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# Socioeconomic Differences in the Use of Physician Services in Nova Scotia

*George Kephart, PhD, Vince Salazar Thomas, PhD, and David R. MacLean, MD*

## ABSTRACT

*Objectives.* Socioeconomic differences in use of physician services in Nova Scotia, Canada were examined.

*Methods.* The study was based on survey data, containing information on socioeconomic status, linked to physician claims data. Socioeconomic differences in use of physician services were estimated, adjusted for age, sex, and region of residence.

*Results.* Large socioeconomic differences were observed in the use of physician services, with use inversely related to both household income and education. These differences remained after adjustment for age, sex, and region.

*Conclusions.* Use of physician services is inversely associated with socioeconomic status. (*Am J Public Health.* 1998;88:800–803)

## *Introduction*

Given the ongoing debate in the United States surrounding the costs of insuring the uninsured population and reducing direct health care costs for consumers,[1–4] studies of socioeconomic differences in the use of health services in Canada are of considerable interest. Several Canadian studies have examined the socioeconomic differences in use of physician services, yielding mixed results. However, the results have generally shown that the introduction of universal medicare resulted in increased use of health services by persons in lower-income households and that there is now an inverse association between income and use of health services.[5–14]

We examined socioeconomic differences in the use of physician services in the Canadian province of Nova Scotia. Nova Scotia (population 900 000) has a health care system that provides universal coverage for nearly all physician services, with no copayments. Unlike most previous researchers, we used administrative claims data to measure use of physician services. As we have discussed in detail elsewhere,[15] this procedure has several advantages over the survey-based, self-report measures used in most previous studies. First, administrative claims data are not subject to recall error. Second, they permit an examination of use over a longer time interval, thus providing a more robust measure of an individual's "typical" level of use. Finally, they permit the examination of the value of services used, rather than simply the number of physician contacts.

## *Methods*

This study was based on the linkage of individual data from the 1990 Nova Scotia Nutrition Survey, a sample survey of 2198 adult Nova Scotians that includes indicators of socioeconomic status,[16] to the Nova Scotia Medical Services Insurance Physicians' Services database.[15] The Nova Scotia Nutrition Survey was a 2-stage cluster sample of

The authors are with the Population Health Research Unit, Department of Community Health and Epidemiology, Dalhousie University, Halifax, Nova Scotia. Dr Thomas is also with the Division of Geriatric Medicine, Faculty of Medicine, Dalhousie University, and the Manitoba Centre for Health Policy and Evaluation, Faculty of Medicine, University of Manitoba, Winnipeg.

Requests for reprints should be sent to George Kephart, PhD, Department of Community Health and Epidemiology, Faculty of Medicine, Dalhousie University, Halifax, Nova Scotia B3H 4H7, Canada.

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*Note.* Although the data analyzed herein are from the Nova Scotia Department of Health, the conclusions are solely those of the authors.

provincial residents aged 18 through 74, stratified by region, age, and sex. Data were collected in the spring and fall of 1990, with a participation rate of 80%. The Medical Services Insurance database comprises inpatient and outpatient fee-for-service claims by physicians and includes nearly all physician services deemed medically necessary. Radiology and some psychiatric claims are not included because of alternative payment mechanisms.

We examined all physician claims for Nutrition Survey respondents for the period April 1, 1991, through March 30, 1994—a 3-year period following the 1990 survey. All 2198 Nutrition Survey respondents were successfully linked to the Medical Services Insurance database by means of patient health card numbers.

Survey respondents lost to follow-up because of death or migration out of the province could not be directly identified. However, we could identify these individuals indirectly because Nova Scotia switched to a new health card registration system in 1993. As a part of this process, all residents had to reregister. Because of the completeness of reregistration (close to 100%), persons in the sample for whom we did not find a health card number presumably had moved out of the province or died. We thus excluded from the analysis 193 respondents (8.7% of the sample) who did not register for a new health card.[15]

### *Measurement*

Two indicators of socioeconomic status were employed. A measure of income adequacy was obtained by adjusting data on total household income by household size, based on Statistics Canada's low-income cutoffs.[17,18] Because of the grouping of income classes in the Nova Scotia Nutrition Survey, the upper and upper-middle income adequacy groups were combined into a single category, resulting in 4 levels of income adequacy plus a fifth category representing those who did not report income (14% of respondents). Socioeconomic status was also measured by education, categorized into 3 levels: (1) those with less than a high school diploma, (2) those with a high school diploma but less than a university baccalaureate degree, and (3) those with a baccalaureate or higher degree. Use of physician services for each respondent was measured as the sum of the values (in constant dollars) of physician services provided to the respondent.

Analyses of socioeconomic differences in use of physician services were adjusted for age, sex and region. For these purposes, age and sex were combined into indicator variables representing the following groups: (1) men aged 18 through 44 (omitted category), (2) men aged 45 through 64, (3) men aged 65 through 74, (4) women aged 18 through 44, (5) women aged 45 through 64, and (6) women aged 65 through 74. Region was designated by indicator variables for Halifax County, Cape Breton County, and all other counties. Halifax County and Cape Breton County are the 2 metropolitan counties in the province and are characterized by higher concentrations of physicians, particularly specialists. Halifax County has a population of approximately 350 000 persons, has the highest concentration of specialists, and contains the province's tertiary care hospitals.

