Wages and Educational Credentials for Canadian Nurses: An Empirical Analysis

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The purpose of this study is to examine if there is a wage premium paid to Canadian born nurses who have a baccalaureate in nursing (BN). This study uses data from the confidential master files from the 2001 Canadian Census on Individuals and the results of this study show that there is a wage premium for registered nurses with a Bachelor's degree. For both the male and female samples it is found that having a BN certification yields a 9 to 14% wage premium when compared to nurses with an RN certification. If nurses are paid at the point where wages are equated with their marginal productivity one would expect to see that earnings of a BN should be greater than that of an RN if a BN has a higher marginal productivity. The results of this study seem to indicate that the increase in education does have significant effects on wages in most cases and this implies that attaining a BN does increase an individual's marginal productivity.

INTRODUCTION AND MOTIVATION

In general, studies find that increases in education are associated with higher earnings and the purpose of this paper is to examine if there is a wage premium paid to Canadian nurses who have graduated from the baccalaureate nurses (BN) program. In keeping with human capital theory, it is hypothesized that nurses who have a Bachelors degree in nursing will earn more than nurses who are trained in a diploma nursing program.

One of the reasons to examine this hypothesis is that there has been a push in recent years by the Canadian Nurses Association (CNA) to eliminate the community college based diploma based registered nurse training programs. At the time of the 2001 Census, students preparing for a career in nursing in BC, Alberta, Saskatchewan, Ontario, Quebec, the Northwest Territories and the Yukon had a choice of obtaining either a registered nurse diploma or a Bachelors degree, while students from all other provinces were required to obtain a Bachelors degree in nursing to begin a career in nursing.

In Canada, until recently, registered nurses have had two main paths to human capital acquisition; these are the baccalaureate nurse and community college based diploma nurse. Over time, the educational requirements and necessary credentials for registered nurses in Canada have been evolving to meet the changing technological advances in medicine. The

Bachelor of Nursing program has been in existence for many years in Canada, but it had not been required as the minimum educational credential for entry into the profession. In the 1960s most nurses were educated in a hospital based nursing program and over time the nursing training programs were available through either a hospital or a community college as well as through the university Bachelor of Nursing program. Each of these programs involved both classroom education and clinical training on the hospital wards. The hospital training programs were phased out in the early 1990s, leaving those who wished to train as a nurse the choice between a community college or university program. Individuals wishing to enter the nursing profession had to make a decision between the costs and time involved in both programs and the potential earnings they could attain as a registered nurse once they had graduated. The community college programs have now been integrated with and work collaboratively with the universities to train nurses. Currently, the nursing student can enrol in the program at either a community college or university and has a baccalaureate degree in nursing conferred upon them from the collaborative university. Once a nurse graduates from a nursing program s/he must write and pass the licensing exam in the province in which they wish to work.

There are also a number of additional institutional details that have an effect on the earnings that nurses can attain. The nursing profession is regulated and controlled by provincial nursing associations, which in turn are overseen by the Canadian Nursing Association. In general, the various provincial nursing unions in most of the institutions where nurses are employed set the minimum and maximum earnings that nurses in Canada observe. Information was gathered from all the unions representing registered nurses for each provincial nursing association and Table 1 shows the pay scale details, effective January 2002, for the various provincial nursing associations across Canada.

Table 1
BASIC WAGE STRUCTURE FOR REGISTERED NURSES IN CANADA (JAN. 2002)

Union	Dollars per Hour		Annual Income	
	Minimum	Maximum	Minimum	Maximum
Alberta Nurses Union (UNA)	24.70	32.42	50573.35	66381.12
Ontario Nurses Association (ONA)	21.75	32.71	43758.00	65812.50
British Columbia Nurses Union (BCNU)	24.70	32.42	47112.00	61836.00
Saskatchewan Union of Nurses (SUN)	21.34	25.92	48681.02	58464.00
Nova Scotia Nurses Union (NSNU)	22.34	26.22	49061.00	57335.00
Manitoba Nurses Union (MNU)	21.48	25.33	50141.79	59113.03
Newfoundland Nurses Union (NLNU)	20.05	25.62	43163.12	55152.16
New Brunswick Nurses Union (NBNU)	20.16	24.53	45159.53	55005.75
Prince Edward Island Nurses Union (PEINU)	19.35	23.58	44928.00	54756.00
Quebec Nurses Union (FIIQ)	17.11	25.49	34064.02	50730.03

Note: The above data is from the Canadian Federation of Nurses Unions National Database.

The details presented in this table mostly apply to full time general duty registered nurses who work in either hospitals or nursing homes or for those who work as public health nurses or

as home care workers.[1] The pay structures do not depend on the specific educational qualifications that the individual has. Nurses with an RN or a BN see the same earnings. The annual salaries listed refer to a nurse who works full time and full year at 37.5 hours per week. The hourly wages apply to both full time and part time nurses. The range seen in the hourly wages represents a difference in the location or place that a nurse works and also in the length of time s/he has been working as a nurse. There are different unions that bargain on behalf of nurses in different places of employment and these differences are also reflected in the pay scales. However, the wages are relatively comparable across the various unionized places of employment. There are often different unions representing nurses in hospitals and nursing homes and frequently nurses working in other industries are not represented by unions. Because of the differing levels of unionization and variation across provinces, controls will be introduced into the analysis to mitigate the impact of these factors.

