

Planning for the Future: Nursing Human Resource Projections

June 2002

The Canadian Nurses Association is the professional voice for registered nurses in Canada. As a federation of 11 provincial and territorial professional nurses' associations, its mission is to advance the quality of nursing in the interest of the public. One of its key concerns is the supply of nurses in relation to the demand for nursing services by Canadians.



**CANADIAN NURSES ASSOCIATION
ASSOCIATION DES INFIRMIÈRES ET INFIRMIERS DU CANADA**

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The names of people who helped provide data used in projecting the number of nursing graduates in the future are mentioned in the appendix.

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© Canadian Nurses Association
50 Driveway
Ottawa ON K2P 1E2

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Tel: (613) 237-2133 or 1-800-361-8404
Fax: (613) 237-3520
E-mail: pubs@cna-nurses.ca
Web site: www.cna-nurses.ca

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Table of Contents

| | |
|--|----|
| Executive Summary | 1 |
| Introduction | 2 |
| Historical Perspective | 3 |
| Chapter 1: Trends in the Employment of Registered Nurses in Canada | 5 |
| Trends in the Funding of Health Care in Canada | 5 |
| Number of RNs and Number of RNs Employed in Nursing | 8 |
| Trends in Full-time/Part-time, Casual & Multiple Employment | 10 |
| Trends in the Gender Distribution of Employed RNs | 15 |
| Place of Work of RNs | 15 |
| Summary of findings with respect to trends in the employment of nurses..... | 16 |
| Chapter 2: Demography of the Nursing Workforce: Age Composition | 18 |
| Analytical Framework..... | 18 |
| Age Trends of Working Nurses | 19 |
| Trends in Age at Graduation..... | 25 |
| Chapter 3: Estimating the Number of Nursing Graduates in the Coming Years | 30 |
| Background and Data Problems..... | 30 |
| Projections of the number of nursing graduates from 2002 to 2015..... | 34 |
| National projections of numbers of nursing graduates from 2002 onwards | 43 |
| Chapter 4: Projections of Demand for RNs in the Years 2011 and 2016 | 45 |
| Underlying Assumptions | 45 |
| Derivation of Future Demand in 2011 and 2016 | 48 |
| Chapter 5: The Supply of Nurses in 2011 and 2016 | 50 |
| Calculating Retention of Current RNs to the Years 2011 and 2016..... | 50 |
| Calculating New Entrants and Additions to the Pool of Nurses Between 2001 & 2011 and Between 2001 & 2016..... | 54 |
| Output of Canadian nursing schools and related issues | 54 |
| New registrations of RNs educated outside Canada | 57 |
| Age at First Registration as an RN | 59 |
| Calculations of new additions to pool of RNs, 2011 & 2016 | 59 |
| Data on new additions from nurses educated outside Canada and projections to 2011 | 60 |
| The 2016 Projection..... | 60 |
| Chapter 6: Will Supply of Nurses be Adequate in 2011 and 2016? | 69 |
| Demand and Supply: The Projections | 69 |
| Effective Demand vs. Demand | 72 |
| Dealing with Shortages | 74 |

| | |
|--|-----------|
| Recommendations | 78 |
| Appendix: Sources for material used in the projections of the number of nursing graduates from 2002 to 2015 | 79 |
| References..... | 81 |

List of Tables

| | |
|--|----|
| Table 1: Total Health Expenditures, Canada, 1975 to 2001 | 6 |
| Table 2: Health Expenditures by Use of Funds, 1975 to 2001 | 7 |
| Table 3: Trends in Total Number of RNs Compared with Number of RNs Employed In Nursing, Canada, 1966-2001 | 9 |
| Table 4: Number of RNs Employed Full-time or Part-time in Nursing, Canada, 1985 – 2001 | 11 |
| Table 5: Employment Status of RNs in Canada, 1992 – 2001 Showing Numbers with Regular Employment and Numbers with Casual Employment | 12 |
| Table 6: Casual and Multiple Employment: Number of Nurses Engaged on Regular vs. Casual Basis and Numbers holding More than One Position, Canada, 1996 to 2001 | 14 |
| Table 7: Employed RNs by Gender, Canada, 1985 – 2001 | 15 |
| Table 8: RNs Employed as Nurses by Place of Work, Canada, 1994 to 2001 | 16 |
| Table 9A: Age Distribution of RNs Employed in Nursing, Canada, 1966 – 2001 | 20 |
| Table 9B: Percentage Distribution Age of RNs Employed in Nursing, Canada, 1966 – 2001 | 21 |
| Table 10: Change in Age Structure of RN Population, 1980 to 2001: Number of RNs in 1980, 1995 & 2001 by Single Year of Age | 24 |
| Table 11: Age at Graduation: Age of All First-time Examinees Educated in Canada RN Licensing Examinations of 1999 | 26 |
| Table 12: Comparison of Age at Graduation of RNs who Graduated Before 1980 and RNs who Graduated in 1980 or Later with RNs Who First Took Licensing Examinations in 1999..... | 27 |
| Table 13: Age at Registration of Nurses Educated Outside Canada | 29 |
| Table 14: Number of Students Graduating in Nursing by Type of Initial Qualification, Canada, 1963 – 2001 | 32 |
| Table 15: Number of Nursing Graduates by Province, 1999 to 2008 | 43 |
| Table 16: Derivation of Future Demand for Nursing Services in Canada | 47 |
| Table 17: Comparison of Demand Projections for Year 2011 Made in 1997 and in 2002 | 49 |
| Table 18: Calculation of Number of RNs in 2001 Who Will still be Registered and Employed as Nurses in 2011 | 51 |
| Table 19: Calculation of Number of RNs in 2001 Who Will Still be Registered and Employed in Nursing in the Year 2016..... | 52 |
| Table 20: Graduating Cohort Retention Rates..... | 56 |
| Table 21: Number of New RN Registrants From Foreign Countries by Examination & Endorsement by Province of Registration, 1983 – 2000 | 57 |
| Table 22: Number of Candidates, Successes and Failures, Educated in Canada or Educated Outside Canada, Taking the RN Licensing Examinations, 1996 to 2001 | 59 |
| Table 23: New Registrants, 2001 to 2010: 85% of Canadian Graduates..... | 61 |
| Table 24: New Registrants From Foreign Sources, 2001 to 2010 By Year of Registration and Age in 2011 | 62 |
| Table 25: Additions of RNs From All Sources, 2001-2010 | 63 |

| | |
|--|----|
| Table 26: Projected RNs in 2011 All & Emp. Canadian and Foreign by Age | 64 |
| Table 27: New Registrants Educated in Canada, 2001 to 2015..... | 65 |
| Table 28: New Registrants From Foreign Sources, 2001 to 2015 by Age in 2016..... | 66 |
| Table 29: Additions of RNs All Sources 2001 – 2015 | 67 |
| Table 30: Projected # of RNs and RNs Working as Nurses in 2016 | 68 |
| Table 31: Employment Prospects for RNs in 2011 and in 2016..... | 70 |
| Table 32: Immigration and Emigration of Nurses Comparison of Numbers of First-time Registrants from Other Countries with Number of RNs Requesting Transfer of Credentials | 75 |

Executive Summary

There are many approaches to determining future supply, including supply forecasting, utilization or demand forecasting, needs-based forecasting, etc. This report, using a cohort analysis modelled on demographic data, tracks and projects the supply of registered nurses (RNs) in Canada for the years 2011 and 2016. The supply of RNs is estimated using standard methods of estimating current stock, entry, exit, etc. Demand estimates are determined on the basis of current consumption of hospital services, assuming that even if services shift to another sector, the age cohort specific need for services will not change over time. The overall goal of this exercise is to project the approximate number of RNs required to meet the future health care needs of Canadians.

First, the report looks at trends in new recruitment. The output from Canada's nursing schools is expected to grow from 4,599 graduates in the year 2000 to more than 9,000 per annum by the year 2007. Annual additions of RNs from outside Canada are estimated at 1,200 per year from 2002 onwards.

The report assesses retention patterns of RNs in the Canadian nursing workforce. Based on age related retention rates and assuming that 85 per cent of graduates will become RNs and enter the Canadian workforce, there will be 253,000 working as RNs in 2011. For 2016, the projections indicate there will be 248,000 working as RNs.

The report also projects the demand for nursing services. The projections of demand, using Statistics Canada's population projections, were based on age/gender related utilization rates of the number of hospital days per 100,000 population in 1993. The calculations suggest that although the population is expected to grow 15.8 per cent between 1993 and 2011, the demand for nursing services will grow 40.6 per cent. The comparable figures for 2016 are a 19.5 per cent increase in population and 53.4 per cent growth in demand for nursing services. The required number of RNs is estimated to be 331,000 in 2011 and 361,000 in 2016 (see footnote).

Putting together the demand and supply figures, the projections suggest that there will be a shortage of 78,000 RNs in 2011 and 113,000 RNs by 2016.

The report recommends increases in the enrolment opportunities for nursing education programs, a number sufficient to secure an output of 12,000 per annum. It also recommends efforts to raise the per cent of new graduates becoming RNs and working in the Canadian nursing workforce from 85 per cent to 95 per cent. As well, it recommends further research into the barriers to nursing careers.

Footnote: The projections made in 1997 arrived at a requirement of 344,000 employed RNs in the year 2011. The same methodology was used in making both projections. The different numbers arise from a sharp downward revision in the population projections for the year 2011. The ageing of the population accounts for the much faster rate of growth in demand for nursing services than in population growth.

Introduction

Predicting the supply and demand of nurses is a complex issue. Numbers generated are not absolute, but instead are an attempt to illustrate the magnitude of the situation. Cohort analysis is just one method of analyzing the workforce supply and demand. There are many other forecasting and simulation models that take into account other factors such as nursing productivity, full-time and part-time equivalents, models of nursing care delivery, etc. As Canadians deliberate about the functioning of the health care system, there will be consideration of issues such as scope of practice, full-time and part-time ratios and nursing workload. Each of these issues rests on the availability, now and into the future, of health professionals.

Registered nursing services form the core of the health care delivery system. Canadian Nurses Association (CNA) has collaborated with governments, employers, researchers, educators and others over the years to address nursing human resources. In a 1990 joint literature review, the Canadian Healthcare Association (CHA) and CNA clearly established that the registered nursing labour market is both complex and dynamic. In 1997, CNA published *A Statistical Picture of the Past, Present and Future of Registered Nurses in Canada*, which provided strong evidence to suggest that by 2011, Canada would experience a severe shortage of nurses. In June 1998, CNA published *Health Human Resources: An Analysis of Forecasting Models*. In 1999, CNA participated in a Situational Analysis and Labour Market Review of nursing and nursing education funded by HRDC. Again in 2000, CNA sponsored research on the issues of retention of the nursing workforce in the form of *Labour Market Integration of Graduates in Nursing in Canada 1986 – 1997*.

Based on these efforts, CNA has identified the impacts of policy changes on the nursing workforce. For example, decisions that decreased the share of GDP devoted to health care caused the elimination of RN positions and conversion of full-time positions to part-time and casual. As the demand for nursing services had not changed, workloads were increased, overtime was “encouraged” and attempts were made at substitution, all of which led to frustration, job dissatisfaction and burnout. New RN graduates were only able to gain part-time or casual employment and many were forced to multiple employment. Nurses became frustrated and left the country or the profession. All of this corresponded to the continuous decrease in the number of RNs employed in nursing as of 1993.

At the same time, the effects of decreased spending reduced the number of graduates from nursing education programs from almost 9,000 in 1991 to less than 5,000 in the year 2000. In addition, nursing candidates saw there was no secure employment for them in nursing and chose other careers. Educational institutions reported not being able to fill their nursing quotas.

In tandem, the nursing workforce continues to age. In 2001, the average age of RNs employed in nursing was 43.7 years. It is expected that over the next 15 years half of the current nurses will exit the workforce.

All of this equates to an inadequate supply of nurses to meet the future health care needs of Canadians. This report quantifies the deficit.

This report, prepared in the spring of 2002, presents the results of an examination of supply and demand concerning nurses. This study reviews and revises the projections for the year 2011 and extends them to the year 2016.

This report is laid out in six chapters. The first chapter identifies trends in the employment of RNs in Canada. The second chapter deals with demographics of the nursing workforce, in particular the age composition. Output of nursing schools is the focus of Chapter 3, while Chapter 4 projects demand for RNs in the years 2011 and 2016. Chapter 5 projects the supply of nurses in 2011 and 2016. Chapter 6 compares projected supply and demand, followed by recommendations for the future.

When making projections, it is only possible to use information that is available at the time projections are made. Certain assumptions must be made. Assumptions used in this report are outlined in their relevant chapters. Data for the report was primarily provided by CNA, provincial/territorial nursing associations/colleges, educational institutions, the Canadian Institute for Health Information (CIHI) and Statistics Canada.

There is an opportunity to change the course of this anticipated shortage. Nursing human resource planning efforts such as those of The Nursing Strategy for Canada, the Canadian Nursing Advisory Committee, the Nursing Sector Study and emerging simulation models offer potential. However, federal and provincial governments, professional associations, educators, administrators and employers must accelerate their efforts to reduce the potential magnitude of this shortage and thus minimize the potential public risk. As a collective, we must strive to increase the numbers of nursing graduates, promote the integration of new graduates into the nursing workforce and create professional, healthy and attractive workplaces to both attract new graduates and retain those already in the workforce.

Historical Perspective

Five years ago, in 1997, CNA commissioned a study on the demand for and supply of nurses. The study was completed in the summer of 1997 and issued under the title *A Statistical Picture of the Past, Present and Future of Registered Nurses in Canada*. The report appeared at a time of turmoil on the frontlines of health care delivery. For several years the rate of growth in the funding of health care had declined, and in some years, there was an absolute, as well as relative, decline in publicly provided funds for health care. Because nurses were, and are, the numerically largest category of health care workers, their salaries constituted a substantial portion of health care costs, particularly in hospitals. With shrinking budgets, hospitals had few options in managing reduced budgets and proceeded to reduce the number of nurses employed, convert many jobs to part-time positions and in general, adopt policies to reduce costs. It was in this climate that CNA felt the need to study the supply/demand situation, and the 1997 report was prepared and issued. Its results came, at first, as quite a surprise. At a time of increasing lay-offs, reduced nurse employment, large-scale migration of Canadian nurses to the United States and other countries (a fact disclosed for the first time in the 1997 report), the principal conclusion of the study was that Canada was heading for a major crisis in health care delivery due to looming nursing shortages.

Five years elapsed, and CNA decided it was time to take another look at the questions raised in the first report and invited the author to replicate and update the original study.

In order to keep this document readable without having recourse to the 1997 report, some portions of that report are reproduced here in appropriate sections. This applies particularly to the descriptions of the methodology used. The cohort-based methodology is described in the second chapter.

