0.4723**	5.5
Under5	(0.0606)	(0.1046)	(0.0852)	

Note: the numbers outside parentheses are coefficients, the numbers within parentheses are standard error. ** denote significant at 5% level..

Table 10 Change of Women's Utilization When They Have Men's Health Status

	Utilization at men's means of health (1)	Utilization at women's means of health (2)	Change of utilization (3)
Visit GP (0/1) (N=9746)	0.0540	0.067	-0.013** (0.0037)
Visit GP (6+) (N=9746)	0.0758	0.0934	-0.017** (0.0032)
Visit specialist (0/1) (N=9758)	0.0849	0.1029	-0.018** (0.009)
Visit specialist (6+) (N=9758)	0.0139	0.0167	-0.0028** (0.0013)

Note: column (1) and (2) are the measures of utilization at men's and women's means of health status and chronic conditions, holding other covariates constant. The numbers outside parentheses of column (3) are changes of women's utilization, the numbers within parentheses are standard errors. ** denote significant at 5% level. N is number of observations.