An additional factor that is demonstrated in the pay scales facing nurses is the progression through the ranks of the profession. Recently graduated and licensed nurses will begin their career at the low end of the pay scale and over time they will progress to higher levels of income and wages. Age, experience and the length of time involved in employment will influence the earnings that any nurse observes. As time progresses the earnings will peak and stabilize at the maximum levels and the increases in pay seen will come from the annual increases that are bargained for by the union for the nurses. In general, nurses with higher educational credentials will see higher wages through their general experience and through their progression through the ranks. Many nurses will also see increases in earnings if they move across various employment locations such as from nursing homes to hospitals. Additionally, nurses will see increased earnings through promotion to head nurse or nurse supervisor positions as well as if they take on positions in various specialized areas of work within each institution.

This paper will be structured as follows: Section 2 will provide a brief literature review of several papers that are related to the study I plan to undertake; Section 3 will describe the data that will be used, and it will introduce the model and the empirical specification that will be used; Section 4 will examine the summary statistics and present the regression results; and Section 5 will conclude with a discussion and implications.

LITERATURE REVIEW

There have been numerous studies of the labour market for nursing and this literature is mostly based on data from the United States. To date, not a lot work has been done studying the labour market for Canadian nurses and this study will fill in this gap in the literature. Also, there are numerous studies in Canada and the United States that examine the issue of wage premiums associated with varying levels of education. Most of the existing studies examine this issue from a general perspective and address the question in terms of broad generalities. This study will focus on a very specific labour market to see how it responds to the general question of wage premiums associated with various levels of education.

[1] This pay scale does not include those who are head nurses or supervisors, nurse practitioners, clinical nurse specialists, licensed practical nurses, nurses aides, student or graduate nurses (those who have graduated from a nursing program but have not yet written or passed their licensing exam).

Spetz (2002) uses data from the National Sample Surveys of Registered Nurses to evaluate the determinants of earnings for three basic types of nursing education in the United States. She finds that registered nurses do not gain financially from obtaining a BN. Lehrer, White and Young (1991) examine the returns to education for three training programs for nurses in the United States. They conclude that a baccalaureate earns the highest returns to education and that the associated wage premium of this degree increases with experience. Botelho, Bland Jones and Kiker (1998) compare wage profiles of registered nurses in the United States across three educational backgrounds. Their results suggest that the wage equations are sensitive to different specifications of labour market experience.

Schumacher (1997) examines the returns to education of nurses who obtain a baccalaureate and find that they earn a higher wage than those who have a diploma. Mennemeyer and Gaumer (1983) examine whether higher credentials for a nurse command a premium in the marketplace in the United States. They also examine the private returns to see if a higher nursing education is a worthwhile investment for individuals. They find that there is no significant premium paid to nurses with higher educational credentials with the exception of nurses who hold a Masters degree. They conclude that neither employers nor most of the nursing profession will benefit financially from upgrading their education to a baccalaureate.

These studies show that there is no firm consensus as to whether obtaining a BN has a benefit for the earnings attained by nurses in the United States. The American studies use the same data set, but they consider various years of the survey, different regions and various specifications. This study will examine if there is conclusive evidence of increased earnings for nurses who obtain a BN in Canada.

DATA AND METHODOLOGY

Data Description

This study will use data from the confidential master files from 2001 Canadian Census on Individuals and it will include individuals who are between the ages of 22 and 65.[2] In the Census, individuals are asked to indicate what their major field of study or predominant discipline of training was in their highest level of post secondary education. This classification structure is grouped by major and minor categories. One such group is categorized as nursing and includes general nursing as well as other specialized nursing fields such as obstetrics, critical care, medical, surgical and geriatric nursing. This question allows for a clear identification of individuals who have studied nursing.

Secondly, since I am interested in whether there is a wage benefit to obtaining a BN certification, considering only people who list their occupation as a registered nurse reduces the sample. The occupation listings in the 2001 Census on Individuals refers to the kind of work that an individual does. The 1991 Standard Occupational Classification (1991 SOC) is composed of ten broad occupational categories, which are in turn further subdivided into numerous smaller unit groups.[3] The unit groups are classified on the basis of education or skills, and the tasks and duties required for each occupation. The group that is of concern is

[2] Since the community college and university nursing programs are three and four years respectively in duration, by the age of 22 many nurses in the sample should have completed their education.

[3] The ten major occupational categories include: Management occupations, Business, finance and administrative occupations, Natural and applied sciences and related occupations, Health occupations, Occupations in social science, education, government service and religion.

the registered nurse. This category allows me to clearly identify those who are currently employed as a registered nurse.

Similarly, the industry listings refer to the general nature of the business where the individual works and this information is found in the North American Industry Classification System (NAICS97). The major industries of concern for this study are the various health care industries.[4] These industries will be categorized into four groups: the first one includes Hospitals, the second one includes Nursing and Residential Care Facilities, the third group includes Offices of Physicians, Offices of Dentists, Offices of Other Health Practitioners and the final group will include the remaining health care industries. Similarly, this category allows me to ensure that my sample includes those who are trained as nurses and are working as nurses in a health care profession.

By defining my sample in this way I can ensure that I am explicitly looking at a very specific, homogeneous group and this will allow me to address very specific questions about this interesting group of individuals.

The Theoretical Model

The basic model often used for wage determination is the human capital model. This model suggests that individuals who invest in the accumulation of human capital through education and training should expect to attain higher lifetime earnings. Education involves an initial expenditure that will later raise an individual's productivity and therefore the earnings they can attain in the future. In terms of education, individuals incur both direct costs and indirect costs. The direct costs include tuition, books, and other instructional expenses, while the indirect costs or opportunity costs include income that is foregone because of the time devoted to schooling.[5] It is reasonable to expect that workers will not choose to invest in human capital unless those with better and higher levels of education receive higher pay.