Throughout this document, unless specifically indicated otherwise, the words “nurse” and “nurses” refer to registered nurses (RNs).

All references to statistician refer to Eva Ryten.

Chapter 1

Trends in the Employment of Registered Nurses in Canada

Trends in the Funding of Health Care in Canada

To understand some of the trend data presented on nurse employment in Canada, it is necessary to study trends in the funding of health care in Canada. To do this data from CIHI are presented in Tables 1 and 2. Table 1 shows the total and per capita funding for health care in Canada from 1975 to 2001. Data are reported in current dollars and constant 1997 dollars. The messages from this table can be summarized succinctly.

- Until 1992, the health care system experienced generous annual increases in funding measured either in current or constant growth terms. These high rates of annual growth in expenditures were reflected in the growth of the GDP percentage devoted to health. This indicator of the importance of the health care sector in the national economy went from 7 per cent in 1975 to 9.9 per cent in 1992.
- From 1992 to 1996, the pattern of regular annual increases in health care funding was interrupted. Between 1992 and 1997, the share of GDP devoted to health dropped from 9.9 per cent to 8.9 per cent. Real rates of growth, which from 1978 to 1991 were typically in the order of 2 to 3.5 per cent per annum, declined to 0.9 per cent in 1992 and were negative for the following four years. It was only in 1997 that real rates of growth were positive again. From 1998 till the present time, real rates of growth have been very high even when measured against the data for the '70s and first half of the '80s, periods of very high increases in health care expenditure. From 1998 to 2001, the last full year for which forecast data are available, annual real rates of growth have ranged from 3.5 per cent to 5.1 per cent. In this time, the GDP percentage has climbed back up to 9.4 per cent.

The impact of such a sudden change in the long-term pattern of health care funding, as occurred in 1992, can only be understood by taking into account the effects of compounding. The health care system had become accustomed to year on year spending increases that exceeded increases in costs. Compounding meant that a rate increase of 1 per cent each year resulted in a larger absolute increase than the rate suggested. This is because 1 per cent of 1 million is more than 1 per cent of half a million. The reductions in annual rates of health care expenditures that started in 1992 were also subject to compounding. Each year, for 5 years, there was a reduced rate of growth applied to an already reduced rate of growth of the year before. The effects of these health care expenditure reductions on the employment of nurses will be demonstrated.

Table 2 gives an overview of trends in the use of health care funds from 1975 to 2001. These data also come from CIHI. Table 2, the utility of which is limited by the fact that data are reported only in current dollars, shows the annual rates of change in funding of hospitals. Looking at the data carefully, it can be deduced that the funding of hospitals was more severely affected by the funding crisis of the '90s than any of the other expenditure categories listed in the statistical table. How these affected nurses will be covered in the next section.

Table 1
Total Health Expenditures, Canada, 1975 to 2001

| Year | Health Expenditures in Current \$ | | | | Health Expenditures in Constant 1997 \$ | | | | Total Health Exp. As % of GDP |
|-------|-----------------------------------|-----------------|------------|-----------------|---|-----------------|------------|-----------------|-------------------------------|
| | Total Exp. | | Per Capita | | Constant Exp. | | Per Capita | | |
| | '000000 \$ | Annual % Change | \$ | Annual % Change | '000000 \$ | Annual % Change | \$ | Annual % Change | |
| 1975 | 12,200.6 | n.a | 527.20 | n.a | 39,695.6 | n.a | 1,715.29 | n.a. | 7.0 |
| 1976 | 14,051.1 | 15.2 | 599.20 | 13.7 | 40,778.2 | 2.7 | 1,738.96 | 1.4 | 7.0 |
| 1977 | 15,451.2 | 10.0 | 651.23 | 8.7 | 41,621.0 | 2.1 | 1,754.21 | 0.9 | 7.0 |
| 1978 | 17,108.4 | 10.7 | 713.92 | 9.6 | 42,953.6 | 3.2 | 1,792.42 | 2.2 | 7.0 |
| 1979 | 19,170.1 | 12.1 | 792.08 | 10.9 | 44,216.2 | 2.9 | 1,826.95 | 1.9 | 6.8 |
| 1980 | 22,308.7 | 16.4 | 909.95 | 14.9 | 46,703.1 | 5.6 | 1,904.98 | 4.3 | 7.1 |
| 1981 | 26,289.1 | 17.8 | 1,059.18 | 16.4 | 48,863.8 | 4.6 | 1,968.70 | 3.3 | 7.3 |
| 1982 | 30,771.7 | 17.1 | 1,225.11 | 15.7 | 51,224.7 | 4.8 | 2,039.41 | 3.6 | 8.1 |
| 1983 | 34,053.9 | 10.7 | 1,342.45 | 9.6 | 53,220.1 | 3.9 | 2,098.01 | 2.9 | 8.3 |
| 1984 | 36,759.2 | 7.9 | 1,435.48 | 6.9 | 55,162.3 | 3.6 | 2,154.14 | 2.7 | 8.2 |
| 1985 | 39,858.5 | 8.4 | 1,542.36 | 7.4 | 57,583.8 | 4.4 | 2,228.25 | 3.4 | 8.2 |
| 1986 | 43,350.0 | 8.8 | 1,660.88 | 7.7 | 60,372.6 | 4.8 | 2,313.07 | 3.8 | 8.4 |
| 1987 | 46,821.3 | 8.0 | 1,770.19 | 6.6 | 62,085.0 | 2.8 | 2,347.27 | 1.5 | 8.4 |
| 1988 | 50,982.6 | 8.9 | 1,902.46 | 7.5 | 64,754.1 | 4.3 | 2,416.35 | 2.9 | 8.3 |
| 1989 | 56,115.6 | 10.1 | 2,056.55 | 8.1 | 67,668.6 | 4.5 | 2,479.95 | 2.6 | 8.5 |
| 1990 | 61,047.0 | 8.8 | 2,203.80 | 7.2 | 69,863.6 | 3.2 | 2,522.07 | 1.7 | 9.0 |
| 1991 | 66,246.2 | 8.5 | 2,363.33 | 7.2 | 72,591.6 | 3.9 | 2,589.70 | 2.7 | 9.6 |
| 1992 | 69,764.8 | 5.3 | 2,458.54 | 4.0 | 74,119.0 | 2.1 | 2,611.98 | 0.9 | 9.9 |
| 1993 | 71,514.1 | 2.5 | 2,491.51 | 1.3 | 74,736.7 | 0.8 | 2,603.78 | -0.3 | 9.8 |
| 1994 | 73,138.4 | 2.3 | 2,518.89 | 1.1 | 75,284.2 | 0.7 | 2,592.79 | -0.4 | 9.5 |
| 1995 | 74,063.2 | 1.3 | 2,523.12 | 0.2 | 75,488.8 | 0.3 | 2,571.68 | -0.8 | 9.1 |
| 1996 | 74,689.3 | 0.8 | 2,517.17 | -0.2 | 75,604.5 | 0.2 | 2,548.02 | -0.9 | 8.9 |
| 1997 | 78,326.1 | 4.9 | 2,611.98 | 3.8 | 78,326.1 | 3.6 | 2,611.98 | 2.5 | 8.9 |
| 1998 | 83,516.8 | 6.6 | 2,761.05 | 5.7 | 82,355.1 | 5.1 | 2,722.64 | 4.2 | 9.1 |
| 1999 | 89,546.6 | 7.2 | 2,936.03 | 6.3 | 87,240.2 | 5.9 | 2,860.41 | 5.1 | 9.2 |
| 2000f | 95,881.3 | 7.1 | 3,116.10 | 6.1 | 91,098.2 | 4.4 | 2,960.65 | 3.5 | 9.1 |
| 2001f | 102,511.9 | 6.9 | 3,298.12 | 5.8 | 96,013.6 | 5.4 | 3,089.05 | 4.3 | 9.4 |

f = forecast, n.a = not applicable
Source: CIHI

Table 2
Health Expenditures by Use of Funds, 1975 to 2001

| Year | Health Expenditures by Use of Funds ('000000 \$) | | | | | | | | |
|-----------------|--|---------------|------------|-------------|----------|---------|---------------------|-------------------|-----------|
| | Hospitals | Other Instit. | Physicians | Other Prof. | Drugs | Capital | Pub. Hlth. & Admin. | Other Health Exp. | Total |
| 1975 | 5,454.8 | 1,124.3 | 1,839.9 | 1,094.6 | 1,076.2 | 536.1 | 514.9 | 559.7 | 12,200.6 |
| 1976 | 6,357.3 | 1,367.7 | 2,071.0 | 1,273.0 | 1,197.9 | 544.1 | 630.4 | 609.7 | 14,051.1 |
| 1977 | 6,791.9 | 1,575.9 | 2,284.4 | 1,491.4 | 1,309.5 | 563.7 | 720.4 | 714.0 | 15,451.2 |
| 1978 | 7,380.6 | 1,850.3 | 2,566.7 | 1,711.7 | 1,442.0 | 672.2 | 714.7 | 770.2 | 17,108.4 |
| 1979 | 8,113.5 | 2,169.5 | 2,857.0 | 1,957.2 | 1,655.3 | 725.1 | 808.1 | 884.3 | 19,170.1 |
| 1980 | 9,333.7 | 2,544.9 | 3,287.5 | 2,260.0 | 1,881.5 | 990.7 | 950.5 | 1,059.7 | 22,308.7 |
| 1981 | 11,029.6 | 2,892.3 | 3,824.8 | 2,626.9 | 2,328.9 | 1,111.2 | 1,117.2 | 1,358.3 | 26,289.1 |
| 1982 | 13,091.3 | 3,367.2 | 4,420.8 | 3,037.5 | 2,635.9 | 1,394.8 | 1,332.6 | 1,491.7 | 30,771.7 |
| 1983 | 14,416.5 | 3,740.9 | 5,052.7 | 3,350.2 | 2,949.6 | 1,436.6 | 1,435.3 | 1,672.2 | 34,053.9 |
| 1984 | 15,343.8 | 3,919.8 | 5,525.8 | 3,681.7 | 3,310.8 | 1,504.1 | 1,591.3 | 1,881.8 | 36,759.2 |
| 1985 | 16,257.5 | 4,106.3 | 6,046.7 | 4,131.9 | 3,793.4 | 1,657.7 | 1,793.4 | 2,071.7 | 39,858.5 |
| 1986 | 17,628.4 | 4,078.7 | 6,675.1 | 4,522.3 | 4,405.6 | 1,816.5 | 1,851.4 | 2,371.9 | 43,350.0 |
| 1987 | 18,948.4 | 4,335.7 | 7,342.8 | 4,912.6 | 4,900.5 | 1,884.4 | 1,959.6 | 2,537.2 | 46,821.3 |
| 1988 | 20,406.1 | 4,748.9 | 7,942.5 | 5,393.1 | 5,491.8 | 1,901.7 | 2,066.1 | 3,032.4 | 50,982.6 |
| 1989 | 22,238.1 | 5,150.8 | 8,507.2 | 5,956.0 | 6,199.2 | 2,092.8 | 2,326.8 | 3,644.8 | 56,115.6 |
| 1990 | 23,819.1 | 5,757.5 | 9,245.9 | 6,497.3 | 6,884.3 | 2,123.7 | 2,612.2 | 4,107.0 | 61,047.0 |
| 1991 | 25,665.8 | 6,350.9 | 10,206.5 | 7,033.8 | 7,653.2 | 1,958.6 | 2,854.8 | 4,522.6 | 66,246.2 |
| 1992 | 26,654.4 | 6,802.3 | 10,449.9 | 7,395.2 | 8,464.0 | 1,984.3 | 3,214.3 | 4,800.4 | 69,764.8 |
| 1993 | 26,734.7 | 6,817.5 | 10,500.5 | 7,731.6 | 9,093.9 | 1,931.6 | 3,380.3 | 5,324.0 | 71,514.1 |
| 1994 | 26,240.6 | 6,945.8 | 10,736.5 | 8,178.0 | 9,347.8 | 2,181.7 | 3,777.6 | 5,730.5 | 73,138.4 |
| 1995 | 25,565.4 | 7,164.9 | 10,600.5 | 8,592.9 | 9,999.2 | 2,170.9 | 4,034.3 | 5,935.1 | 74,063.2 |
| 1996 | 25,353.5 | 7,327.7 | 10,713.6 | 8,855.8 | 10,242.6 | 2,062.4 | 4,213.9 | 5,919.9 | 74,689.3 |
| 1997 | 25,883.4 | 7,540.5 | 11,133.4 | 9,650.1 | 11,277.8 | 2,022.8 | 4,311.0 | 6,506.9 | 78,326.1 |
| 1998 | 27,366.3 | 7,952.2 | 11,694.0 | 10,102.8 | 12,373.5 | 2,187.1 | 5,021.4 | 6,819.4 | 83,516.8 |
| 1999 | 28,549.6 | 8,527.6 | 12,191.8 | 10,866.5 | 13,322.6 | 2,969.0 | 5,493.4 | 7,626.0 | 89,546.6 |
| 2000 f | 30,639.3 | 8,976.7 | 12,917.3 | 11,363.0 | 14,312.4 | 3,600.9 | 6,024.6 | 8,047.0 | 95,881.3 |
| 2001 f | 32,242.1 | 9,449.4 | 13,849.6 | 11,938.1 | 15,549.8 | 4,234.5 | 6,650.4 | 8,597.9 | 102,511.9 |
| Annual % change | | | | | | | | | |
| 1975 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1976 | 16.5 | 21.7 | 12.6 | 16.3 | 11.3 | 1.5 | 22.4 | 8.9 | 15.2 |
| 1977 | 6.8 | 15.2 | 10.3 | 17.2 | 9.3 | 3.6 | 14.3 | 17.1 | 10.0 |
| 1978 | 8.7 | 17.4 | 12.4 | 14.8 | 10.1 | 19.2 | -0.8 | 7.9 | 10.7 |
| 1979 | 9.9 | 17.3 | 11.3 | 14.3 | 14.8 | 7.9 | 13.1 | 14.8 | 12.1 |
| 1980 | 15.0 | 17.3 | 15.1 | 15.5 | 13.7 | 36.6 | 17.6 | 19.8 | 16.4 |
| 1981 | 18.2 | 13.6 | 16.3 | 16.2 | 23.8 | 12.2 | 17.5 | 28.2 | 17.8 |
| 1982 | 18.7 | 16.4 | 15.6 | 15.6 | 13.2 | 25.5 | 19.3 | 9.8 | 17.1 |
| 1983 | 10.1 | 11.1 | 14.3 | 10.3 | 11.9 | 3.0 | 7.7 | 12.1 | 10.7 |
| 1984 | 6.4 | 4.8 | 9.4 | 9.9 | 12.2 | 4.7 | 10.9 | 12.5 | 7.9 |
| 1985 | 6.0 | 4.8 | 9.4 | 12.2 | 14.6 | 10.2 | 12.7 | 10.1 | 8.4 |
| 1986 | 8.4 | -0.7 | 10.4 | 9.4 | 16.1 | 9.6 | 3.2 | 14.5 | 8.8 |
| 1987 | 7.5 | 6.3 | 10.0 | 8.6 | 11.2 | 3.7 | 5.8 | 7.0 | 8.0 |
| 1988 | 7.7 | 9.5 | 8.2 | 9.8 | 12.1 | 0.9 | 5.4 | 19.5 | 8.9 |
| 1989 | 9.0 | 8.5 | 7.1 | 10.4 | 12.9 | 10.0 | 12.6 | 20.2 | 10.1 |
| 1990 | 7.1 | 11.8 | 8.7 | 9.1 | 11.1 | 1.5 | 12.3 | 12.7 | 8.8 |
| 1991 | 7.8 | 10.3 | 10.4 | 8.3 | 11.2 | -7.8 | 9.3 | 10.1 | 8.5 |
| 1992 | 3.9 | 7.1 | 2.4 | 5.1 | 10.6 | 1.3 | 12.6 | 6.1 | 5.3 |
| 1993 | 0.3 | 0.2 | 0.5 | 4.5 | 7.4 | -2.7 | 5.2 | 10.9 | 2.5 |
| 1994 | -1.8 | 1.9 | 2.2 | 5.8 | 2.8 | 12.9 | 11.8 | 7.6 | 2.3 |
| 1995 | -2.6 | 3.2 | -1.3 | 5.1 | 7.0 | -0.5 | 6.8 | 3.6 | 1.3 |
| 1996 | -0.8 | 2.3 | 1.1 | 3.1 | 2.4 | -5.0 | 4.4 | -0.3 | 0.8 |
| 1997 | 2.1 | 2.9 | 3.9 | 9.0 | 10.1 | -1.9 | 2.3 | 9.9 | 4.9 |
| 1998 | 5.7 | 5.5 | 5.0 | 4.7 | 9.7 | 8.1 | 16.5 | 4.8 | 6.6 |
| 1999 | 4.3 | 7.2 | 4.3 | 7.6 | 7.7 | 35.7 | 9.4 | 11.8 | 7.2 |
| 2000 f | 7.3 | 5.3 | 6.0 | 4.6 | 7.4 | 21.3 | 9.7 | 5.5 | 7.1 |
| 2001 f | | | | | | | | | |