### *Analyses*

Unweighted univariate analyses were conducted to examine the total value of physician services used by the 2 measures of socioeconomic status (education and income adequacy), by region, and by age and sex group. Because of the skewed distributions for use of physician services, the median and interquartile ranges were employed as measures of central tendency and dispersion. Weighted multivariate regression analyses were conducted to obtain age-, sex-, and region-adjusted differences in use. The dependent variable was logged, and ordinary least squares regression models were estimated for all persons in the sample who had used at least 1 service during the 3-year period.

Because the Nova Scotia Nutrition Survey has a complex sample design, issues of weighting and estimation of standard errors were addressed.[19] All reported results were weighted, but unweighted regressions were also estimated for comparison.[20] For assessment of the impact of the sampling design on study results, the results were compared with results in which standard errors were adjusted for intracluster correlation by Huber variance estimates[21] and with results with jackknife-estimated standard errors.[19] All analyses were conducted with Stata software.[22]

## *Results*

Table 1 displays unweighted descriptive statistics for the total value of services used, by patients' education, income adequacy, region, and age and sex group.

**TABLE 1—Use of Physician Services among Respondents in Nova Scotia: April 1991 to March 1994**

| | n | % Using 1 or More Services | Total Value of Services Used, in Constant Dollars[a] Median | Interquartile Range |
|---|---|---|---|---|
| Education | | | | |
| No high school diploma | 872 | 96.4 | 551.9 | 1150.3 |
| High school diploma | 949 | 97.5 | 413.3 | 764.8 |
| BA degree | 184 | 96.7 | 331.8 | 642.5 |
| Income adequacy[b] | | | | |
| Lower | 144 | 97.2 | 553.1 | 990.8 |
| Lower middle | 308 | 97.1 | 530.5 | 1228.2 |
| Middle | 674 | 97.0 | 435.0 | 944.3 |
| Upper middle + | 599 | 97.7 | 374.3 | 738.9 |
| Missing | 280 | 95.0 | 565.2 | 870.5 |
| Region | | | | |
| Halifax County | 352 | 96.6 | 529.2 | 969.3 |
| Cape Breton County | 330 | 98.5 | 540.1 | 917.5 |
| Other/nonmetropolitan | 1323 | 96.7 | 424.8 | 892.3 |
| Age and sex | | | | |
| Male, 18–44 y | 388 | 94.3 | 211.0 | 438.5 |
| Male, 45–64 y | 387 | 96.4 | 429.6 | 987.7 |
| Male, 65–74 y | 187 | 97.9 | 913.8 | 1739.4 |
| Female, 18–44 y | 414 | 98.3 | 489.8 | 680.0 |
| Female, 45–64 y | 404 | 97.0 | 518.4 | 882.3 |
| Female, 65–74 y | 225 | 99.1 | 910.7 | 1410.7 |
| Total | 2005 | 97.0 | 457.1 | 909.4 |

[a]Defined only for respondents who used at least one physician service. Services were valued at the amount, in Canadian dollars, paid for services in July 1992.
[b]Based on household income adjusted for household size according to Statistics Canada's low-income cutoffs.[17,18]

**TABLE 2—Regression Estimates of Effects of Education and Income on the Total Value of Physician Services Used, Adjusted for Age, Sex, and Region: Nova Scotia, April 1991 to March 1994**

| | $e^{\beta}$ | 95% Confidence Interval |
|---|---|---|
| Education (vs BA degree) | | |
| No high school diploma | 1.49 | 1.24, 1.79 |
| High school diploma | 1.12 | 0.95, 1.32 |
| Income adequacy (vs upper) | | |
| Lower | 1.43 | 1.12, 1.84 |
| Lower middle | 1.33 | 1.11, 1.59 |
| Middle | 1.11 | 0.98, 1.26 |
| Missing | 1.27 | 1.06, 1.51 |

*Note.* Coefficients for age, sex, and region are not reported. The education and income adequacy effects were estimated in separate models. Regression coefficients are exponentiated to express effects as proportionate differences.

Nearly all members of the sample (97%) used at least 1 physician service during the 3-year study period. The 2 metropolitan areas (Halifax County and Cape Breton County) had a higher median total value of services used than nonmetropolitan counties. Age and sex differences in use varied, as would be expected. A clear gradient is evident in the use of physician services by both indicators of socioeconomic status (education and income adequacy), with the higher median total value of services used in the lower socioeconomic groups.