There are several aspects to consider for the choice of using a human capital model for this study. The human capital model is a model of individual educational choice and this can be used to help explain the choice between obtaining an RN or a BN certification. Typically the human capital model is used to examine individual educational choices, but in the case of nursing education in Canada this will no longer entirely be the case. Policies have been designed to phase out the RN training program in favour of the BN program, so there will no longer be a choice for individuals to make regarding the two avenues to a nursing education.[6]

Before the change to having a BN requirement for entry into the profession as a registered nurse in Canada, this was a decision that had to be made by individuals considering this

[4] The industries that will be considered for this study include: Offices of Physicians, Offices of Dentists, Offices of Other Health Practitioners, Out-Patient Care Centres, Medical and Diagnostic Laboratories, Home Health Care Services, Other Ambulatory Health Care Services, Hospitals, Nursing and Residential Care Facilities, Individual and Family Services, Emergency and Other Relief Services, and Vocational Rehabilitation Services.

[5] I will not be calculating the direct and indirect costs of the various nursing education programs in this paper as they will not be directly used in the model that I'm using. There is a potential that this can be incorporated into later research I plan to do on this topic.

[6] Individuals do however have a choice in deciding whether to pursue a career as a registered nurse or some other health care provider such as a licensed practical nurse, nurse's aide, nurse practitioner or a physician but the focus of this study is strictly related to registered nurses. Additionally, those who are considered in the 2001 Census will have had the choice of either two educational paths.

occupation. Each person would need to consider the costs involved in taking either the RN or BN program and compare that to the earnings that were expected from either program.

An implication of the human capital model is an equalization of returns across educational choices. If the BN program has higher returns and if individual choices are unconstrained, this should imply that people will go into this program until the return to that program falls. If, however, the returns to the program are already equalized then a higher return to the BN educational choice will not be observed.

Other factors may have an influence on the educational choice of nurses. Perhaps the RN/BN decision is more influenced by issues such as program availability and liquidity constraints. Historically, program availability was likely more of an issue. In the past, there were not as many programs available as there are currently and it was more difficult for many individuals to relocate from rural areas to study. Liquidity constraints are another issue that can influence an individual's educational choice. Individuals facing a tighter liquidity constraint will likely opt for the RN program, which is shorter in duration that the four year BN program. Individuals may not be able to easily borrow against future earnings and this will be expected to have an effect on individual educational choices.

The most commonly used empirical estimation for the human capital model is based on the functional form of the Mincer (1974) earnings equation:

Figure 1
MINCER EARNINGS EQUATION

$$\log w_i = \beta \mathbf{X_i} + rS_i + \delta e_i + \gamma e_i^2 + u_i$$

where:
w_i is a measure of hourly wages for an individual i,
S_i represents the measure of individual i's schooling or educational attainment,
e_i is a measure of potential experience and this is also entered as a quadratic term to capture the concavity of the typical earnings profile,
$\mathbf{X_i}$ is a vector of other variables such as gender, marital status, province of residence and native language, all of which are assumed to affect earnings, and
u_i is a disturbance term which is assumed to be independent of $\mathbf{X_i}$ and S_i.

A straightforward method by which the human capital framework can be used to examine the relative wages of Canadian nurses will be used. The simplest method is to include a series of dummy variables for the various educational choices in a pooled regression equation (where the different educational groupings are pooled together). Conditional on working as a nurse, those with a registered nurse designation will be the reference group against which nurses with a BN and other additional educational credentials will be compared. The level of wage advantage or disadvantage can be then measured by the coefficients on the educational dummy variables.

Ordinary least squares (OLS) regressions will be used for males and females separately using conventional variables that are expected to have an effect on the earnings that an individual attains.[7] If the hypothesis that a nurse with a BN gains a wage premium is supported, one expects to find a statistically significant and positive coefficient on that

[7] Men and women will be considered separately in this study since the two samples are very unbalanced in size.

independent variable. Since the educational requirements facing nurses have been changing over time, an additional analysis will look at various age cohorts of nurses in the sample. This will allow for an examination of nurses who entered the nursing profession at different stages of educational requirements for entry into the profession. The trend of educational requirements has changed over time and it is expected that older nurses will have a larger proportion of individuals with an RN designation and that younger nurses will have a larger proportion of individuals with a BN designation.

The Independent Variables

The dependent variable for this study is hourly wages. In the 2001 Census on Individuals, employment income refers to total income received by persons 15 years of age and over during calendar year 2000 as wages and salaries. Since the standard Mincer equation uses hourly wages as the dependent variable, the total income reported in the Census is divided by the average number of weeks worked and the average number of hours per week worked for each individual to derive hourly wage.[8]

In order to abstract from potential gender earnings issues as much as possible, and since the sample sizes for the two groups are very different, male and female samples will be considered separately. The sample is also restricted to Canadian born nurses so that the issue of foreign educational credentials can be removed. By doing this, the premiums associated with the various Canadian educational paths for nurses can be examined without questioning the possible differences associated with where the nursing education was received. Finally, the sample is also restricted to those who are trained as nurses and who are actively working as nurses. This includes those who are working as registered nurses and also those who are working as head nurses or nurse supervisors.