f = forecast
Source: CIHI

Number of RNs and Number of RNs Employed in Nursing

To use the title “registered nurse,” a person must qualify for that designation. To continue to have the right to practise as a RN, a nurse must maintain registration, which must be renewed annually. The data used in this study related to the total number of RNs and to the number of RNs employed in nursing come from annual counts done by provincial and territorial nursing associations/colleges. Individuals who, for whatever reason, do not maintain registration status are not included in these counts. Those who maintain registration status but do not work as nurses are included in the RN count but not in the count for RNs employed in nursing in Canada. It is not known how many individuals of working age have allowed their RN status to lapse. In any case, such an individual would have to re-register with a provincial or territorial licensing authority prior to being able to work as a RN in Canada.

Table 3 shows the number of RNs and the number of RNs employed in nursing from 1966 to 2001, the time period for which data are available. Such a long time series makes it possible to examine long-term trends.

It is important to study both the total number of RNs and the numbers employed as RNs, because it is not possible to be employed as a RN if one is not registered and in good standing with a provincial/territorial authority. Also, it does not matter how many RNs are being educated if the proportion of RNs working as nurses is low.

Reviewing the entire 35-year time period, it can be seen that the proportion of RNs working as nurses has increased steadily. This rate has progressed from 70 per cent initially to over 90 per cent in the last couple of years. This progression is what would be expected due to 1) the increasing participation of women in the workforce, even during the prime child-bearing years and 2) the increasing professional demands of the nursing profession that have also taken place over the same time period.

Table 3
Trends in Total Number of RNs Compared with Number of RNs
Employed In Nursing, Canada, 1966-2001

| Year | Total RNs | RNs Employed in Nursing | | Growth in Employment: 5 year periods |
|-------------------|------------|-------------------------|------|--------------------------------------|
| | Number (#) | Number (#) | % | |
| 1966 | 112866 | 82517 | 73.1 | 1966-1971, 36% |
| 1967 | 120186 | 84431 | 70.3 | |
| 1968 | 129058 | 95553 | 74.0 | |
| 1969 | 137318 | 103110 | 75.1 | |
| 1970 | 140176 | 107284 | 76.5 | |
| 1971 | 151374 | 111902 | 73.9 | |
| 1972 | 158090 | 114349 | 72.3 | 1971-1976, 26% |
| 1973 | 164609 | 118897 | 72.2 | |
| 1974 | 173414 | 128675 | 74.2 | |
| 1975 | 182828 | 144193 | 78.9 | |
| 1976 | 184572 | 141059 | 76.4 | |
| 1977 | 192677 | 143388 | 74.4 | |
| 1978 | 202039 | 161125 | 79.7 | |
| 1979 ^a | 192747 | 148827 | 77.2 | |
| 1980 | 203654 | 155178 | 76.2 | |
| 1981 | 205985 | 161070 | 78.2 | |
| 1982 | 214776 | 164086 | 76.4 | 1981-1986, 27% |
| 1983 | 222008 | 176623 | 79.6 | |
| 1984 | 222749 | 187918 | 84.4 | |
| 1985 | 229445 | 194361 | 84.7 | |
| 1986 | 236993 | 204579 | 86.3 | |
| 1987 | 241759 | 210773 | 87.2 | |
| 1988 | 249673 | 210506 | 84.3 | |
| 1989 | 252189 | 220999 | 87.6 | |
| 1990 | 256145 | 223965 | 87.4 | |
| 1991 | 262288 | 227689 | 86.8 | |
| 1992 | 263683 | 234128 ^b | 88.8 | 1991-1996, 0% |
| 1993 | 264339 | 235630 | 89.1 | |
| 1994 | 264355 | 234502 | 88.7 | |
| 1995 | 259007 | 232249 | 89.7 | |
| 1996 | 260664 | 228570 | 87.7 | |
| 1997 | 259758 | 228713 | 88.0 | |
| 1998 | 254911 | 227814 | 89.4 | |
| 1999 | 256612 | 228534 | 89.1 | |
| 2000 | 254765 | 232566 | 91.3 | |
| 2001 | 252913 | 231512 | 91.5 | |

Source: CNA, Statistics Canada, CIHI; Calculations by E. Ryten

Note.

^a New data series from 1979 onwards. In 1979, the information collection period on registrations was changed to the first four months of each provincial or territorial registration year. This was done to eliminate duplicate registrations on the understanding that most renewals of registration take place early in the year and that registration in later months of the year represented migration from one province to another. This is true for renewals but most first-time registrations do not take place in the first four months of the year. Because of this way of counting registrants, most new entrants to nursing are counted in the statistics in the year after they first become registered nurses.

^b The numbers for Quebec for 1991 were estimated by interpolation of the numbers reported for Quebec in 1990 and in 1992.

The number of RNs in Canada increased steadily from about 113,000 in 1966 to 262,000 in 1991. There was a small increase in 1992 and a more or less steady decline since then. In the year 2001, there were 253,000 registered nurses in Canada, whereas there had been 264,000 in 1993 and 1994. Why the sudden change in a long-term trend? It is difficult not to conclude that the crisis in health care funding was a direct cause.

When examining the numbers employed in nursing, statistics show that the growth in employment was most rapid at the beginning of the time period. From 1966-1971, there was a 36 per cent increase in the number of employed RNs. The following five years saw a 26 per cent increase in the employment of RNs. In the next five years, this increase fell to 14 per cent. The employment of RNs increased by 27 per cent during the years 1981-1986 and slowed to 11 per cent between 1986 and 1991. After 1991, in tandem with the funding crisis, growth in the employment of nurses stabilised at first and then declined in absolute numbers. At the lowest point, in 1998, 228,000 RNs worked as nurses, the same number as in 1991, seven years earlier. During this time, Canada's population did not stop growing nor did it stop ageing.

What the numbers do show is that employment growth is subject to considerable fluctuation from year to year. There have been periods of very rapid growth, modest growth and even negative growth. The task is to find a method for assessing future nursing requirements in this environment of uncertainty.

Trends in Full-time/Part-time, Casual & Multiple Employment

From 1985 onwards, data are available to show how many RNs worked full-time and how many worked part-time each year. These data are presented in Table 4.

In 1985, nearly two thirds of all nurses (64 per cent) worked full-time. This proportion decreased in every single year from 1986 to 1998, by which time only 52 per cent of RNs were working full-time. In 1999, the full-time proportion increased to 53 per cent; in 2000, a further increase to 55 per cent took place; in 2001, 54 per cent of RNs working as nurses worked full-time. Comparing 1985 with 2001, there were only 1 per cent more nurses employed full-time in 2001. By contrast, there were 50 per cent more part-time nurses.

These numbers provide a quantitative dimension to facts that have been widely reported in the Canadian media for almost 10 years. The reductions in health care funding brought in their wake the elimination of nursing positions in hospitals and other clinical sites. Not only were nursing positions withdrawn but also many existing positions were converted to part-time and/or casual jobs. It is impossible to tell how much part-time work was voluntary and how much was imposed on nurses as part of the cost-cutting measures. However, starting in 1998, as funding was restored (data shown in Tables 1 & 2), job opportunities for RNs increased. Some positions were re-instated, new positions were created and some positions were converted back to full-time.

Table 4
Number of RNs Employed Full-time or Part-time in Nursing, Canada, 1985 - 2001

| Year | Full-time | Part-time | Total Employed | Full-time | Part-time | Index, 1985 = 100 | |
|------|-----------|-----------|----------------|-----------|-----------|-------------------|-----------|
| | # | # | # | % | % | Full-time | Part-time |
| 1985 | 123808 | 70553 | 194361 | 63.7 | 36.3 | 100 | 100 |
| 1986 | 129294 | 75285 | 204579 | 63.2 | 36.8 | 104 | 107 |
| 1987 | 132576 | 78198 | 210773 | 62.9 | 37.1 | 107 | 111 |
| 1988 | 132619 | 77887 | 210506 | 63.0 | 37.0 | 107 | 110 |
| 1989 | 134588 | 86411 | 220999 | 60.9 | 39.1 | 109 | 122 |
| 1990 | 134827 | 89138 | 223965 | 60.2 | 39.8 | 109 | 126 |
| 1991 | 135247 | 92442 | 227689 | 59.4 | 40.6 | 109 | 131 |
| 1992 | 140477 | 93651 | 234128 | 60.0 | 40.0 | 113 | 133 |
| 1993 | 139022 | 96608 | 235630 | 59.0 | 41.0 | 112 | 137 |
| 1994 | 136456 | 98046 | 234502 | 58.2 | 41.8 | 110 | 139 |
| 1995 | 132970 | 99279 | 232249 | 57.3 | 42.7 | 107 | 141 |
| 1996 | 126902 | 101668 | 228570 | 55.5 | 44.5 | 102 | 144 |
| 1997 | 119424 | 109289 | 228713 | 52.2 | 47.8 | 96 | 155 |
| 1998 | 117527 | 110287 | 227814 | 51.6 | 48.4 | 95 | 156 |
| 1999 | 121190 | 107344 | 228534 | 53.0 | 47.0 | 98 | 152 |
| 2000 | 127911 | 104655 | 232566 | 55.0 | 45.0 | 103 | 148 |
| 2001 | 125527 | 105985 | 231512 | 54.2 | 45.8 | 101 | 150 |

Source: CNA and CIHI; calculations by E. Ryten

Note.

- 1) The percentages of RNs working full-time or part-time each year were calculated using only records for which data were reported. The number of records for which data were *not* reported was relatively small, but varied substantially from year to year.

To calculate trends in the number of RNs and RNs working full-time or part-time each year and to eliminate the “not reported” category, the not reported cases were allocated proportionately to reported cases.

- 2) Quebec numbers for 1991 were estimated by interpolation of numbers reported for Quebec in 1990 and 1992.

Till relatively recently no statistics were available on the numbers working on a casual basis. Whereas some nurses are satisfied to work part-time, most employees prefer to have regular, as opposed to casual, employment. Based on anecdotal evidence, sudden large increases in numbers working on a casual basis triggered increased levels of worker dissatisfaction. Table 5 shows the number of RNs working on a regular and casual basis from 1992 to 2001. These data are shown along with some other information about RNs who were **not** working as nurses at all during those years. The question remains as to what extent the increase in the numbers working on a casual basis was involuntary.

RNs are categorized as working in nursing or not working in nursing. The numbers of RNs working as nurses are disaggregated to show the numbers with regular employment and the numbers employed on a casual basis. Those not employed as nurses are divided into two groups: those seeking nursing employment and those not seeking nursing employment. A residual category shows the number of RNs whose employment status is not known. The vast majority, if not all, of these RNs are not working as nurses, but their other activities were not reported.

Table 5
Employment Status of RNs in Canada, 1992 – 2001
Showing Numbers with Regular Employment and Numbers with
Casual Employment

| Year | Employed in Nursing | | | Not Employed in Nursing | | | Emp. Status Not Rep. | Total |
|------|---------------------|--------|-----------|-------------------------|----------------------|-----------|----------------------|--------|
| | Regular | Casual | Sub-total | Seeking Nurs. Emp. | Not seek. Nurs. Emp. | Sub-total | | |
| 1992 | 202624 | 31504 | 234128 | 7153 | 13966 | 21119 | 8436 | 263683 |
| 1993 | 201698 | 33932 | 235630 | 6863 | 14530 | 21393 | 7316 | 264339 |
| 1994 | 198658 | 35844 | 234502 | 6708 | 12938 | 19646 | 10207 | 264355 |
| 1995 | 195592 | 36657 | 232249 | 6329 | 10257 | 16586 | 10172 | 259007 |
| 1996 | 188962 | 39608 | 228570 | 5824 | 11084 | 16908 | 15186 | 260664 |
| 1997 | 186959 | 41754 | 228713 | 6395 | 6923 | 13318 | 17727 | 259785 |
| 1998 | 185455 | 42359 | 227814 | 5643 | 7881 | 13524 | 11558 | 254911 |
| 1999 | 187026 | 41508 | 228534 | 4489 | 9712 | 14201 | 13877 | 256612 |
| 2000 | 197974 | 34592 | 232566 | 2908 | 6096 | 9004 | 13195 | 254765 |
| 2001 | 201826 | 29686 | 231512 | 2884 | 10285 | 13169 | 8232 | 252913 |

Source: CNA and CIHI

It can be inferred that data regarding casual employment were not collected prior to 1992, as it was not considered a serious issue until some point in time not much earlier than 1992. Whatever the case may be, in 1992, 13.4 per cent of RNs employed as nurses were employed on a casual basis. The figures rose each year till 1998, during which 18.6 per cent or nearly 1 in 5 nurses were employed on a casual basis. **In each of 1997, 1998 and 1999, more than 40,000 nurses in Canada had to make do with casual employment!** In the year 2000, there was a drop in numbers of casually employed nurses from 41,500 the year before to 34,600. In the year 2001, this number was reduced to 29,700, a drop of 12,700 from the peak of 42,400 three years earlier. The trends for regular employment were the mirror image of the trends for casual employment. As casual employment increased, regular employment decreased. Is this a case of substituting casual employees for regular employees? Whereas regular employment presents obvious advantages for employees, casual employment is superficially advantageous to employers, who gain flexibility and control over total wage payments and the time and place of work of their employees. However, it is now known that the levels of job dissatisfaction, stress and turmoil, created by the implementation of policies such as labour casualization, led to a substantial withdrawal of nursing labour and contributed to a shortage of nurses. In subsequent sections of this report, the impact these developments have had on nursing participation rates and, and above all, on the education of nurses, as well as the implications on the supply of nurses in the years 2011 and 2016 will be traced.

