# Biosocial Determinants of Hysterectomy in New Zealand

*A. Dharmalingam, PhD, Ian Pool, PhD, and Janet Dickson, MSocSc*

A B S T R A C T

*Objectives.* This study examined the prevalence and biosocial correlates of hysterectomy.

*Methods.* Data were from a 1995 national survey of women aged 20 to 59 years. We applied piecewise nonparametric exponential hazards models to a subsample aged 25 to 59 to estimate the effects of biosocial correlates on hysterectomy likelihood.

*Results.* Risks of hysterectomy for 1991 through 1995 were lower than those before 1981. University-educated and professional women were less likely to undergo hysterectomy. Higher parity and intrauterine device side effects increased the risk.

*Conclusions.* This study confirms international results, especially those on education and occupation, but also points to ethnicity's mediating role. Education and occupation covary independently with hysterectomy. Analysis of time variance and periodicity showed declines in likelihood from 1981. (*Am J Public Health.* 2000;90:1455–1458)

Hysterectomy is a common surgical procedure in women in developed and developing countries. Most women undergo hysterectomy to improve quality of life rather than to solve life-threatening problems.[1,2] In New Zealand, about 70% of the hysterectomies among women aged 15 to 54 in 1991 were done for nonmalignant medical conditions.[3] It is argued that undergoing a hysterectomy for nonmalignant indications is due to the absence of absolute indications for hysterectomy and a lack of consensus among professionals on the appropriate weights to mortality, suffering, emotional factors, and finances, which are factored into the determination of indications.[4,5]

Hysterectomy rates have varied among countries and within countries by geographic units.[1,5–14] This variation is largely caused by differences in availability or operation of the supply factors, such as hospital beds, method of payment, number of surgeons, and surgeons' training, plus demand factors, such as patient characteristics and attitudes and general practitioner management practice and attitudes.[5,11]

Research on hysterectomy in New Zealand is very limited. The few studies to date have focused on age-specific prevalence rates,[15] incidence rates,[6,9] or the economic costs of hysterectomy.[3] In this report, we examine the biosocial correlates and prevalence of hysterectomy.

## Methods

In 1995, we carried out the first nationally representative survey of women aged 20 to 59 years to study family formation in New Zealand. We used data from this survey to analyze hysterectomy and its relations to various biosocial and demographic determinants. Of the 3741 women selected with a stratified cluster sampling procedure, 2507 agreed to participate in the survey (response rate was 67%). A further statistically refined oversampling of Maori (the indigenous population) was carried out. Comparison of selected sample characteristics with the 1991 census data showed a high degree of representativeness.[16,17] Data presented in this report are drawn from both the main sample and the oversample of Maori, which gives a total of 2367 women (including 249 Maori) aged 25 to 59 years in 1995.

We considered 4 sets of fixed and time-varying covariates: (1) temporal: calendar period and age; (2) background: place of residence, religious affiliation, and ethnicity; (3) biosocial: parity, pregnancy loss, tubal sterilization, use of pill and intrauterine device (IUD); and (4) socioeconomic: marital status, educational attainment, and occupation.

Table 1 gives the percentage of women who had had hysterectomy in each covariate category. To estimate the effects of the explanatory variables on the likelihood of hysterectomy at a given age, we used a piecewise nonparametric exponential hazards model of the following form[18] (an extension of Cox's model): $H_{ik}=H_{0k}\exp[\Sigma\beta_{jk}\times X_{ijk}]$, where $H_{ik}$ is the risk of hysterectomy for individual $i$ at age $k$, $H_{0k}$ is the baseline risk at age $k$, $X_{ijk}$ is the observed value of covariate $j$ for individual $i$ at age $k$, and $\beta_{jk}$ is the regression parameter for covariate $j$ at age $k$. The parameter estimates and the associated test statistics from the final model are presented. The covariates place of residence and religious affiliation were dropped from the final model because these variables were not statistically significant and theoretically not very important. The exponential values of the parameter estimates given in Table 2 indicate the risk of hysterectomy associated with each covariate relative to the baseline hazard.

## Results

About one quarter of the women aged 50 to 54 in 1995 had had hysterectomies. There was a weak trend toward declining likelihood of hysterectomy for the period 1981 through 1995 compared with the period 1960 through 1980 (see Table 2). During 1991 through 1995, the likelihood of having a hysterectomy was only 63% as high as that for the period 1960 through 1975. Some previous evidence indicates that Maori are less likely than non-Maori to undergo hysterectomy,[6,19] but our data do not show a strong effect. The estimated effect of age is in the expected direction.[4,6,9,20] As women passed through the age group 35 to 54, their chances of undergoing hysterectomy increased by about 3-fold compared with when they were younger than 35 years.