There are a variety of factors that contribute to the determination of wages that any particular individual attains. An individual's level of education is one factor that certainly influences the wages that are earned. It is expected that as education increases, wages should also increase. The highest degree, certificate or diploma obtained includes information about the basic type of training nurses have received. The following educational levels are included: non-university certificate, certificate below the Bachelors degree, a Bachelors degree, and a higher degree. The first group includes those who have obtained a non-university certificate or diploma and these individuals will include those who have had their training either through a hospital or community college based program. These individuals are classified as RNs and they form the reference group since they are the largest group of nurses in the sample and are those against whom the other nurses will be compared. Those who have obtained a Bachelors degree are classified as BNs. Nurses who have other certification below a Bachelors degree include those who have taken additional certification courses above their first RN certification but have not completed a BN. Those with a higher degree are those who have obtained certification above the Bachelors degree, a Masters degree or a Ph.D. Each of the other educational levels is expected to have a positive impact on earnings since they are expected to increase someone's human capital.

An individual's age and potential experience are also characteristics that are expected to be related to wages in a positive manner. The standard Mincer equation is used to determine an

[8] The various exercises and regressions were also executed using annual employment earnings and the results are very similar to that which was found using the derived hourly wages.

individual's potential experience. Each person's age minus the years of schooling they have minus six is used to obtain an individual's potential work experience. Potential experience squared is also included in the regressions to capture the concavity of the typical earnings profile. One problem with this measure of experience is that it may overestimate the actual experience for people who, for various reasons, have taken time out of the labour force. This is more of an issue for the female sample who are more likely to have taken time out of the workforce to raise children. This effect will not be as noticeable in the male sample. By considering the male and female samples separately, the possible effect that experience may be overestimated will be kept separated.

In this sample the individuals are categorized into three groups based on their marital status; divorced, legally separated or widowed, legally married or in a common law relationship, and single. The individuals who are single are the reference group. Data is not available for the number of dependent children living at home. Instead the number of hours of unpaid childcare is included as a variable that is expected to have an effect on the decision to work and earnings. This is set to a dummy variable that indicates the presence of unpaid childcare or not. Childcare and the number of children present in a household are expected to have an effect on the earnings of those in the sample.

Two additional factors that may potentially have an effect on the wages that an individual earns are visible minority status and language. Numerous studies indicate that race and language influence wage differentials (Chapman & Iredale, 1993 and Li, 2001). Other studies (Pendakur & Pendakur, 2002 and Hum & Simpson, 1999) find that visible minority status is associated with wage penalties compared to individuals who are not a visible minority.

In terms of race, this sample has two groups: those who identify themselves as a visible minority and those who do not identify themselves as a visible minority. Those who are not a visible minority form the reference group. Individuals who speak English as their mother tongue are the reference group. French speaking individuals make up the second group of people. The final group includes those who have any other languages as their mother tongue. There are not a significant number of Canadian born nurses who speak a language other than the two official languages.

Another issue that arises in the study of registered nurses is the structure of the wage agreements in the place of employment and province of residence. To allow for the differences seen in wage agreements in different regions of the country, dummy variables are included for provincial and territorial groupings and the place of employment categories to control for this aspect of the nursing labour market. Additionally, controls are included for the three largest Census Metropolitan Areas (Montreal, Toronto and Vancouver) as well as a control for individuals who live in mostly rural, small town or urban locations.[9]

RESULTS AND ANALYSIS

Summary Statistics

The summary statistics for the female and male nursing samples are found in Tables 2 and 3 respectively. The female nurses tend to earn less than the male nurses. Both female and male nurses work nearly the same number of weeks per year but the men work slightly more hours

[9] Those in rural areas are defined as having a population of less than 1,000, while towns have a population of between 1,000 and 100,000. Urban locations include those areas with a population of more than 100,000.

per week. In the full samples, with all of the age groups combined, the proportion of men and women who have different educational credentials is quite similar. Slightly more men have an RN certification (65% of women and 66% of men) and slightly more women have a BN certification (22% of women and 21% of men). Once the nurses are separated out into the various age cohorts, there is some variation to be seen in the samples of women. We see that only 57% of the women in the less than 35 year old age bracket have an RN designation while 66% of the women in the 55 - 65 year old age group have an RN designation. The opposite trend is seen in the proportion of women who have a BN designation; 33% of the youngest nurses have a BN while only 15% of the oldest nurses have a BN. In terms of the various age groups, these results are expected since one anticipates seeing more nurses having a BN certification as the educational requirements for entry into profession have been changing. The changing requirements have likely begun to factor into the decisions made by the younger nurses as they decided which education path to follow. This trend, however, is not as apparent in the male sample.

Table 2:
Summary Statistics for the sample of women whose major field of study was nursing and who are currently working as registered nurses