It is useful to take a look at some of the other data in Table 5. In the late '90s, as funding began to be restored to the health care system, the policies that brought increased part-time and casual working, job cuts, etc., began to be reversed. Hospitals and other employers found it difficult to hire nurses in the numbers they required. Efforts to re-hire nurses who had lost their jobs only a few years earlier were not successful. Many nurses had left Canada for other countries, retired or

quit nursing altogether. Many recruitment schemes operate(d) on the assumption that there is a large pool of RNs waiting to be lured back into the profession. Is this the case? From Table 5 it is seen that the numbers of RNs not working as nurses who state that they are looking for a job in nursing has declined steadily since 1992. In 1992, there were at least 7,153 RNs looking for a nursing position. By 2001, this had dropped to 2,884. It is not known how many of the “not reported” fall into this category, but it is relevant to note that there were far fewer not reported cases in the years 2000 & 2001 than in all the other years except 1993. It is particularly relevant to note that **in both 2000 and 2001, there were fewer than 3,000 RNs who were not working as nurses but looking for jobs in nursing.** This is a tiny number compared with the total stock of RNs in the country. It is inevitable that, at any moment in a large profession, such as nursing, a few thousand individuals have just moved or are returning to work after sick or maternity/paternity leave, etc., and thus may be in the process of looking for a job. A plausible interpretation of these numbers is that at the present time **there is no large pool of RNs with active registration status in Canada waiting to be hired back into nursing.** The inescapable conclusion from this observation is that the only sources of additional nurses for Canada must be the output of Canadian educational institutions or immigration of nurses from abroad.

The RN database reveals the fact that, each year, there are several thousand RNs who renew their registration but neither work nor seek employment as nurses. Table 5 indicates that the number of such RNs showed a substantial drop in the years 1997, 1998, 1999 and 2000. Why do RNs who have no intention of working as nurses maintain registration? One possible answer is personal pride and affection for the profession. Another could be a marginal attachment to nursing. Perhaps in the back of their minds, under some circumstances, these individuals might return to nursing. Could it be that during the nursing employment crisis years, a few thousands of the RNs with a marginal attachment to nursing ceased to renew registration, thus accounting for the drop in numbers of RNs indicating no intention to work in nursing and the drop in total numbers of RNs? This category of nurses may never have been a major source of recruitment back into nursing, but whatever potential it did have was also seriously diminished in the crisis years.

Many nurses faced with involuntary part-time and/or casual employment resorted to seeking more than one job in order to make ends meet. This by-product of casual and involuntary part-time work is known as multiple employment. It also features high on the list of unpleasant, unintended consequences suffered by nurses during the cost-cutting measures of the '90s. These data only reinforce and confirm what the numbers regarding casual employment have already shown. Nevertheless, it is useful to document as accurately as possible the work-related phenomena of the nursing crisis of the '90s, because without statistics, it is impossible to obtain an idea of the magnitudes involved. Table 6 provides data from 1996 to 2001 on multiple employment.

Table 6
Casual and Multiple Employment: Number of Nurses Engaged on Regular vs. Casual Basis and Numbers holding More than One Position, Canada, 1996 to 2001

| Year | Regular or Casual Employment? | Multiple Employments? | | Total |
|------|-------------------------------|-----------------------|---------------|---------------|
| | | Yes | No | |
| 1996 | Regular Employment | 16140 | 172822 | 188962 |
| | Casual Employment | 8244 | 31364 | 39608 |
| | <i>Total</i> | <i>24384</i> | <i>204186</i> | <i>228570</i> |
| 1997 | Regular Employment | 40612 | 146347 | 186959 |
| | Casual Employment | 16623 | 25131 | 41754 |
| | <i>Total</i> | <i>57235</i> | <i>171478</i> | <i>228713</i> |
| 1998 | Regular Employment | 23363 | 162092 | 185455 |
| | Casual Employment | 12427 | 29932 | 42359 |
| | <i>Total</i> | <i>35790</i> | <i>192024</i> | <i>227814</i> |
| 1999 | Regular Employment | 25551 | 161475 | 187026 |
| | Casual Employment | 12141 | 29367 | 41508 |
| | <i>Total</i> | <i>37692</i> | <i>190842</i> | <i>228534</i> |
| 2000 | Regular Employment | 27666 | 170308 | 197974 |
| | Casual Employment | 9816 | 24776 | 34592 |
| | <i>Total</i> | <i>37482</i> | <i>195084</i> | <i>232566</i> |
| 2001 | Regular Employment | 27456 | 174370 | 201826 |
| | Casual Employment | 8344 | 21342 | 29686 |
| | <i>Total</i> | <i>35800</i> | <i>195712</i> | <i>231512</i> |

Source: CNA and CIHI; Calculations by E. Ryten.

Note. Data were adjusted for not reported cases. There were 20,969 not reported cases in 1996; 20,040 in 1997; 21,599 in 1998; 13,670 in 1999; 11,292 in 2000; 8,774 in 2001. Not reported cases were allocated proportionately to reported cases.

The date of the commencement of the series is a clue as to when this began to be perceived as a problem. It is only when an issue becomes problematic that data are collected (adding a year to make arrangements to change data collection instruments). It can be presumed that multiple employment became a concern around 1994.

In 1996, approximately 25,000 nurses held more than one job. In 1997, the numbers reached 57,000, 25 per cent of all employed nurses in that year. Remembering that annual registration takes place early in the year (see notes to Table 3), the details given by nurses about their employment reflects more on what was happening the year before than in the year of report. On this basis, it was likely that multiple employment peaked in 1996 at the very high number of 57,000. By 1998, the numbers were down to 35,790 and have remained at around 36 to 38,000 in the last four years. By any yardstick, these are large numbers, though the situation has clearly improved since the worst crisis years.

Trends in the Gender Distribution of Employed RNs

Nursing remains a female-dominated profession although the gender composition of employed nurses is slowly changing. In 1985, 2.6 per cent of employed RNs were male. In 2001, this had doubled to 5 per cent. A profession as numerically large as the nursing profession needs to expand its base of recruitment to include the whole population base. There is progress on this front, but it is quite slow. As women's career alternatives have expanded exponentially, it is critical to encourage men to enter fields that are traditionally female. There are not enough females to staff 50 per cent of previously male dominated occupations (largely successful goal of the feminist movement during the last three decades), as well as 100 per cent of traditionally female occupations.

Table 7
Employed RNs by Gender, Canada, 1985 – 2001

| Year | Men | Women | Total | Men | Women | Total |
|------|-------|--------|--------|-----|-------|-------|
| | # | # | # | % | % | % |
| 1985 | 5001 | 189360 | 194361 | 2.6 | 97.4 | 100.0 |
| 1986 | 5486 | 199093 | 204579 | 2.7 | 97.3 | 100.0 |
| 1987 | 5864 | 204909 | 210773 | 2.8 | 97.2 | 100.0 |
| 1988 | 6245 | 204261 | 210506 | 3.0 | 97.0 | 100.0 |
| 1989 | 6842 | 214157 | 220999 | 3.1 | 96.9 | 100.0 |
| 1990 | 7404 | 216561 | 223965 | 3.3 | 96.7 | 100.0 |
| 1991 | 7732 | 219957 | 227689 | 3.4 | 96.6 | 100.0 |
| 1992 | 8218 | 225910 | 234128 | 3.5 | 96.5 | 100.0 |
| 1993 | 8847 | 226783 | 235630 | 3.8 | 96.2 | 100.0 |
| 1994 | 9059 | 225443 | 234502 | 3.9 | 96.1 | 100.0 |
| 1995 | 9215 | 223034 | 232249 | 4.0 | 96.0 | 100.0 |
| 1996 | 9085 | 219485 | 228570 | 4.0 | 96.0 | 100.0 |
| 1997 | 9707 | 219006 | 228713 | 4.2 | 95.8 | 100.0 |
| 1998 | 10096 | 217718 | 227814 | 4.4 | 95.6 | 100.0 |
| 1999 | 10598 | 217936 | 228534 | 4.6 | 95.4 | 100.0 |
| 2000 | 11073 | 221493 | 232566 | 4.8 | 95.2 | 100.0 |
| 2001 | 11467 | 220045 | 231512 | 5.0 | 95.0 | 100.0 |

Source: CIHI

Place of Work of RNs

A report issued in 1997 by Statistics Canada states that between the fiscal years 1986/87 and 1994/95, the number of public hospitals fell by 14 per cent and the number of approved beds in public hospitals decreased by 11 per cent (Tully & Saint-Pierre, 1997). The number of staffed beds per 1,000 people in the general population fell by nearly 40 per cent from 6.6 to 4.1. Such a major reorganization in nurses' principal place of work was bound to alter the distribution of nurses by place of work.

It would have been useful to review statistics regarding the place of work of nurses over a long time period, but data for the most recent years use a different classification. For the latest years, less detail regarding place of work is available making the data not fully comparable with data for earlier years and also less interesting from an analytical point of view. For example, the current data do not show nursing home care or homes for the aged separately. These are probably sites with increased nurse employment.

Table 8 provides the available data from 1994 to 2001. During the years 1994 to 2001, hospital employment dropped by nearly 9,000. The number of nurses working in educational institutions decreased 17 per cent between 1994 and 2001. This, no doubt, reflects the very large drops in nursing enrolments that occurred while the nursing employment crisis was in full swing. Employment in community health experienced a large increase, from 14,000 to more than 21,000, between 1994 and 2001.

Table 8
RNs Employed as Nurses by Place of Work, Canada, 1994 to 2001

| Place of Work | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Hospital | 157026 | 154158 | 148985 | 146471 | 144091 | 144226 | 148728 | 148445 |
| Nursing Home | 25591 | 25746 | 27962 | 28067 | 27346 | 26943 | 26136 | 25349 |
| Comm. Health | 14237 | 14434 | 14200 | 15863 | 16423 | 18762 | 20287 | 21441 |
| Physician's Off. | 5972 | 6094 | 5988 | 5891 | 5958 | 5783 | 5634 | 5284 |
| Educat. Inst. | 6399 | 6188 | 5593 | 5346 | 5079 | 4975 | 5037 | 5297 |
| Other | 25277 | 25630 | 25842 | 27077 | 28918 | 27844 | 26743 | 25697 |
| Total | 234502 | 232249 | 228570 | 228713 | 227814 | 228534 | 232566 | 231512 |

Source: CIHI; Calculations by E. Ryten

Note. Data were adjusted for not reported cases. Not reported cases were allocated proportionately to reported cases.

The increase in the number of nurses working in community health reflects the movement of care, out of hospitals and into the community. Reorganization in the delivery of health care may result in shifts in the sites where care is delivered, but cannot eliminate the need for care. If hospitals are downsized, this may lead to the employment of fewer nurses in hospitals, but it creates a demand for their services in other locales such as nursing homes or the community.

Summary of findings with respect to trends in the employment of nurses

After many years of sizeable year on year growth in funding of the Canadian health care system, the years 1992 to 1997 saw reduced real term funding of health care. Although in 1992, there was a small positive increase, it was far less than what the system had become accustomed to. Hospitals were particularly hard hit and in order to live within their budgetary constraints, they laid off nurses and converted jobs to part-time and/or casual positions. They did not hire new nurses, and the work environment of those who were employed as nurses became ever more stressful as smaller groups of nurses had to cope with a workload that did not diminish just because the hospital budgets had been cut. Because of seniority clauses in contracts, it was new graduates who were not hired or who were likely to be hired on a casual basis. Many nurses

responded to the bleak employment prospects and working conditions by emigrating or quitting the nursing profession altogether. It did not take long before Canada was experiencing major nurse shortages. Starting in 1997, funding began to be restored to the health care system and very soon the incidence of casual employment and multiple job holding also decreased. However, hospitals and other employers found it was not easy to hire nurses in the numbers they could now afford. This is the situation facing the Canadian health care system early in the year 2002.

Statistics have been provided to show the funding trends underlying the developments summarized above. Data were also provided on trends in full-time or part-time working, growth and subsequent decline in casual employment, multiple employment held by nurses and changes in the place of work of nurses. All the statistical series support the interpretation of events as described above.

The rest of this report will be devoted to studying the impact of these developments on the education of nurses and on projections of supply and demand for RNs in the years 2011 and 2016.

Chapter 2

Demography of the Nursing Workforce: Age Composition

Analytical Framework

The concepts used in this study come from demography, the statistical study of populations. In demography, a population being studied is categorized by age, as analysis is based on age cohorts. An age cohort refers to all individuals born in a particular year. Births and deaths are recorded each year, and calculations are made on such factors as life expectancy at birth (how long, on average, an individual born in a particular year can be expected to live if observed trends in rates of death by year of death are projected into the future). Thus, the life expectancy of individuals born in 1952 can be compared with the life expectancy of individuals born in 2002.

Cohort analysis modelled on demographic analysis is the ideal method for studying supply and demand in the professions, as professional education has much in common with traditional demography. In nursing, for example, the annual number of “births” can be defined as the number of individuals receiving a licence or registration as an RN for the first time in each year. The annual number of “deaths” can be defined as the number of individuals leaving the nursing profession each year. Just as demographers classify deaths by the cause of death, of interest to our study is the reason why RNs leave the profession of nursing (retirement? emigration? change of career?). Just as individuals become one year older with each passing year, so with the passage of each succeeding year, RNs move from the start of their working life toward retirement or another exit from the nursing profession.