The authors are with the Population Studies Centre, University of Waikato, Hamilton, New Zealand.

Requests for reprints should be sent to A. Dharmalingam, PhD, Population Studies Centre, Department of Sociology and Social Policy, University of Waikato, Private Bag, Hamilton, New Zealand (e-mail: dharma@waikato.ac.nz).

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**TABLE 1—Selected Characteristics of the Respondents and Percentage Who Had Had Hysterectomy, by Covariates: New Zealand, 1995 (N = 2367)**

| Covariates | % of Total Sample | % Who Had Had Hysterectomy |
|---|---|---|
| Age at survey,[a] y | | |
| 25–29 | 14.4 | 0.3 |
| 30–34 | 16.6 | 3.3 |
| 35–39 | 19.2 | 4.8 |
| 40–44 | 16.6 | 10.4 |
| 45–49 | 15.1 | 18.1 |
| 50–54 | 10.0 | 26.1 |
| 55–59 | 8.1 | 25.0 |
| Fetal loss | | |
| 0 | 69.9 | 10.0 |
| 1 | 13.9 | 12.7 |
| 2 | 8.9 | 6.6 |
| ≥3 | 7.3 | 17.2 |
| Parity | | |
| 0 | 15.2 | 4.7 |
| 1 | 8.1 | 6.7 |
| 2 | 19.8 | 12.3 |
| 3 | 18.3 | 9.4 |
| 4 | 16.9 | 13.4 |
| ≥5 | 21.8 | 13.7 |
| Marital status | | |
| Not married | 32.8 | 8.3 |
| Married | 67.2 | 11.7 |
| Ever used IUD | | |
| No | 81.0 | 9.7 |
| Yes | 19.0 | 14.3 |
| IUD side effects (if used) | | |
| No | 63.4 | 10.5 |
| Yes | 36.6 | 21.1 |
| Ever used pill | | |
| No | 21.7 | 11.0 |
| Yes | 78.3 | 10.5 |
| Tubal sterilization | | |
| No | 84.1 | 10.1 |
| Yes | 15.9 | 13.5 |
| Religious affiliation | | |
| No religion | 25.2 | 7.8 |
| Anglican/Presbyterian/Methodist | 40.0 | 13.1 |
| Catholic | 13.9 | 10.9 |
| Other church | 15.9 | 9.5 |
| Other religions | 5.0 | 8.4 |
| Educational attainment | | |
| <High school | 26.2 | 14.1 |
| Polytechnical/technical school[b] | 17.2 | 11.5 |
| High school | 23.8 | 7.1 |
| Bachelor's or higher degree | 32.8 | 10.0 |
| Ethnicity | | |
| Maori | 10.5 | 7.2 |
| European | 80.7 | 11.4 |
| Others | 8.8 | 14.7 |

*Note.* IUD = intrauterine device.
[a]Women aged 20 to 24 years were not included in the analysis because none of them had had hysterectomies, and none of those older than 25 at survey had had a hysterectomy before 25 years of age.
[b]This qualification is usually of short duration, and most women with this qualification do not have a high school diploma.

The covariates parity and pregnancy loss were strongly associated with the likelihood of hysterectomy: the higher the parity, the greater the chances of having a hysterectomy. Women who had 2 or more live births were about twice as likely to undergo hysterectomy as those with 1 or no live births. Similarly, any pregnancy loss increased the risk of hysterectomy by about 22%, although this effect was statistically weak. Tubal sterilization and use of the pill did not have any effect on the likelihood of hysterectomy, whereas use of an IUD was only a weak covariate of hysterectomy. But women who stopped using an IUD because of side effects were more than 2.5 times more likely to have a hysterectomy than those who stopped for other reasons.

In general, education and occupation are strong predictors of hysterectomy. Women with high school diplomas were about 30% less likely than those lacking a high school diploma to undergo hysterectomy. Women with university qualifications were much less likely than women lacking a high school diploma to have a hysterectomy. A similar result has been obtained for the covariate occupation. Women with managerial and professional jobs were less likely to undergo hysterectomy than others. Interestingly, the introduction of occupation as an explanatory variable did not reduce the independent effect of education. Thus, education and occupation could play complementary roles in influencing hysterectomy rates.

## *Discussion*

About 1 in 4 New Zealand women can be expected to undergo hysterectomy before their 60th birthday—a rate similar to that found in many Western countries.[5,11,21] The influence of the sociobiologic factors also corresponds to findings from other studies.[5,8,11,22,23] Our results reinforce the importance of the physiologic complications resulting from childbearing and pregnancy loss and the psychologic and social changes associated with childbearing.