	Full sample	Less than 35	35 – 44	45 – 54	55 – 65
	N = 26458	N = 5811	N = 8710	N = 9278	N = 2659
Less than 35	0.2196				
35 – 44	0.3292				
45 – 54	0.3507				
55 – 65	0.1005				
Employment income	41268.69	35501.38	41403.9	44819.48	41039.97
Hourly wages	28.4250	26.4690	29.1101	28.6194	29.7771
Weeks	50.0730	47.7097	50.4110	51.3730	49.5946
Hours	35.1913	35.9709	34.8109	35.7013	32.9537
Potential Experience	20.7989	7.1599	17.9578	27.6083	36.1519
Non-university certification	0.6540	0.5710	0.6617	0.6980	0.6566
Other certification below Bachelors	0.1004	0.0797	0.0876	0.1062	0.1677
Bachelors degree	0.2199	0.3283	0.2242	0.1685	0.1478
Higher degree	0.0257	0.0210	0.0265	0.0274	0.0278
Head nurse	0.0374	0.0196	0.0381	0.0442	0.0504
Registered nurse	0.9626	0.9804	0.9619	0.9558	0.9496
Hospitals	0.7201	0.7687	0.7521	0.7014	0.5743
Nursing and residential care facilities	0.1107	0.0936	0.0948	0.1148	0.1862
Offices	0.0475	0.0320	0.0373	0.0551	0.0884
Other Health Care Facilities	0.1216	0.1057	0.1157	0.1287	0.1512
English	0.7030	0.6877	0.7103	0.6935	0.7458
French	0.2591	0.2688	0.2533	0.2719	0.2117
Other	0.0379	0.0435	0.0364	0.0346	0.0425
Visible Minority	0.0311	0.0582	0.0293	0.0186	0.0214
Not a Visible Minority	0.9689	0.9418	0.9707	0.9814	0.9786
Separated, divorced or widowed	0.1573	0.0520	0.1348	0.2069	0.2885
Married or common law	0.6538	0.5194	0.7061	0.6916	0.6439

Single	0.1889	0.4287	0.1591	0.1014	0.0677
No dependent children	0.4199	0.4498	0.2061	0.5123	0.7326
Dependent children	0.5801	0.5502	0.7939	0.4877	0.2674
Rural (less than 1,000)	0.2236	0.2051	0.2331	0.2323	0.2023
Town (between 1,000 and 100,000)	0.2612	0.2426	0.2730	0.2668	0.2441
City (over 100,000)	0.5152	0.5522	0.4939	0.5010	0.5536
The Atlantic Provinces	0.1083	0.1158	0.1234	0.0969	0.0824
Montreal	0.0987	0.1139	0.0916	0.0929	0.1087
Rest of Quebec	0.1318	0.1249	0.1289	0.1540	0.0786
Toronto	0.0687	0.0755	0.0660	0.0629	0.0827
Rest of Ontario	0.2807	0.2779	0.2785	0.2867	0.2730
Manitoba	0.0485	0.0434	0.0513	0.0495	0.0470
Saskatchewan	0.0424	0.0361	0.0414	0.0453	0.0496
Alberta	0.1030	0.1074	0.1022	0.0945	0.1256
Vancouver	0.0448	0.0490	0.0404	0.0410	0.0628
Rest of BC	0.0615	0.0411	0.0622	0.0676	0.0820
The Territories	0.0116	0.0148	0.0139	0.0087	0.0075

Table 3:
Summary Statistics for the sample of men whose major field of study was nursing and who are currently working as registered nurses

	Full sample	Less than 35	35 – 44	45 – 54
	N = 1476	N = 459	N = 581	N = 383
Less than 35	0.3110			
35 – 44	0.3936			
45 – 54	0.2595			
55 – 65	0.0359			
Employment income	47543.58	41784.7	49914.32	50836.85
Hourly wages	31.9836	28.6315	28.9037	28.0372
Weeks	50.6850	49.0872	51.6162	51.7781
Hours	39.5542	40.0000	39.8709	39.4674
Potential Experience	17.2148	6.8736	17.2100	27.0522
Non-university certification	0.6640	0.6427	0.6850	0.6658
Other certification below Bachelors	0.1037	0.0850	0.1050	0.1175
Bachelors degree	0.2121	0.2614	0.1928	0.1802
Higher degree	0.0203	0.0109	0.0172	0.0366
Head nurse	0.0454	0.0196	0.0482	0.0731
Registered nurse	0.9546	0.9804	0.9518	0.9269
Hospitals	0.8056	0.8540	0.7676	0.8172
Nursing and residential care facilities	0.0840	0.0675	0.0861	0.0914
Offices	0.0149	0.0065	0.0207	0.0157
Other Health Care Facilities	0.0955	0.0719	0.1256	0.0757
English	0.5122	0.5621	0.4768	0.4909
French	0.4641	0.4139	0.4991	0.4935
Other	0.0237	0.0240	0.0241	0.0157
Visible Minority	0.0359	0.0654	0.0258	0.0209
Not a Visible Minority	0.9641	0.9346	0.9742	0.9791

Separated, divorced or widowed	0.1125	0.0458	0.1119	0.1749
Married or common law	0.5298	0.4183	0.5473	0.6214
Single	0.3577	0.5359	0.3408	0.2037
No dependent children	0.4783	0.5730	0.3752	0.4752
Dependent children	0.5217	0.4270	0.6248	0.5248
Rural (less than 1,000)	0.2005	0.1786	0.1876	0.2428
Town (between 1,000 and 100,000)	0.2636	0.2331	0.2599	0.2950
City (over 100,000)	0.5359	0.5882	0.5525	0.4621
The Atlantic Provinces	0.0705	0.0871	0.0757	0.0444
Montreal	0.1402	0.1569	0.1583	0.0992
Rest of Quebec	0.2730	0.2004	0.2823	0.3577
Toronto	0.0427	0.0458	0.0482	0.0261
Rest of Ontario	0.2127	0.2309	0.1928	0.2141
Manitoba	0.0556	0.0545	0.0516	0.0574
Saskatchewan	0.0305	0.0414	0.0258	0.0261
Alberta	0.0630	0.0806	0.0534	0.0548
Vancouver	0.0420	0.0392	0.0482	0.0366
Rest of BC	0.0535	0.0327	0.0534	0.0731
The Territories	0.0163	0.0305	0.0103	0.0104