The analogies are not perfect. With populations, everybody is born at age 0. In the professions, some people qualify at a young age and others at varying older ages. Over time, there may be significant changes in the age distribution of newly qualifying cohorts. Additionally, among populations, death is final. In a profession, individuals may practise a few years, step out for a few years and then re-enter the profession for a few more years. These factors make the study of supply in the professions much more complicated than most demographic studies.

Despite the complications, trend data on the nursing profession do make sense if studied in terms of cohorts of newly qualifying RNs proceeding over time through their professional careers. In this nursing study, cohorts of nurses are classified in two ways: as members of a birth cohort (this is relevant to how many years of professional nursing service a member can be expected to deliver) and/or as members of a year of qualification cohort. This may be either the year of initial graduation in nursing or the year in which first registered as an RN and is related to the rate at which the nursing profession is renewing itself. This is a measure of the birth rate of the nursing profession.

Two important features of cohorts must be kept in mind by readers of this study:

- **Once a cohort has been constituted, it can never be added to.** For example, if only 4,600 students graduated in nursing in the year 2000 (the nurse graduating cohort in Canada of the year 2000), nothing can be done to change the size of that year’s graduating cohort. Policies may be adopted to influence the size of future graduating cohorts in an upward or downward direction, but the past cannot be altered.

- **Once a cohort has been constituted, its numbers are reduced over time.** With births, for example, demography studies the rate at which a cohort of births is reduced to 0. In brief, the cohort is studied from birth until all its members have died. This report studies the number of years various cohorts of nursing graduates provide professional service until the entire cohort has left the profession or retired.

Just as the population of a country consists of more than 100 birth cohorts (individuals born in the same year), the population of RNs at any one time consists of many graduating cohorts, with some RNs qualifying more than 50 years ago. Just as it is expected that the vast majority of members of recent birth cohorts are alive but that only a very small proportion of the members of the 1910 birth cohort will still be alive in the year 2002 (people aged 92 in 2002), so too it is to be expected that high proportions of recently qualified RNs are practising nursing in 2002 whereas only a small proportion of the 1960 qualifying cohort will still be practising in 2002.

The point raised in the paragraph above explains why data throughout this report are organized on a cohort basis (wherever relevant). Organizing data on a cohort basis tells us how far practising RNs are along their professional life cycles. A situation in which most RNs are at the early stages of their career with the potential to practise for many more years is very different from one in which large proportions are nearing or at the end of their professional life.

Age Trends of Working Nurses

All work forces must renew themselves over time, including the nursing profession. Each year, there are new entrants to the profession, and each year, there are departures. The difference between the numbers entering nursing and the numbers leaving each year determines the annual change in the number of working nurses. In the following sections, an examination will be made of the flows (flow describes entries and departures between two time periods; here the flow period is one year) into and out of nursing. Age is a central variable in the study of flows.

Every person who qualifies as a RN and enters employment as a nurse starts work at a given time point and eventually will cease working as a nurse. How long a person works as a nurse depends on many factors, among which the age at qualification is crucial. Age at qualification determines the total number of available years of work prior to retirement. Whether a qualified nurse works the full number of potentially available working years depends on many other factors, but for any particular retirement age, the age at qualification is always the determinant of the potential maximum number of available work years.

This section will examine trends in the age composition of working nurses and age at qualification, as well as how this has evolved over time. The findings will be used to make projections of future supply of RNs in Canada.

Tables 9A and 9B present data showing the number of RNs working in nursing by age group from 1966 to 2001. Table 9A shows the numbers and Table 9B shows the percentage distribution.

There has been a quite dramatic shift in the age composition of nurses over the years. In 2001, there were approximately 2.8 times as many practising nurses as there were in 1966. However, only one quarter of the number of nurses was in the youngest age group, aged 24 or younger.

Among those aged 25-34, there were only 1.5 times as many nurses in 2001 compared to 1966. Among nurses aged 35-44, there were 4.4 times as many nurses in 2001 as in 1966 and 6.2 times as many aged 45-54 in 2001 compared to 1966. In 2001, the number of nurses in the oldest age group, those aged 55 or more, was 3.8 times what it was in 1966. Almost without exception, throughout the entire 35 years covered by the data series, the nursing workforce has seen the age composition shift to older age groups.

Table 9A
Age Distribution of RNs Employed in Nursing, Canada, 1966 - 2001

| Year | Employed RNs by Age | | | | | Total |
|-------------------|---------------------|-------|-------|-------|-------|--------|
| | <25 | 25-34 | 35-44 | 45-54 | 55+ | |
| 1966 | 15878 | 29069 | 15834 | 13032 | 8704 | 82517 |
| 1967 | 15777 | 31531 | 16309 | 12569 | 8245 | 84431 |
| 1968 | 16803 | 36887 | 18764 | 13913 | 9186 | 95553 |
| 1969 | 17300 | 40200 | 20466 | 14725 | 10419 | 103110 |
| 1970 | 17108 | 42880 | 21623 | 14861 | 10812 | 107284 |
| 1971 | 20087 | 45508 | 22255 | 14264 | 9788 | 111902 |
| 1972 | 18155 | 47660 | 23435 | 14961 | 10138 | 114349 |
| 1973 | 19404 | 48991 | 24761 | 15605 | 10136 | 118897 |
| 1974 | 20848 | 52551 | 27512 | 16914 | 10850 | 128675 |
| 1975 | 22302 | 57061 | 31260 | 19958 | 13612 | 144193 |
| 1976 | 16265 | 57002 | 33061 | 21024 | 13707 | 141059 |
| 1977 | 19138 | 57983 | 33208 | 20583 | 12476 | 143388 |
| 1978 | 20493 | 65876 | 38486 | 23018 | 13252 | 161125 |
| 1979 ¹ | 9227 | 64235 | 39479 | 23020 | 12866 | 148827 |
| 1980 | 7275 | 65820 | 43417 | 24878 | 13788 | 155178 |
| 1981 | 13143 | 65700 | 44670 | 25052 | 12505 | 161070 |
| 1982 | 12298 | 66233 | 47446 | 25628 | 12481 | 164086 |
| 1983 | 11483 | 69602 | 53207 | 28560 | 13771 | 176623 |
| 1984 | 11539 | 70561 | 58955 | 31844 | 15019 | 187918 |
| 1985 | 11428 | 69987 | 63173 | 33930 | 15843 | 194361 |
| 1986 | 11622 | 70322 | 68304 | 37170 | 17161 | 204579 |
| 1987 | 11099 | 68746 | 72303 | 40362 | 18263 | 210773 |
| 1988 | 10172 | 65976 | 73580 | 42505 | 18273 | 210506 |
| 1989 | 9376 | 66110 | 78008 | 46992 | 20513 | 220999 |
| 1990 | 8787 | 65455 | 80394 | 48974 | 20355 | 223965 |
| 1991 | 8065 | 64146 | 81441 | 52688 | 21349 | 227689 |
| 1992 | 7401 | 63497 | 83447 | 57159 | 22624 | 234128 |
| 1993 | 6252 | 61592 | 83516 | 60866 | 23404 | 235630 |
| 1994 | 5152 | 58795 | 82360 | 63728 | 24467 | 234502 |
| 1995 | 4458 | 56707 | 80888 | 65885 | 24311 | 232249 |
| 1996 | 4263 | 53656 | 78785 | 67320 | 24546 | 228570 |
| 1997 | 4336 | 50212 | 76995 | 71362 | 25808 | 228713 |
| 1998 | 4433 | 47791 | 75931 | 73351 | 26308 | 227814 |
| 1999 | 4642 | 45702 | 74349 | 76038 | 27803 | 228534 |
| 2000 | 4247 | 44559 | 72783 | 79752 | 31225 | 232566 |
| 2001 | 3934 | 42543 | 70650 | 80964 | 33421 | 231512 |

Source: CNA, Statistics Canada & CIHI; Calculations by E. Ryten

Note. Data were adjusted to eliminate non-reported values, which were allocated proportionally to reported values.

1) See note for Table 3.

Table 9B
Percentage Distribution
Age of RNs Employed in Nursing, Canada, 1966 - 2001

| Year | Employed RNs by Age | | | | | Total |
|-------------------|---------------------|--------|--------|--------|--------|---------|
| | <25 | 25-34 | 35-44 | 45-54 | 55+ | |
| 1966 | 19.2 % | 35.2 % | 19.2 % | 15.8 % | 10.5 % | 100.0 % |
| 1967 | 18.7 | 37.3 | 19.3 | 14.9 | 9.8 | 100.0 |
| 1968 | 17.6 | 38.6 | 19.6 | 14.6 | 9.6 | 100.0 |
| 1969 | 16.8 | 39.0 | 19.8 | 14.3 | 10.1 | 100.0 |
| 1970 | 15.9 | 40.0 | 20.2 | 13.9 | 10.1 | 100.0 |
| 1971 | 18.0 | 40.7 | 19.9 | 12.7 | 8.7 | 100.0 |
| 1972 | 15.9 | 41.7 | 20.5 | 13.1 | 8.9 | 100.0 |
| 1973 | 16.3 | 41.2 | 20.8 | 13.1 | 8.5 | 100.0 |
| 1974 | 16.2 | 40.8 | 21.4 | 13.1 | 8.4 | 100.0 |
| 1975 | 15.5 | 39.6 | 21.7 | 13.8 | 9.4 | 100.0 |
| 1976 | 11.5 | 40.4 | 23.4 | 14.9 | 9.7 | 100.0 |
| 1977 | 13.3 | 40.4 | 23.2 | 14.4 | 8.7 | 100.0 |
| 1978 | 12.7 | 40.9 | 23.9 | 14.3 | 8.2 | 100.0 |
| 1979 ¹ | 6.2 | 43.2 | 26.5 | 15.5 | 8.6 | 100.0 |
| 1980 | 4.7 | 42.4 | 28.0 | 16.0 | 8.9 | 100.0 |
| 1981 | 8.2 | 40.8 | 27.7 | 15.6 | 7.8 | 100.0 |
| 1982 | 7.5 | 40.4 | 28.9 | 15.6 | 7.6 | 100.0 |
| 1983 | 6.5 | 39.4 | 30.1 | 16.2 | 7.8 | 100.0 |
| 1984 | 6.1 | 37.3 | 31.9 | 16.8 | 7.9 | 100.0 |
| 1985 | 5.9 | 36.5 | 32.8 | 16.5 | 8.3 | 100.0 |
| 1986 | 5.7 | 34.4 | 33.4 | 18.2 | 8.4 | 100.0 |
| 1987 | 5.3 | 32.6 | 34.3 | 19.1 | 8.7 | 100.0 |
| 1988 | 4.8 | 31.3 | 35.0 | 20.2 | 8.7 | 100.0 |
| 1989 | 4.2 | 29.9 | 35.3 | 21.3 | 9.3 | 100.0 |
| 1990 | 3.9 | 29.2 | 35.9 | 21.9 | 9.1 | 100.0 |
| 1991 ² | 3.5 | 28.2 | 35.8 | 23.1 | 9.4 | 100.0 |
| 1992 | 3.2 | 27.1 | 35.6 | 24.4 | 9.7 | 100.0 |
| 1993 | 2.7 | 26.1 | 35.4 | 25.8 | 9.9 | 100.0 |
| 1994 | 2.2 | 25.1 | 35.1 | 27.2 | 10.4 | 100.0 |
| 1995 | 1.9 | 24.4 | 34.8 | 28.4 | 10.5 | 100.0 |
| 1996 | 1.9 | 23.5 | 34.5 | 29.5 | 10.7 | 100.0 |
| 1997 | 1.9 | 22.0 | 33.7 | 31.2 | 11.3 | 100.0 |
| 1998 | 1.9 | 21.0 | 33.3 | 32.2 | 11.5 | 100.0 |
| 1999 | 2.0 | 20.0 | 32.5 | 33.3 | 12.2 | 100.0 |
| 2000 | 1.8 | 19.2 | 31.3 | 34.3 | 13.4 | 100.0 |
| 2001 | 1.7 | 18.4 | 30.5 | 35.0 | 14.4 | 100.0 |

Source: CNA, Statistics Canada & CIHI; Calculations by E. Ryten

Note. See note for Table 7A.

1) Percentages do not always add up to 100 per cent due to rounding off numbers.

2) For numbers on which these percentages are based, see Table 9A.

Apart from the fact that the ageing of the nursing workforce shows no signs of slowing down, there are some unusual age patterns revealed by these age distribution trends. In a typical age distribution, if numbers at time period one are compared with numbers at time period two, one would expect to see reduced numbers because of dropouts from practice (the cohort effect). The numbers in Table 9A do not exhibit the typical pattern expected. For example, in 1975 there were 57,061 RNs aged 25-34 working as nurses. In 1985, 10 years later, these nurses would have been 35-44 years old. In 1985, there were 63,173 RNs aged 35-44 working as nurses, an increase of more than 6,000 compared to the number of 25-34 year olds in 1975; in 1990, there were 65,455 nurses aged 25-34 and in 2000, 10 years later, there were 72,783 nurses aged 35-44; in 1991, there were 64,146 nurses aged 25-34, and 10 years later, in 2001, there were 70,650 nurses aged 35-44. Readers can examine the numbers for themselves. They will find that this pattern of increased numbers as the cohort ages proves to be common when comparing the number of 35-44 year olds with the number of RNs aged 25-34 10 years earlier. It is only when comparing the number of RNs aged 55+ with the number of RNs aged 45-54 10 years earlier that the numbers follow the expected pattern (e.g., in 1991, there were 52,688 RNs working as nurses and in 2001, 10 years later, there were 33,421 RNs working as nurses).

Clearly the age groups do not behave as age cohorts in the traditional sense. The numbers in Tables 9A & 9B could not be used to make projections of future supply, because retention rates in excess of 100 per cent would be attained, which is logically impossible. It is necessary to figure out what accounts for the age distribution patterns exhibited by the data, because they are clearly important in understanding changes in the supply of nurses in Canada.

There are three hypotheses regarding possible contributory factors to the observed age patterns of RNs employed in nursing.

- **The age at qualification and entry to practice is shifting to older people.** If substantiated, the implication of this hypothesis is that age is not a good proxy measurement for cohorts of nursing graduates. In brief, age may be useful for estimating future retirements, but it is not a good indicator of rate of entry to the profession.
- **The rate of entry into practice of newly qualified RNs is lower in recent years than it used to be.** This hypothesis, if substantiated, implies that fewer qualified young people are in the pool of practising RNs not only because of increasing age at graduation but also because a smaller proportion of those who qualify actually enter nursing practice. This could arise because jobs in nursing were difficult to come by, unattractive or that new nurses chose another career or to emigrate.
- **The entry to practice cohorts of recent years are smaller than the entry to practice cohorts of earlier years.** This hypothesis implies there were fewer nursing graduates in recent years and/or the success rates in passing the RN licensing examinations have decreased.