Table 2 displays weighted estimates—adjusted for age, sex, and region—of differences in use of physician services, by patients' education and income adequacy. Regression coefficients are exponentiated to express effects as proportionate differences in use. Weighting and adjusting for age, sex, and region did not appreciably alter the patterns observed in the descriptive statistics. Significant socioeconomic differences and a clear socioeconomic gradient were observed in the total value of physician services used. The total value of services used by Nova Scotians in the lowest education group was 49% higher than the value of services used by persons in the highest education group ($e^{\beta}$=1.49, 95% confidence interval [CI] = 1.24, 1.79). Similarly, the total value of services used by those in the lowest income adequacy group was 43% higher than the value of services used by those in the highest income adequacy group ($e^{\beta}$=1.43, 95% CI=1.12, 1.84) Unweighted regression models, estimated for comparison, produced similar results. Adjustment of standard errors for intracluster correlation also did not alter the statistical significance of any socioeconomic status effects, and a simple jackknife method yielded remarkably consistent results across jackknife samples, suggesting that the design effects for these estimates are close to unity.

## *Conclusions*

We found strong evidence for an inverse association between socioeconomic status, measured both by education and by income adequacy, and the use of physician services. To highlight the magnitude of these differences, it is useful to express the socioeconomic effects as "excess" expenditures on physician services by comparing the estimated total use of physician services with the estimated use assuming that persons in the lower socioeconomic groups had the same level of use as persons in the highest socioeconomic group. Our results indicate that excess use associated with educational inequality amounts to 17.4% of the total (Can $242.4 million), or Can $42.2 million per year in a population of about 900 000 people. Excess use associated with income inequality is estimated at 11.3%, or Can $27.5 million per year.

The analyses presented here are descriptive, and we did not attempt to account for factors (other than age, sex, and region) that might explain or mediate the observed associations. The socioeconomic differences in use observed in this study most likely reflect socioeconomic differences in health status,[23–27] but they may also reflect differences in the propensity to use physician services, net of health status.[28] This possibility should be addressed in future studies. □

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# Contraception and Induced Abortion in Armenia: A Critical Need for Family Planning Programs in Eastern Europe

*Gayane Dolian, MD, Frank Lüdicke, MD, Naira Katchatrian, MD, and Alfredo Morabia, MD, PhD*

ABSTRACT

*Objectives*. The purpose of this study was to determine the number of induced abortions per woman and the reasons for selecting induced abortion among parous Armenian women.

*Methods*. A consecutive series of 200 women attending an abortion clinic in Yerevan, Armenia, were queried by a physician about their reproductive histories.

*Results*. Women younger than 20 years of age reported a median of 1 and women older than 40 years reported a median of 8 induced abortions in their lifetimes (overall median = 3). Lack of contraceptive information was the major reason cited for not using contraception.

*Conclusions*. Induced abortion is the major form of birth control among parous Armenian women. Concerted public health campaigns are needed to inform women and their physicians in Armenia and other Eastern European countries about alternative contraceptive methods. (*Am J Public Health*. 1998;88:803–805)

## *Introduction*

Induced abortion contributes to high rates of maternal mortality worldwide and continues to be an important cause of preventable morbidity among women of reproductive age.[1] In the countries of Central and Eastern Europe and the newly independent states of the former Union of Soviet Socialist Republics (USSR), abortion rates are among the highest in the world (from 30 per 1000 women-years of reproductive life in Armenia to 105 per 1000 women-years of reproductive life in Russia).[2,3] It is estimated that nearly 6 million legal abortions and an equal number of illegal abortions are carried out annually in these countries.[4] Although it is likely that the related morbidity is high, few data exist on the health consequences of induced abortion for women (such as inflammatory disease and infertility) or on the costs to the national health care systems.

Armenia, previously one of the most stable regions of the former USSR, has suffered several recent socioeconomic setbacks and natural disasters, including a breakdown of its economic system, an earthquake in 1988, and a conflict in Nagorno-Karabach. These events have undermined the public's health, as evidenced by a decline in total fertility rates from 2.6 in 1985 to 1.7 in 1994 and an increase in the maternal mortality rate from 22.4 to 34.7 per 100 000 live births between 1985 and 1995.[5] In addition, infertility rates in Armenia increased from 18% in 1980 to 24% in 1990.

Here we present the results of a pilot study conducted on a sample of 200 women admitted to the Armenian Research Center of Maternal and Child Health Protection in Yerevan. The purpose of this study was to determine the number of induced abortions among women attending the abortion clinic as well as their reasons for selecting induced abortion. For a subset of these women, contraceptive knowledge, attitudes, and practices were also assessed.

## *Methods*

Between October 1994 and January 1995, women consecutively attending an abortion clinic in Yerevan, Armenia

Gayane Dolian is with the Armenian Research Center of Maternal and Child Health Protection, Yerevan. Frank Lüdicke is with the Department of Obstetrics and Gynecology, Infertility and Gynecological Endocrinology Clinic, and Naira Katchatrian and Alfredo Morabia are with the Division of Clinical Epidemiology, University Hospital, Geneva, Switzerland.

Requests for reprints should be sent to Alfredo Morabia, MD, PhD, Division of Clinical Epidemiology, University Hospital, Rue Michelidu-Crest 25, CH-1211 Geneva 14, Switzerland.

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