Fewer women work in hospitals compared to men (72% of women compared to 81% of men), while more women work in the other three categories of industries compared to men. Again it can be seen that there are differences in the various age cohorts. 77% of the youngest female nurses work in hospitals compared to 57% of the oldest female nurses. This similar trend is seen in the male sample. 85% of the youngest male nurses work in hospitals compared to 82% of the oldest male nurses. These numbers are expected. The majority of nurses who are newly graduated will wish to work in a hospital setting where they will be able to practice the skills that they have recently learned. A hospital provides a wide variety of medical opportunities for working such as emergency room, intensive care, surgical wards and maternity wards. Fewer newly graduated nurses will choose to work in the other nursing employment industries since these do not provide as much practice for their training. We see that 9% and 7% of the youngest women and men respectively work in nursing homes compared to 19% and 9% of the oldest female and male nurses.

There is a fairly significant difference in languages spoken by female and male nurses. 70% of female registered nurses speak English compared to 51% of the men; on the other hand, 46% of the men speak French while only 26% of the female registered nurses do. These figures correspond with the distribution of registered nurses in the various provinces. The largest proportion of female registered nurses is found in Toronto and the rest of Ontario with 35% followed by 23% in Montreal and the rest of Quebec. The largest proportion of male registered nurses, however, is found in Montreal and the rest of Quebec with 41% followed by 26% in Toronto and the rest of Ontario. The remaining characteristics of this sample of registered nurses are quite similar between the genders.

Ordinary Least Squares Regression Results

By selecting only individuals who have made the educational choice to become a nurse, this may result in a selection bias issue, but on the other hand it also allows me to abstract from

many other issues that can influence labour market outcomes. One of the implications of only studying those who have chosen nursing is that the estimated relationships between earnings and the variables that are expected to determine earnings may be biased. However, since this study is primarily interested in examining questions about those who are in the nursing labour market, the effect of a potential sample selection bias is mitigated. This choice deviates from general studies and allows for a detailed analysis of a specific group of individuals who have made certain educational selections. Randomly selecting individuals from all fields would allow for a general analysis, but the focus in this study is on a specific set of questions regarding a specific group of people.

The results of the wage equation regressions using the natural logarithm of hourly wages for the sample of female and male nurses are shown in Tables 4 and 5 respectively. The first column reports the regression results for the full sample of nurses and the next four columns report the results for each of the four age cohorts. In order to interpret the coefficients on the dummy variables one can't simply multiply the coefficient by 100 and report this value as the percentage effect that the variable has on the dependent variable. Instead one must make a modification to accurately use the values as percentages (see Gujarati, 1995, Halvorsen & Palmquist, 1980 and Kennedy, 1981). To get the percentage wage differential one needs to use $(e^{\beta} - 1)*100$.

The results answer the question that nurses who have graduated from a baccalaureate program do indeed see a wage premium. The effect of having a BN is positive and statistically significant for all of the samples of female nurses. As can be seen in Table 4, in the full sample nurses with a BN earn around 14% more than nurses with a RN designation. The highest wage premium is seen in the youngest cohort at 18%, followed by 13% in the nurses between 45 - 54, 9% in the 35 - 44 year old nurses and 6% in the oldest nurses. It is also worth noting that increasing one's education does improve one's earnings in the labour market for registered nurses in Canada. Having another certification above the RN or BN designation is positive and statistically significant for the full sample and for both the less than 35 year old group and the 45 - 54 year age group. In the full sample this additional education yields a wage premium of 10%. The less than 35 year old group sees a premium of 13% while the 45 - 54 year old nurses see a 6% premium. Human capital theory suggests that individuals who invest in the accumulation of human capital through education and training should expect to attain higher lifetime earnings. Numerous studies show that this result is generally observed and it is interesting to see that this certainly holds for the samples of nurses that are examined in this study.

Place of employment has a negative effect on earnings when compared to nurses who work in a hospital setting. In general, this result is expected since hospitals tend to pay the highest salaries of the various nursing employment locations. One question that arises relates to the possible endogeneity of the place of employment variable. As a simple test to see if this is a significant problem all of the regressions are run excluding the place of employment variable.[10] It was found that there is very little, if any, change in the remaining coefficients and it is concluded that the potential endogeneity problem is not a significant problem to be concerned with.

The presence of children has a statistically significant negative effect on earnings for the nurses in the oldest group, but this effect is positive and statistically significant in the youngest

[10] These results are available upon request.

nurses. Being a visible minority has a 13% wage penalty on earnings in the full sample. This result ranges from an 8% penalty for nurses 45 - 54 to a 25% penalty for nurses in the 55 - 65 year old cohort. Marital status has a variable effect on earnings. Being a married or in a common law relationship does not have a statistically significant effect in many of the samples except for an 8% wage penalty to woman between 55 and 65 years of age. Being a separated, widowed or divorced woman has a varying effect depending on the age group being examined. For the younger nurses this yields a positive effect of 7% for those under the age of 35 and 3% premium for those between the ages of 35 and 44. Women between 45 and 54 see a 3% wage penalty.

The results of the wage equation regressions using the natural logarithm of hourly wages for the sample of Canadian male nurses are shown in Table 5. Many variables show signs that are expected but many of the explanatory variables are not statistically significant. Many of the coefficients on the variables for the oldest cohort of male nurses show the wrong signs but the sample size is very small and this group will not be analyzed.