No meaningful projections about future supply are possible without some attempt to investigate these hypotheses and feed the findings into the supply projections. In following sections, aspects of all these hypotheses will be examined. First, the age data will be examined in greater detail. The next statistical table examines the age structure of RNs in 1980, 1995 and 2001 by a single year of age (see Table 10).

The numbers in Table 10 enable us to compare the ages of RNs in 2001 with those of 1980 and with the RNs of 1995. This latter comparison provides an idea of what has been happening in the last few years, while the 1980 numbers enable a comparison over the longer term.

Starting with the comparison of 2001 with 1980, we find there were 252,913 RNs in 2001 and 203,654 in 1980. There are single year of age data for all RNs in 2001 and 201,943 RNs in 1980. This compares the numbers at each age for 50,924 more RNs in 2001 than in 1980, and yet there were far, far more young RNs in 1980 than in 2001. At every age under 35, there were more RNs in 1980 than in 2001. At each age from 23 to 29 (seven age categories), the difference between the number of RNs in 1980 and 2001 exceeded 4,000 in the favour of the 1980 RN complement. The extremely small numbers of nurses at young ages (those with the longest working life ahead of them) of the 2001 nurse complement is striking. Although at every one of the younger age categories there were more RNs in 1980 than in 2001, the opposite is the case for older RNs. At every age from 36 onwards, there were more RNs in 2001 than in 1980. The modal age (the age category with the largest number of RNs) in 1980 was 28. In 2001, it was 47 years of age. In fact, comparing the number of 28-year olds and the number of 47-year olds, a pretty fair appraisal of how the age structure has changed can be seen. In 1980 there were 8,920 28-year olds and 3,391 47-year olds; in 2001, there were 4,179 28-year olds and 9,540 47-year olds.

When comparing the age structure of RNs in 1995 with the age structure of RNs in 2001, it is seen that the large shift towards older RNs (compared with 1980) was well established by 1995, but that it progressed even further during the last six years. Compared with 1980, there were already much smaller cohorts of young RNs in 1995. For this reason, it is not encouraging to find even smaller numbers of young RNs in 2001. **Examining these numbers in light of the three hypotheses, it looks very much as though the last few years can be characterized by low outputs from nursing education programs and low rates of entry into the practice of nursing.** The reason for making these inferences is that it would appear that the more recent entering cohorts of nurses composing the 1995 complement had a similar age structure to those of the 2001 complement (i.e., considerably older than the newer entrants of the 1980 complement). Thus the differences in the numbers of young graduates of 1995 and 2001 can only be due to the fact that the entering cohorts of the 2001 complement were smaller. Statistics showing the numbers graduating from nursing programs and qualifying for RN registration by year will clear this matter up. These data will be shown in a later section of this report.

However, the proportions of the cohorts qualifying as RNs each year that register and practise also needs to be ascertained. This topic will be dealt with in the context of numbers qualifying each year. As with the comparison of the 1980 and the 1995 complements of RNs, there are many more RNs in the older age categories in 2001 than in 1995. To a large extent, this is the normal, expected cohort effect. The larger age cohorts of earlier years are moving through their professional life cycles towards retirement. What is problematic about the age distribution of the current nursing work force is that behind the large cohorts of nurses in their mid-40s and older, follow smaller and smaller age cohorts, suggesting serious underproduction of nurses in recent years.

Table 10
Change in Age Structure of RN Population, 1980 to 2001:
Number of RNs in 1980, 1995 & 2001 by Single Year of Age

| Age in Years | Number of RNs in: | | | 2001 minus 1980 | 2001 minus 1995 |
|------------------|-------------------|---------------|---------------|-----------------|-----------------|
| | 1980 | 1995 | 2001 | | |
| <21 | 103 | 9 | 2 | -101 | -7 |
| 21 | 1500 | 358 | 148 | -1352 | -210 |
| 22 | 3797 | 937 | 550 | -3247 | -387 |
| 23 | 5724 | 1794 | 1347 | -4377 | -447 |
| 24 | 6805 | 2759 | 2306 | -4499 | -453 |
| 25 | 7532 | 3449 | 2978 | -4554 | -471 |
| 26 | 8480 | 4174 | 3534 | -4946 | -640 |
| 27 | 8712 | 4800 | 3910 | -4802 | -890 |
| 28 | 8920 | 5229 | 4179 | -4741 | -1050 |
| 29 | 8439 | 5773 | 4387 | -4052 | -1386 |
| 30 | 8145 | 6422 | 4771 | -3374 | -1651 |
| 31 | 7904 | 7181 | 5039 | -2865 | -2142 |
| 32 | 7587 | 7292 | 5376 | -2211 | -1916 |
| 33 | 8008 | 7121 | 5644 | -2364 | -1477 |
| 34 | 7304 | 7073 | 5936 | -1368 | -1137 |
| 35 | 6478 | 7233 | 6410 | -68 | -823 |
| 36 | 6718 | 7173 | 6889 | 171 | -284 |
| 37 | 6790 | 7471 | 7723 | 933 | 252 |
| 38 | 6129 | 8152 | 7724 | 1595 | -428 |
| 39 | 5498 | 8433 | 7583 | 2085 | -850 |
| 40 | 4939 | 8946 | 7538 | 2599 | -1408 |
| 41 | 4669 | 9222 | 7693 | 3024 | -1529 |
| 42 | 4378 | 9255 | 7612 | 3234 | -1643 |
| 43 | 4148 | 9248 | 8009 | 3861 | -1239 |
| 44 | 3949 | 8728 | 8634 | 4685 | -94 |
| 45 | 3683 | 8379 | 8825 | 5142 | 446 |
| 46 | 3484 | 8031 | 9217 | 5733 | 1186 |
| 47 | 3391 | 7730 | 9540 | 6149 | 1810 |
| 48 | 3348 | 8045 | 9464 | 6116 | 1419 |
| 49 | 3240 | 7287 | 9505 | 6265 | 2218 |
| 50 | 3116 | 6323 | 8880 | 5764 | 2557 |
| 51 | 2768 | 6481 | 8470 | 5702 | 1989 |
| 52 | 2619 | 6379 | 8028 | 5409 | 1649 |
| 53 | 2472 | 5691 | 7629 | 5157 | 1938 |
| 54 | 2226 | 4989 | 7674 | 5448 | 2685 |
| 55 | 2066 | 4449 | 6645 | 4579 | 2196 |
| 56 | 1887 | 4007 | 5440 | 3553 | 1433 |
| 57 | 1668 | 3489 | 5257 | 3589 | 1768 |
| 58 | 1740 | 3136 | 4922 | 3182 | 1786 |
| 59 | 1672 | 2772 | 4062 | 2390 | 1290 |
| 60 | 1561 | 2344 | 3249 | 1688 | 905 |
| 61 | 1350 | 1883 | 2452 | 1102 | 569 |
| 62 | 1240 | 1665 | 2003 | 763 | 338 |
| 63 | 1067 | 1382 | 1573 | 506 | 191 |
| 64 | 956 | 1125 | 1226 | 270 | 101 |
| 65 | 829 | 836 | 912 | 83 | 76 |
| >65 | 2904 | 2320 | 1972 | -932 | -348 |
| Sub-total | 201943 | 246975 | 252867 | 50924 | 5892 |
| n.r. | 1711 | 12032 | 46 | | |
| Total | 203654 | 259007 | 252913 | 49259 | -6094 |

Source: CIHI; Calculations by E. Rytten

Trends in Age at Graduation

Attention must now be turned to age at graduation to examine the extent to which this may account, at least partly, for the shift towards an older nursing workforce. Two statistical tables are presented to obtain an accurate idea of the ages at which new nurses are entering nursing practice. One of the tables deals with the age of graduates of Canadian nursing programs and the other with the age at which nurses who received their education outside Canada passed the RN licensing examination.

Nurses educated in Canada

Because nurses in practice do not include all members of a graduating cohort (not all graduates are registered or practising nurses), an attempt was made to find data covering age at qualification that would be both comprehensive and recent. The regular enrolment and graduation surveys of CNA do not include age as a variable. However, the administrative records related to the RN licensing examinations do include candidates' date of birth. Most graduates take the RN examinations at the first available opportunity following graduation, (typically within 3 months of completion of nursing education), so the age at which the RN exams are taken is very close to the time of graduation and just as close to the time when a graduate can be expected to start working as a registered nurse. Up to and including the year 1999, CNA administered both English and French language examinations to nursing graduates all across Canada. From 2000 onwards, Quebec administered its own licensing examinations. Since the last year for which data are available for the entire country was 1999, statistics were compiled showing the age at which first-time takers educated in Canada took the RN exams that year. These data are shown in Table 11.

The numbers in Table 11 make it clear that there is no one age at which nurses graduate. A few graduates were either younger than 21 or older than 50 when they graduated. However, 19.2 per cent were at least 30 years of age at the time of graduation. An interesting feature of Table 11 is the breakdown between diploma and degree graduates. Although the modal age for diploma graduates (22) was lower than that of bachelor degree graduates (23), far more of the older examinees had earned a diploma than had earned a degree.

Table 11
Age at Graduation: Age of All First-time Examinees Educated in Canada
RN Licensing Examinations of 1999

| Age | Type of Qualification | | Total | Age Distribution % |
|--------------|-----------------------|-------------|-------------|--------------------|
| | Diploma | Bacc. | | |
| <21 | 190 | 0 | 190 | 3.7 |
| 21 | 399 | 16 | 415 | 8.1 |
| 22 | 482 | 305 | 787 | 15.4 |
| 23 | 346 | 560 | 906 | 17.7 |
| 24 | 235 | 377 | 612 | 12.0 |
| 25 | 161 | 235 | 396 | 7.7 |
| 26 | 128 | 138 | 266 | 5.2 |
| 27 | 102 | 100 | 202 | 3.9 |
| 28 | 97 | 97 | 194 | 3.8 |
| 29 | 100 | 72 | 172 | 3.4 |
| 30 | 73 | 40 | 113 | 2.2 |
| 31-35 | 246 | 116 | 362 | 7.1 |
| 36-40 | 185 | 51 | 236 | 4.6 |
| 41-45 | 113 | 40 | 153 | 3.0 |
| 46-50 | 68 | 18 | 86 | 1.7 |
| >50 | 20 | 11 | 31 | 0.6 |
| Total | 2945 | 2176 | 5121 | 100.0 |

Source: CNA RN examinee data; Compiled and calculations by E. Ryten

Note. Data include 5,121 out of 5,221 graduates for whom data were available. Data cover graduates of Canadian nursing programs who sat the RN examinations for the first time at any session of the examinations in 1999.

A high school graduate who chooses to study nursing immediately after leaving high school and makes steady progress through the nursing curriculum would typically be 20, 21 or 22 at the time of graduation. This allows for three years to complete a diploma program and four years for degree. Graduates who are older than these ages have either encountered delay in graduation or have not chosen nursing straight out of high school. Looking at the numbers in Table 11, it has to be concluded that most people who graduated in nursing in the year 1999, made a decision to become a nurse after trying something else. Even if graduates aged 23 are included in the group of people who went directly into nursing from high school, this still leaves more than 55 per cent of all nursing graduates who earned a degree or diploma in nursing at age 24 or older. The inference must be that their choice of a career in nursing came late. Not only do these data address one of the issues raised in the three hypotheses, but they also provide a basis for projecting the age distribution of future graduating cohorts. It is clear that one of the contributing factors to the age structure of the nursing pool in Canada is, indeed, the relatively mature age at which people are commencing nursing practice. To find out whether this particular age pattern for new nursing graduates is a recent phenomenon, Table 12 compares the age distribution of 1999 nursing graduates with the age distribution of all nurses who were registered in 1995.

Table 12
Comparison of Age at Graduation of RNs who Graduated Before
1980 and RNs who Graduated in 1980 or Later with RNs
Who First Took Licensing Examinations in 1999

| Age at Graduation (yrs) | All RNs in 1995: | | RNs in 1995 Who Graduated in 1993 | Canadian Educated 1 st Time Takers of RN Exams 1999 |
|----------------------------|------------------------------|--------------------------------|--------------------------------------|--|
| | Who graduated before 1980 | Who graduated 1980 or later | | |
| | % | % | % | % |
| <21 | 12.4 | 11.8 | 5.7 | 3.7 |
| 21 | 34.9 | 15.6 | 9.4 | 8.1 |
| 22 | 25.0 | 16.2 | 13.7 | 15.4 |
| 23 | 11.1 | 12.8 | 13.7 | 17.7 |
| 24 | 4.8 | 7.5 | 8.2 | 12.0 |
| 25 | 2.6 | 5.1 | 6.0 | 7.7 |
| 26 | 1.8 | 4.0 | 4.7 | 5.2 |
| 27 | 1.3 | 3.1 | 4.0 | 3.9 |
| 28 | 1.0 | 2.6 | 3.5 | 3.8 |
| 29 | 0.8 | 2.2 | 3.6 | 3.4 |
| 30 | 0.7 | 2.0 | 2.6 | 2.2 |
| 31-35 | 2.0 | 7.9 | 10.7 | 7.1 |
| 36-40 | 0.9 | 5.3 | 7.8 | 4.6 |
| 41-45 | 0.4 | 2.7 | 4.1 | 3.0 |
| 46-50 | 0.2 | 0.9 | 1.7 | 1.7 |
| >50 | 0.1 | 0.2 | 0.5 | 0.6 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 |
| Numbers | 200766 | 102215 | 6234 | 5121 |

Source: CIHI, CNA 1995 & 2001; Compiled by E. Ryten

Note. For years before 1999, age at graduation distributions were based on records for which both year of birth and year of graduation were reported in the 1995 CNA database. There is no overlap between the numbers reported as having graduated before 1980 and those who graduated in 1980 or later. The individuals counted in the first three columns were all registered nurses in 1995.

The nursing complement of 1995 was divided up into all RNs who had graduated in nursing before 1980 and all those who had graduated in or after 1980. Essentially, this meant grouping together graduates from approximately 1955 to 1979, who were still registered in 1995, into one category and graduates from 1980 to 1993 into another. In order to see the age distribution of the most recent graduates who were part of the 1995 RN complement, the graduates of 1993 are shown in a column by themselves. The data on 1993 graduates are also included in the column covering RNs who graduated in 1980 or later. The data for the graduates of 1999 come from Table 11 of this report.