The literature points to an increased likelihood of hysterectomy following tubal sterilization.[11,24–29] However, in our study there was no difference in the risk of undergoing hysterectomy between those women who had had tubal sterilization and those who had not—a finding confirmed by a more recent US study.[30] Prior pill and IUD use was associated with a lower likelihood of hysterectomy, but the relation was not statistically significant. However, the likelihood of hysterectomy was increased among those who experienced side effects and stopped using the IUD, probably because of complications arising from IUD use as well as inherent physiologic conditions.[25]

Our research supports other studies showing that higher education and occupational status are usually associated with a lower likelihood of hysterectomy. This is because better-educated women (1) are more likely to seek medical advice and to be better informed about advantages and risks, (2) have greater access to resources, (3) communicate better with their doctors, (4) are more likely to seek alternative treatments, and (5) are more likely to be viewed as intelligent and knowledgeable by doctors.[11,22,31–33] Our results also suggested that ethnicity may have a moderate mediating effect on this outcome. Maori are disproportionately among the less well off and less qual-

**TABLE 2—Estimated Effects of Covariates on the Risk of Hysterectomy in New Zealand, 1995 (N = 2367)**

| Covariates[a] | Relative Risk | *Z* Score[b] |
|---|---|---|
| Calendar period | | |
| 1960–1975 | 1.00 | … |
| 1976–1980 | 1.08 | 0.28 |
| 1981–1985 | 0.78 | 0.94 |
| 1986–1990 | 0.84 | 0.69 |
| 1991–1995 | 0.63 | 1.78* |
| Age, y | | |
| 25–34 | 1.00 | … |
| 35–39 | 2.24 | 4.32*** |
| 40–44 | 2.81 | 4.92*** |
| 45–49 | 3.25 | 4.83*** |
| 50–54 | 2.94 | 3.02*** |
| Ethnicity | | |
| Maori | 1.00 | … |
| Non-Maori | 1.18 | 0.90 |
| Parity | | |
| 0–1 | 1.00 | … |
| 2–3 | 1.78 | 2.54** |
| ≥4 | 2.04 | 3.01*** |
| Pregnancy loss | | |
| 0 | 1.00 | … |
| ≥1 | 1.22 | 1.43 |
| Tubal sterilization | | |
| No | 1.00 | … |
| Yes | 0.94 | 0.35 |
| Use of pill | | |
| No | 1.00 | … |
| Yes | 0.84 | 0.89 |
| Use of IUD | | |
| No | 1.00 | … |
| Yes | 0.71 | 1.11 |
| IUD side effects | | |
| No | 1.00 | … |
| Yes | 2.68 | 5.02*** |
| Educational attainment | | |
| <High school | 1.00 | … |
| Polytechnical/technical school[c] | 1.02 | 0.10 |
| High school | 0.67 | 2.00** |
| Bachelor's or higher degree | 0.46 | 2.38** |
| Occupation | | |
| Managers and professionals | 1.00 | … |
| Associate professionals | 1.68 | 2.17** |
| Personal services/sales | 1.60 | 2.49*** |
| Agriculture/trade workers | 1.22 | 1.30 |
| Marital status | | |
| Not married | 1.00 | … |
| Married | 0.94 | 0.40 |

*Note.* IUD = intrauterine device.
[a]All but ethnicity, place of residence, religion, educational attainment, and tubal sterilization are time-varying variables in the sense that their values may change from year to year.
[b]Adjusted for intracluster correlations that can arise from the cluster sampling approach used in the survey.
[c]This qualification is usually of short duration, and most women with this qualification do not have a high school diploma.
*$P$ < .10; **$P$ < .05; ***$P$ < .01.

ified yet have marginally lower rates than do non-Maori.

This study highlights the effects of periodicity, a factor that has received little attention except in Australia.[10,11,13] Since 1981, the likelihood of undergoing hysterectomy has declined, particularly during 1991 through 1995. This decline could be partly a result of the availability of alternative treatments to hysterectomy and critical assessments of the appropriateness of indications leading to "unnecessary surgery."[2,4,8,34–37] A detailed analysis of all aspects of contraception and sterilization showed that hysterectomy decreased simultaneously with the growth of tubal sterilization and a decline in IUD use.[16] It has also been argued that this finding reflects the increased power of women and changes in women's health policy in New Zealand.[38]

Perhaps it is not the level of hysterectomy per se in a society that is important. Rather, what matters is whether the prevailing sociopolitical context enables women to make well-informed decisions about their bodies and whether the operation leads to an improved quality of life. □

## Contributors

A. Dharmalingam, I. Pool, and J. Dickson were involved in the design of this study, the analysis of the data, and the writing of the paper, using data from a wider survey. A. Dharmalingam played the instrumental role in initiating the paper. A. Dharmalingam and I. Pool planned the survey on which this paper is based, collected data, and revised the paper. I. Pool managed and coordinated the survey.

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