The effect of having a BN is statistically significant in each of the regressions for the male sample of nurses. Male nurses with a BN designation earn around 9 to 14% more than RNs. Again we see an earnings benefit by those with a BN designation and also for some of those with other training beyond the RN certification. This effect is not a strong as what was seen in the sample of female nurses. Place of employment has a statistically significant negative effect on earnings when compared to nurses who work in a hospital setting in the full sample of male nurses and those between the ages of 35 and 44 working in nursing homes. These nurses see a statistically significant wage penalty of 7 and 11% respectively.

The presence of children has a positive and statistically significant effect on earnings for all of the samples with the exception of those between 35 and 44 years of age. Being married or in a common law relationship has a negative and statistically significant effect on natural logarithm of hourly wages when compared to single males for those in the 45 - 54 year old cohort.

Discussion, Implications and Conclusion

In general, the results of this study support the hypothesis that attaining a BN significantly increases the wages earned by nurses in Canada. This result contradicts the results of Spetz (2002) and Mennemeyer & Gaumer (1983) and this study concludes that there is convincing evidence of increased earnings for nurses in Canada who obtain a BN. This study also finds that there are systematic differences between visible minorities, place of employment and province of employment for female nurses and to a lesser extent for male nurses.

It appears that increasing one's human capital does improve one's marginal productivity. If nurses are paid at the point where wages are equated with their marginal productivity one would expect to see that earnings of a BN should be greater than that of an RN if a BN has a higher marginal productivity. The results of this study seem to indicate that the increase in education does have significant effects on wages in most cases and this implies that attaining a BN does increase an individual's marginal productivity.

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Table 4:

Regression results for the Mincer earnings equation including place of employment variables for the sample of Canadian women working as nurses (Second columns for each model reports the percentage change in the coefficient from the dummy variable changing from zero to one)

	Full Sample		Less than 35		35 - 44		45 - 54		55 - 65	
Constant	2.8323 ***		2.5594 ***		3.0405 ***		3.2463 ***		3.2934 **	
Potential Experience	0.0252 ***	2.5537	0.0683 ***	7.0688	0.0246	2.4913	-0.0013	-0.1265	0.0124	1.2503
Potential Experience squared	-0.0004 ***	-0.0422	-0.0031 ***	-0.3094	-0.0008 *	-0.0792	0.0001	0.0071	-0.0003	-0.0326
Other certification below Bachelors	0.0280 **	2.8368	0.1211 ***	12.8739	-0.0142	-1.4053	0.0155	1.5583	0.0058	0.5835
Bachelors degree	0.1278 ***	13.6344	0.1626 ***	17.6529	0.0902 ***	9.4373	0.1234 ***	13.1382	0.0616 *	6.3511
Higher degree	0.0959 ***	10.0618	0.1241 *	13.2087	0.0751	7.7972	0.0626 *	6.4580	0.0199	2.0069
Childcare	0.0114	1.1468	0.0658 ***	6.8023	0.0112	1.1265	-0.0119	-1.1800	-0.0654 **	-6.3263
French	0.0336 **	3.4197	0.0916 **	9.5941	0.0054	0.5461	0.0115	1.1603	0.1071 **	11.3035
Other	0.0273	2.7695	0.0120	1.2104	-0.0417	-4.0870	0.0826 **	8.6130	0.1288 **	13.7467
Married or common law	-0.0005	-0.0453	-0.0256	-2.5320	-0.0126	-1.2517	-0.0373 **	-3.6620	-0.0794 *	-7.6332
Separated, divorced or widowed	0.0402 ***	4.0988	0.0678 ***	7.0128	0.0329 *	3.3425	-0.0275 *	-2.7133	0.0037	0.3743
Nursing Homes	-0.1473 ***	-13.6925	-0.0957 **	-9.1253	-0.1941 ***	-17.6457	-0.1404 ***	-13.0976	-0.1457 ***	-13.5581
Offices	-0.1947 ***	-17.6878	-0.0151	-1.5018	-0.1792 ***	-16.4082	-0.2220 ***	-19.9113	-0.3154 ***	-27.0511
Other health care facilities	-0.0822 ***	-7.8954	-0.0339	-3.3376	-0.0845 ***	-8.1014	-0.0986 ***	-9.3938	-0.1019 ***	-9.6919
Visible minority	-0.1421 ***	-13.2497	-0.1407 ***	-13.1230	-0.1246 **	-11.7159	-0.0857 **	-8.2149	-0.2815 ***	-24.5387
Rural	0.0012	0.1208	0.0239	2.4185	0.0072	0.7220	-0.0276 *	-2.7213	0.0050	0.5024
Town	-0.0151 *	-1.4958	-0.0205	-2.0293	-0.0361 **	-3.5503	-0.0078	-0.7771	0.0135	1.3607
The Atlantic Provinces	-0.2262 ***	-20.2416	-0.2039 ***	-18.4456	-0.2651 ***	-23.2852	-0.2139 ***	-19.2597	-0.2245 ***	-20.1061
Montreal	-0.0621 ***	-6.0178	-0.0006	-0.0602	-0.1250 ***	-11.7478	-0.0297	-2.9287	-0.1367 *	-12.7732
Rest of Quebec	-0.0819 ***	-7.8644	-0.0301	-2.9665	-0.0913 **	-8.7262	-0.0622 *	-6.0346	-0.2594 ***	-22.8458
Rest of Ontario	-0.0243 *	-2.4000	-0.0126	-1.2512	-0.0651 **	-6.3062	0.0001	0.0099	-0.0404	-3.9552
Manitoba	-0.1323 ***	-12.3898	-0.1011 *	-9.6199	-0.1780 ***	-16.3078	-0.1349 ***	-12.6181	-0.0854	-8.1844
Saskatchewan	-0.0745 ***	-7.1748	0.0462	4.7271	-0.1036 ***	-9.8370	-0.1144 ***	-10.8062	-0.0781	-7.5118
Alberta	-0.0552 ***	-5.3736	0.0095	0.9540	-0.0917 ***	-8.7588	-0.0924 ***	-8.8254	-0.0230	-2.2713
Vancouver	-0.0427 *	-4.1798	0.0625	6.4521	-0.0704 *	-6.7981	-0.0782 **	-7.5201	-0.0962 *	-9.1675
Rest of BC	-0.0426 **	-4.1682	0.0252	2.5546	-0.0736 **	-7.0997	-0.0539 *	-5.2494	-0.0760	-7.3205
The Territories	0.1938 ***	21.3893	0.3130 ***	36.7583	0.1285 **	13.7115	0.1753 ***	19.1607	0.1779 *	19.4708
N	26458		5811		8710		9278		2659	
R^2	0.0373		0.0419		0.0277		0.0309		0.0395	