When one compares the age distribution of more than 200,000 RNs in 1995 who graduated in nursing before 1980, one observes that more than 83 per cent of them had graduated by the age of 23. This is in very marked contrast to only 45 per cent of the 1999 graduates having graduated by the age of 23. For those who graduated between 1980 and 1994 and were RNs in 1995, 56 per cent had graduated by the age of 23. For those who graduated in 1993, 42 per cent had graduated

by age 23. Thus, the pattern observed for 1999 was already in place by 1993. In fact, there was a higher per cent of graduates aged 30 and over among the 1993 graduates than among those of 1999. Exactly when the shift started towards the majority of nursing graduates not going into nursing directly out of high school cannot be addressed by the data provided, but it seems to have come about a little bit at a time during the '80s. This pattern of age at graduation is one explanation for why there are now so few young nurses in Canada.

Nurses educated outside Canada

Nurses who come to Canada from other countries enter practice here after they have successfully passed the RN examination. The expected length of professional life of nurses educated outside Canada is determined not by the age at which they graduated but rather the age when they came to Canada and qualified to work as RNs in Canada. This may be close to their date of graduation or many years afterwards. In order to have some basis for making projections about the supply of nurses in the future, some data were obtained about the age at which nurses educated abroad passed the Canadian Registered Nurse Examination (excluding the Quebec exam). These data come from the administrative records of the CNA and are presented in Table 13.

The data show that nurses from abroad who come to practise in Canada are typically in the 35-44 year-old age bracket when they start practising. There are very few foreign nurses who are in the youngest age groups when they start practising in Canada. As later data will show, there has been an increase in the number of foreign nurses passing the RN examinations in recent years, so their characteristics and numbers must also be taken into consideration when making projections of future supply.

The principal consequence for the supply of nurses of having nurses starting their nursing careers at relatively mature ages is that their careers in nursing will be shorter.

Table 13
Age at Registration of Nurses Educated Outside Canada
(Age at Which RN Examination Passed by Foreign-educated Examinees
Who Took RN Examinations in the Year 2001)

| Age at Registration | Passed RN Exams In 2001 | % Distribution by Age |
|---------------------|-------------------------|-----------------------|
| <22 | 2 | 0.1 |
| 22 | 9 | 0.6 |
| 23 | 18 | 1.2 |
| 24 | 48 | 3.2 |
| 25 | 49 | 3.3 |
| 26 | 64 | 4.3 |
| 27 | 85 | 5.7 |
| 28 | 113 | 7.5 |
| 29 | 129 | 8.6 |
| 30 | 123 | 8.2 |
| 31 | 106 | 7.1 |
| 32 | 62 | 4.1 |
| 33 | 86 | 5.7 |
| 34 | 67 | 4.5 |
| 35-39 | 216 | 14.4 |
| 40-44 | 183 | 12.2 |
| 45-49 | 101 | 6.7 |
| 50-54 | 33 | 2.2 |
| >54 | 8 | 0.5 |
| Total | 1502 | 100.00 |

Source: CNA RN examinee data, 2001; Compiled by E. Ryten

The next chapter provides some historical data on the output of Canada's nursing programs followed by a province-by province set of output projections from 2002 to 2015 to be used in making projections about the future supply of nurses in Canada.

Chapter 3

Estimating the Number of Nursing Graduates in the Coming Years

Background and Data Problems

For many decades there have been two principal routes to qualification and certification as a registered nurse in Canada. The first, and until recently, the primary route has been through a diploma program offered at a community college or, in earlier years, at a hospital-based school of nursing. The second route has been through the basic baccalaureate of science in nursing (B.Sc.N. or B.N.). This degree is frequently referred to as the generic bachelor degree to distinguish it from the nursing degree earned by nurses who are already diploma qualified RNs. That degree, generally referred to as the post-RN bachelor degree, is not of concern in this study, as the focus here is the number of individuals qualifying as nurses and entering nursing practice. All subsequent material excludes the post-RN degree.

In 1982, the CNA adopted a policy to require a B.Sc.N. for entry to practice by the year 2000. In order for this policy to become operational, the educational authorities in each of the provinces had to provide the necessary facilities in educational institutions and financial resources. The implementation of CNA's 1982 policy on the educational requirements for entry to practice has proceeded unevenly in time from one Canadian province to the other. At the time of writing (April 2002), there are some provinces that have fully implemented the policy and some where it has had hardly any impact.

The transition from one system of educating nurses to another has brought in its wake many new and innovative models for delivering university-level education in community college settings. Although there has been some increase in the number of nursing students following generic degree programs, the vast majority of students, who would have previously entered a community college nursing diploma program, are now receiving their education in collaborative programs, involving cooperation between universities and community colleges. The degree and type of cooperation varies enormously from one program to another. In some cases, students take part of their education in the college and part in the university; in others only the accreditation and program planning involves the university, and the college provides all education. There are many different variants of these models for collaborative degree programs. The distinction between degree and diploma programs has become blurred, especially in the early stages of the nursing program as a decision to opt for a diploma or degree may not be made until as late as the third year of study.

These developments have complicated the collection and compilation of statistics related to nursing education. There is confusion as to who reports enrolment: the university or the college where the students study. This situation has led to both under-reporting and double counting. Nursing programs are now offered on more sites than in the past. Inadvertently, data for some sites have not been reported at all. In recent years many colleges have introduced second or even third entries during the year, accelerated programs (opportunities to complete nursing education in less than the normal allotted time), entry at points other than the first year of study, etc.

There are three principal data series affected: admission, enrolment and graduation statistics.

- Data on new entrants provide a leading indicator of what is in the pipeline and are used for projecting outputs in the following three to four years.
- Enrolment data by year of study provide a means for studying the progress of students and are used for measuring attrition rates. Attrition rates are used in projecting future output levels.
- Graduation data provide counts of the numbers of students qualifying to take the RN licensing examination. In this report, for the years starting with 1985, the number of first-time takers of the RN examinations was used as an indicator of numbers graduating rather than the flawed counts provided in the regular data series.

Table 14 shows that undercounting due to non-reporting by some institutions, and for other reasons previously mentioned, has been far more frequent than overcounting. The rate of undercounting has worsened as the diversity of types of program has increased.

As a consequence of unreliable trend data on admissions, enrolment and graduation,

- Attrition rates cannot be calculated accurately and, hence, success rates for completion of nursing education programs cannot be calculated satisfactorily;
- It is still difficult to figure out to what extent, if any, conversion to collaborative programs results in fewer admissions to nursing programs, as opposed to reductions in the number of places that accompanied elimination of diploma programs.

Unreliable as they are, the long-term trend data available on output from nursing education programs in Canada from 1963 to 2001 are presented in Table 14.*

* CNA has since updated graduation data to reflect previously non-reported data.

Table 14
Number of Students Graduating in Nursing by Type
of Initial Qualification, Canada, 1963 – 2001

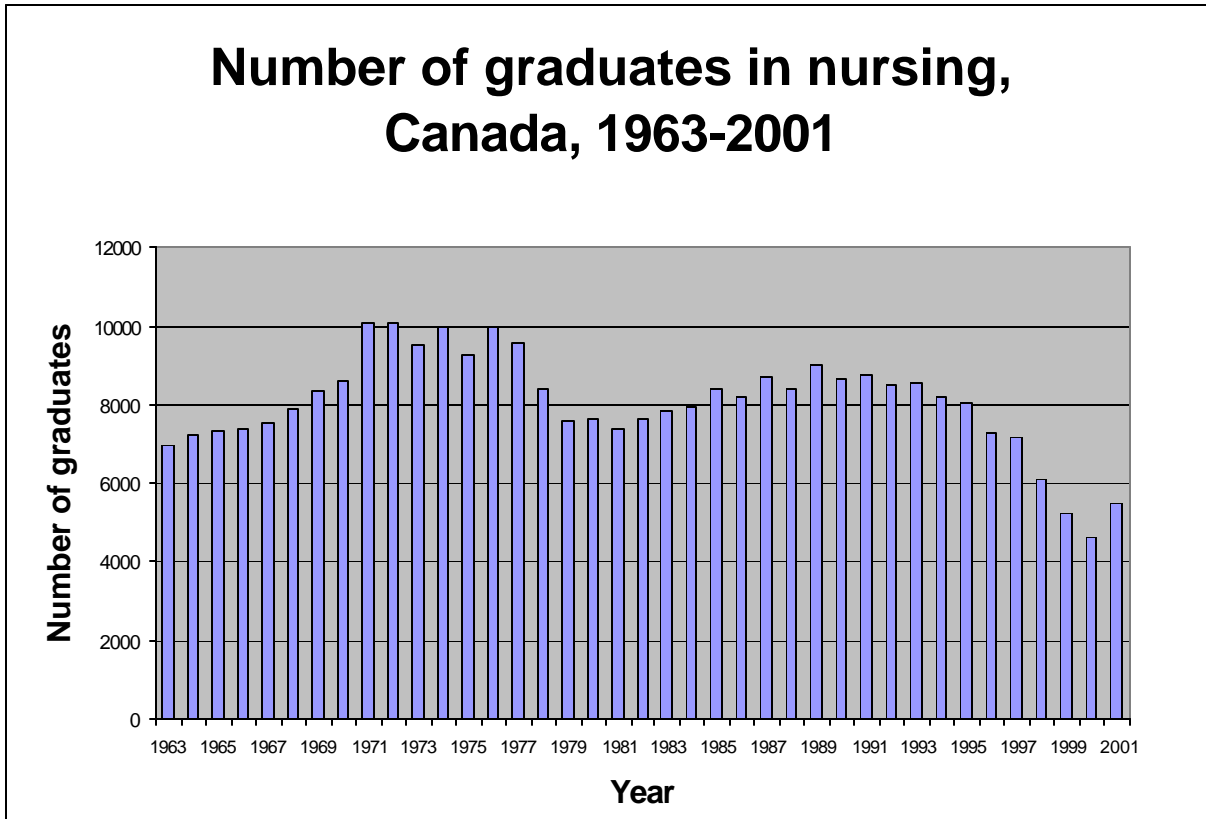
| Year | Graduates | | | First-time Examinees | Undercount of grads. |
|------|------------|--------|--------------|----------------------|----------------------|
| | RN Diploma | B.Sc.N | Total | | |
| 1963 | 6764 | 171 | 6935 | n.a. | n.a. |
| 1964 | 7107 | 154 | 7261 | n.a. | n.a. |
| 1965 | 7154 | 206 | 7360 | n.a. | n.a. |
| 1966 | 7167 | 220 | 7387 | n.a. | n.a. |
| 1967 | 7249 | 273 | 7522 | n.a. | n.a. |
| 1968 | 7591 | 300 | 7891 | n.a. | n.a. |
| 1969 | 7978 | 381 | 8359 | n.a. | n.a. |
| 1970 | 8212 | 413 | 8625 | n.a. | n.a. |
| 1971 | 9543 | 515 | 10058 | n.a. | n.a. |
| 1972 | 9596 | 487 | 10083 | n.a. | n.a. |
| 1973 | 8901 | 613 | 9514 | n.a. | n.a. |
| 1974 | 9266 | 694 | 9990 | n.a. | n.a. |
| 1975 | 8433 | 845 | 9278 | n.a. | n.a. |
| 1976 | 9042 | 954 | 9996 | n.a. | n.a. |
| 1977 | 8611 | 977 | 9588 | n.a. | n.a. |
| 1978 | 7403 | 1019 | 8422 | n.a. | n.a. |
| 1979 | 6680 | 900 | 7580 | n.a. | n.a. |
| 1980 | 6685 | 954 | 7639 | n.a. | n.a. |
| 1981 | 6478 | 918 | 7396 | n.a. | n.a. |
| 1982 | 6621 | 1023 | 7644 | n.a. | n.a. |
| 1983 | 6761 | 1062 | 7823 | n.a. | n.a. |
| 1984 | 6871 | 1092 | 7963 | n.a. | n.a. |
| 1985 | 7218 | 1196 | 8414 | 8380 | +0.4% |
| 1986 | 6762 | 1249 | 8011 | 8225 | -2.6% |
| 1987 | 7054 | 1218 | 8272 | 8722 | -5.2% |
| 1988 | 6981 | 1228 | 8209 | 8412 | -2.4% |
| 1989 | 7635 | 1202 | 8838 | 9023 | -2.1% |
| 1990 | 7005 | 1213 | 8218 | 8683 | -5.4% |
| 1991 | 7022 | 1162 | 8184 | 8760 | -6.6% |
| 1992 | 7061 | 1345 | 8406 | 8530 | -1.5% |
| 1993 | 6707 | 1346 | 8053 | 8546 | -5.8% |
| 1994 | 6213 | 1323 | 7536 | 8201 | -8.1% |
| 1995 | 5696 | 1507 | 7203 | 8026 | -10.3% |
| 1996 | 4966 | 1818 | 6784 | 7283 | -6.9% |
| 1997 | 4249 | 2175 | 6424 | 7115 | -9.7% |
| 1998 | 3586 | 1914 | 5500 | 6080 | -10.5% |
| 1999 | 1594 | 2176 | 3770 | 5221 | -27.8% |
| 2000 | 2015 | 2085 | 4100 | 4599 | -10.9% |
| 2001 | .. | .. | .. | 5453 | .. |

.. = not reported, n.a. = not applicable

Source: Graduation data: CNA annual surveys; RN examinee data: CNA, 1985 to 2001 and OIIQ in 2000 & 2001

Note. Because the reported statistics became increasingly unreliable from the mid-'80s, it was decided to substitute the number of first-time takers of the RN Licensing Examinations. These counts are 100 per cent accurate and completely up-to date. To read the numbers as a time series, follow the numbers in bold typeface.

Figure 1



Data are disaggregated to show the number of diploma (community college or hospital nursing school) graduates separately from basic B.Sc.N. graduates. To illustrate the degree of underreporting of numbers of graduates from 1985 onwards, the numbers of first-time Canadian-educated takers of the RN licensing examinations are shown alongside the number of graduates reported in the data series. Almost 100 per cent of nursing graduates take the licensing examinations as soon after graduating as possible. Thus, whenever the number of first-time takers of the RN examinations exceeds the reported number of graduates, the difference is a reliable measurement of the extent of underreporting. Of the 231,412 RNs working as nurses in Canada in the year 2001, only 7,153 or 3.1 per cent graduated before 1963, so the table showing the number of graduates each year since 1963 covers the time period during which 97 per cent of working nurses were educated.