Dependent variable is the natural log of hourly wages. Significance indicated by *** for 1%, ** for 5% and * for 10%.

Table 5:
Regression results for the Mincer earnings equation including place of employment variables for the sample of Canadian men working as nurses (Second columns for each model reports the percentage change in the coefficient from the dummy variable changing from zero to one)

	Full Sample		Less than 35		35 - 44		45 - 54	
Constant	2.7885 ***		2.8224 ***		2.6126 ***		3.6894 **	
Potential Experience	0.0170 **	1.7185	0.0217	2.1896	0.0500	5.1237	-0.0296	-2.9194
Potential Experience squared	-0.0001	-0.0132	-0.0004	-0.0359	-0.0015 *	-0.1539	0.0005	0.0491
Other certification below Bachelors	0.0545	5.6036	0.0605	6.2371	-0.0217	-2.1462	-0.0106	-1.0557
Bachelors degree	0.1321 ***	14.1259	0.1058 *	11.1579	0.0953 **	10.0001	0.0855 *	8.9286
Higher degree	-0.0542	-5.2784	0.1118	11.8315	0.2097 ***	23.3252	-0.4663	-37.2661
Childcare	0.0778 **	8.0928	0.1261 **	13.4417	0.0261	2.6419	0.1160 **	12.2968
French	0.0493	5.0571	-0.0047	-0.4738	0.0472	4.8376	0.0518	5.3186
Other	0.0735	7.6228	-0.0212	-2.0931	0.2227 *	24.9428	-0.0587	-5.7023
Married or common law	-0.0502	-4.8929	0.0985	10.3468	0.0099	0.9958	-0.1764 **	-16.1747
Separated, divorced or widowed	-0.0251	-2.4831	0.0210	2.1239	-0.0097	-0.9657	-0.1180	-11.1346
Nursing Homes	-0.0740 **	-7.1334	-0.0870	-8.3352	-0.1113 **	-10.5292	-0.0265	-2.6120
Offices	0.0660	6.8207	-0.0350	-3.4406	0.1811	19.8564	0.0031	0.3134
Other health care facilities	0.0162	1.6305	0.0981	10.3085	-0.1519 **	-14.0904	0.0532	5.4616
Visible minority	-0.0215	-2.1312	-0.0409	-4.0104	-0.0645	-6.2428	0.1693	18.4435
Rural	0.0241	2.4402	0.0910	9.5284	0.0383	3.9049	-0.0701	-6.7679
Town	0.0227	2.2993	0.1251 *	13.3311	0.0160	1.6115	-0.0908	-8.6768
The Atlantic Provinces	-0.0678	-6.5543	-0.2788	-24.3295	-0.0619	-6.0044	0.2269	25.4660
Montreal	0.0069	0.6943	-0.1341	-12.5520	0.1773	19.3973	-0.1170	-11.0422
Rest of Quebec	-0.0172	-1.7029	-0.2304	-20.5815	0.1340	14.3429	0.0189	1.9086
Rest of Ontario	0.0438	4.4783	-0.0479	-4.6781	0.1205	12.8047	0.0339	3.4502
Manitoba	-0.0294	-2.8953	-0.2623	-23.0683	0.1297	13.8452	-0.0177	-1.7569
Saskatchewan	0.1140	12.0789	0.0860	8.9790	0.2620 *	29.9511	-0.2316	-20.6706
Alberta	0.0351	3.5730	0.0630	6.5017	0.1355	14.5117	-0.2302	-20.5632
Vancouver	0.0044	0.4403	-0.0542	-5.2715	0.1659	18.0480	-0.1778	-16.2863
Rest of BC	0.0227	2.2954	0.0798	8.3065	0.1633	17.7392	-0.1138	-10.7530
The Territories	0.1666	18.1313	0.0185	1.8653	0.0789	8.2047	0.3288	38.9320
N	1476		459		581		383	
R^2	0.0434		0.0545		0.0531		0.0854	

Dependent variable is the natural log of hourly wages. Significance indicated by *** for 1%, ** for 5% and * for 10%.