In the 39 years from 1963 to 2001, over 313,000 students graduated in nursing from Canadian educational institutions (initial nursing programs only). The trends over time are not at all what one would expect. In 1964, at a time when Canada's population was 19.5 million, more than 7,000 new nurses were educated. All through the '60s, the numbers of new nursing graduates grew and by 1969 had reached 8,359. The decade of the '70s was one of unparalleled productivity as far as the output from nursing programs was concerned. In the '70s, the average number of nurses graduating each year exceeded 9,300. Output from nursing programs declined to an average of 7,700 each year in the first half of the '80s and rose to an average of 8,600 per year in the second half of that decade. From 1990-1994, an average of 8,500 nurses graduated each year. The nurses who completed their initial nursing education by 1994 had all commenced their educational programs in 1991, 1990 or earlier, the time period immediately preceding the

precipitous drops in health care funding that led to the crisis in the hospitals described in this report. Starting in 1996, the number of nursing graduates dropped sharply. Whereas in 1995, more than 8,000 nurses graduated, following yearly drops in output, the numbers of graduates had reached the alarmingly low level of 5,221 in 1999. Rock bottom was reached in the millennium year of 2000, in which only 4,599 new nurses emerged from Canadian educational institutions. Last year in 2001, there were 5,449 new nursing graduates. By 2001, Canada's population had reached 31 million and its age structure was very different from that of the 1960s. A much older population utilizes far more health care services per capita than a younger one and that includes nursing services (see Table 16).

For output from Canadian nursing programs to decrease by such a large amount, a number of things must have occurred. Admission levels must have taken a tumble in 1992 and the completion rate of students already enrolled must have tumbled also. Unfortunately, with the admission and enrolment statistics in the state previously described, it is impossible to completely disentangle the multiple causes leading to the drop in the number of nursing graduates. The data, such as they are, suggest the following.

- Substantial decline in the attraction of nursing as a future career followed by reduced levels of admission to nursing programs. For a number of years, many nursing programs could not fill their quota of seats for the study of nursing.
- Substantial dropout of students enrolled in nursing prior to completion of their studies. Available statistics suggests that in many jurisdictions, the completion rate for new enrollees was 60 per cent or less.

It is encouraging that there were 850 more graduates in 2001 than in 2000.

The projections for future outputs of nursing programs until 2011 and 2016 were made within this context.

Projections of the number of nursing graduates from 2002 to 2015

For various reasons, it is particularly difficult, at the present time, to project outputs from Canadian nursing programs for the coming years. Some of the statistical problems have been described above. When the work to make these projections commenced, it soon became obvious that the immediate past was not going to be a good guide to the future. It became necessary to return to each and every province to get information on what was in the pipeline and what plans were for the future. Because this was the case, a brief summary will be given for each province, of how the projections for that province were arrived at and an assessment of the reliability of the numbers used. Before proceeding to the province-by-province descriptions, there are a few general remarks.

- Whereas in 1997, when a similar set of output projections was made, applications to nursing programs everywhere seemed to be declining, today the situation is reversed. All the universities/colleges asked about this matter reported expanding applicant pools. With extremely few exceptions, institutions are reporting no difficulty in filling available slots.

- There are many new programs being announced and every effort has been made to take account of these new programs and the multiple entries in educational institutions. Although the uptake of these new programs is very high at the present time, we do not really have enough experience with them to know what their long-term success rate will be. A long-term success rate is defined as the proportion of new entrants to a program who successfully complete the nursing degree or diploma program.
- For some of the accelerated programs, multiple entry programs, etc., funding has been committed for a finite number of years. It is impossible to know whether funding will continue beyond the initial period for which funding was committed. Given the serious shortage of nurses, which is unlikely to be alleviated any time soon, it is presumed that the number of places available for studying nursing will not fall below the number of slots provided or planned (promised but not yet implemented) for the foreseeable future. In brief, over the entire projection period, i.e., up to 2015, the following projections assume that in no province or territory will the number of places for nursing be reduced.

With these considerations in mind, the projections for each province are described below.

Newfoundland and Labrador is a province that has completed the transition from diploma education to only university education for nurses. The last diplomas were awarded in 1998. In the years 1992 and 1993, approximately 300 students earned nursing qualifications. In 1993, 260 diplomas in nursing and 44 degrees in nursing were awarded by Newfoundland universities and colleges. Output of nursing programs decreased following the elimination of diploma programs. In 1999, only 40 nurses graduated, all from the generic program. Because the graduates of the new collaborative program had to spend an extra year before graduating, there was a “lost” year of graduates, those who would have qualified in 1999, had they been in a three-year diploma program. The new graduates from the collaborative program came on stream in 2000. In that year, there were only 163 nursing graduates, compared with approximately 300 in the early years of the '90s. It is difficult to ascertain how much of the decrease in output was due to the educational system changes and how much to a drop in interest in nursing as a career.

The projections for the future are based on total intake of 221 students at all sites for 2000 & 2001. It is further assumed that in 2002 intake will increase by 16 students and by a further 32 students in 2003 for a total of approximately 270 students and will remain at that level subsequently, as there is no basis for assuming further change. Based on those levels of admission to nursing and a graduation rate of just above 80 per cent, the number of graduates is projected to be 180 in 2002, 2003 & in 2004 and 192 in 2005. Given current knowledge, Newfoundland and Labrador graduates are projected to number 220 each year from 2006 to 2015. Note, this is well below the output of nursing programs in the early '90s.

Prince Edward Island The last diplomas in nursing awarded in P.E.I were in 1994. In 1995, there were no nursing graduates in P.E.I. as students required an extra year to complete a degree in nursing, which was now the sole route to RN qualification. In the four years from 1990 to 1993, the annual number of diploma graduates was 38, 45, 40 and 32 respectively. From 1996 to 2000, the annual number of degrees awarded in nursing was 17, 26, 17, 25 and 18 respectively. In P.E.I., also, a considerable drop in the annual number of nursing graduates accompanied the move to a degree only profession. During the years 1992 to 2000, annual intake into nursing programs varied considerably from a low of 23 in 1996 (the graduating class of the year 2000)

and a high of 45 in the last three years. Quotas for nursing are being increased to 59 in 2002, for an initial period of four years. Projections of the annual number of graduates in P.E.I. based on known admission data are 26 in 2002, 36 in each of the years 2003, 2004 and 2005 and 47 from 2006 onwards. This, of course, assumes funding for the increased quota up to 59 places annually will continue and that all places will be filled. At that level of output, the annual number of university graduates in nursing will be larger than the number of diploma graduates in the early '90s.

Nova Scotia. In N.S., the last nursing diplomas were awarded in 1995. By 1996, the only route to qualifying as a RN was via a university degree in nursing. Numbers graduating prior to the switch to an all-graduate nursing profession were as follows. In 1990, 285 nursing diplomas and 60 degrees in nursing were awarded by educational institutions in N.S., for a total of 345 nursing graduates. In 1991, there were 379 nursing graduates (307 diplomas, 72 degrees); and in 1992, there were 320 nursing graduates (262 diplomas, 58 degrees). In 1996, the first year in which no diplomas in nursing were awarded, there were only 85 nursing graduates. By 1999, this number had climbed to 137. As with the other Atlantic provinces, the switch to an all-graduate nursing profession entailed a significant decrease in output in the first few years following the switch over. However, there have been increases in the quota of places provided for nursing students, which will lead to future increases in the number of nurses educated in N.S. These numbers were used in making projections of future output. There are two universities providing nursing education in N.S., Dalhousie University and St. Francis Xavier University. Dalhousie offers nursing education in Halifax and Yarmouth. In 1999, the quota of places at Halifax increased from 110 to 135 and has remained at that level. Since 1996, there has been a quota of 20 places for the study of nursing at Yarmouth. Thus, Dalhousie now has a quota of 155 places. In recent years this quota has been filled. St. Francis Xavier University offers nursing education at two sites, Antigonish and the University College of Cape Breton in Sydney. In 1995/96, the quota of places at Antigonish increased from 40 to 75 and increased again in 1999/2000 to 100. Places were first offered at Sydney in 1999/2000, and the quota there has been and is 25 places. At the time of preparing this report, there were no plans to further increase quotas, so the total quota of places at all N.S. sites is 280. The quotas were 205 in 1996/97 to 1998/99 and 280 subsequently. Over the years the available quota has not always been filled, but the current demand for nursing education is high and the projections assume all quotas will be filled. The projections of output from nursing programs in N.S. are: 142 graduates in 2002, 207 in 2003, 200 in 2004, 219 in 2005 and approximately 219 from 2006 to 2015. Readers will note that in N.S. as well, with current quota levels and anticipated graduation levels, output from nursing programs will still be far below graduation levels in the first half of the '90s, before the switch to an all-graduate nursing profession.

New Brunswick In N.B., the phasing out of diploma programs was completed in 1997, the year in which the last group of nurses earned a nursing diploma in N.B. educational institutions. The total number of graduates in nursing prior to the elimination of the diploma programs exceeded 300 in every year from 1990 to 1997 inclusive. For example, in 1991, there were 353 nursing graduates (262 diplomas, 91 degrees); in 1994, there were 332 nursing graduates (254 diplomas, 78 degrees). In 1998, the first year in which only university graduates were eligible to take the RN licensing examinations in N.B., there were only 104 nursing graduates. The number of graduates increased to 169 in 1999, dropped down to 134 in the year 2000 and increased again to 172 in 2001. Projections of output for the coming years were made using data on quotas for the universities offering nursing education in N.B. Two universities provide nursing education: the

University of New Brunswick (UNB) and the Université de Moncton. UNB offers nursing education at four sites, Fredericton, which has long had a generic program, Bathurst, Moncton and St. John. The three latter sites have had degree programs in nursing since 1995/96. As of 2001/02, the available quota per year at UNB sites is 110 places at Fredericton (80 places for the four-year program and 30 places in an accelerated three-year program), 40 places at Moncton, 30 places at Bathurst and 40 places at St. John, for a total of 220 places. The Université de Moncton offers nursing education in French at three sites, Moncton, Bathurst and Edmunston. University level nursing education was first offered at Edmunston in 1994/95 and at Bathurst in 1995/96. The quotas at Université de Moncton from 1995/96 to 1998/99 inclusive were 70 places at Moncton, 35 places at Bathurst and 35 places at Edmunston, for a total of 140 places. In 1999/2000 these quotas were raised to 80 at Moncton, 42 at Bathurst and 42 at Edmunston, for a total of 164. These quotas currently are in effect, and although there is some talk of increasing quotas further in N.B., no firm decisions have been taken. Thus the projections of output used in this report are based on current enrolment levels and the quotas for the two universities mentioned. These projections are: 196 graduates in 2002, 209 graduates in 2003, 271 graduates in 2004, 277 graduates in 2005, 297 graduates in 2006 and 300 graduates per year thereafter. N.B. also experienced a significant decrease in output with the phasing out of diploma programs. If currently available quota levels are filled, by the year 2006, output will approach the levels they were at in earlier years.

Quebec Quebec still has both diploma and degree programs. In fact, at this point, there are still no university/college collaborative programs in operation. Because CNA statistical records are incomplete for many of the Quebec colleges, the projections in this section rely heavily on data provided by the Ordre des infirmières et infirmiers du Québec (OIIQ). As will be seen, inputs into and outputs from nursing programs have been subject to very large fluctuations in recent years. To understand these numbers, it will be useful to recall that in 1996/97, during the height of the disruptions caused by shrinking hospital budgets, Quebec nurses were offered an attractive early retirement package. Many took advantage of the offer and retired. It very rapidly became apparent that the services of the departed nurses were very badly needed. In the meantime, this had a very negative impact on numbers entering nursing programs and on those students already enrolled, many of whom, dropped out. With these facts in mind, data are presented on input into and output from nursing programs in Quebec in recent years. Statistics on the number of students enrolled in the first year of study for nursing programs in Quebec between 1990/91 and 2001/02 (including repeaters) show widely varying numbers. They are: 3,478 in 1990/91; 3,737 in 1991/92; 3,899 in 1992/93; 4,035 in 1993/94; 4,134 in 1994/95; 3,380 in 1995/96; 2,239 in 1996/97; 1,941 in 1997/98; 2,842 in 1998/99; 4,213 in 1999/2000; 5,076 in 2000/01 and 5,309 in 2001/02. With such variation in first year enrolment, it is not surprising that annual outputs will vary to a similar degree, with a suitable time lag. The figures include university and college programs, both of which are of three years duration. Given the level of first year enrolment in 1996/97 and 1997/98, it is expected that the number of nursing graduates would be very low in 1999 and 2000, only to start increasing again in 2001. As of 2002, the number of nursing graduates can be expected to rise sharply as the large intakes of the years 1999/2000, 2000/01 and 2001/02 graduate. From 1990 until 1998, Quebec produced more than 2,000 nursing graduates annually. For reasons previously described, this dropped sharply to approximately 1,482 in 1999 and approximately 1,120 in the year 2000. By 2001, Quebec produced just over 1,400 nursing graduates. Making projections of output in the future for Quebec is complicated by two factors. First, enrolment caps have been eliminated for nursing programs, so for the foreseeable future, student demand, not quotas, will determine entry levels to nursing programs.

Second, enrolment data by year of study demonstrate relatively high attrition rates compared with other provinces, and it has been assumed, when projecting output, that this will continue in the future. In the face of a good deal of uncertainty, the output of Quebec nursing programs is projected to be 2,200 in 2002, 2,800 in 2003, 3,100 in 2004 and approximately 3,000 per annum thereafter, assuming the applicant pool stays at the current high levels.

Ontario In 2001/02, Ontario introduced collaborative university/college programs in nursing on the way to phasing out diploma programs. From 2005, all candidates for the RN licensing examinations in Ontario will be required to have a university degree in nursing. The last entry into diploma programs in nursing in Ontario commenced study in the fall of 2001. Using MTCU data for college graduates and CNA data for university graduates, output in recent years in Ontario has been as follows.

| | | | |
|-------|----------------|-------------|-------------|
| 1992: | diploma 2,289; | degree 564; | total 2,853 |
| 1993: | diploma 2,227; | degree 551; | total 2,778 |
| 1994: | diploma 2,502; | degree 552; | total 3,054 |
| 1995: | diploma 2,286; | degree 579; | total 2,865 |
| 1996: | diploma 2,083; | degree 610; | total 2,693 |
| 1997: | diploma 1,894; | degree 626; | total 2,520 |
| 1998: | diploma 1,729; | degree 505; | total 2,234 |
| 1999: | diploma 1,480; | degree 525; | total 2,005 |
| 2000: | diploma 1,047; | degree 527; | total 1,574 |
| 2001: | diploma 1,541; | degree 497; | total 2,038 |

These data are shown to illustrate that the numbers of graduates decreased sharply in the latter half of '90s. Because no move had as yet been made to phase out diploma programs, the reason for these declines cannot possibly be changes in the educational requirements for nurses. In Ontario, the low point was reached in 2000, in which there were only 1,574 nursing graduates compared with more than 3,000 in 1994. A planning report for the introduction of collaborative programs in Ontario states, as an objective, the provision of 3,300 places in these programs to replace the diploma programs that are being phased out. Making projections of output for Ontario presents a certain number of problems. For one, it is too early to tell what the uptake will be of places in the new collaborative programs. Also, attempts were made to obtain data on the number of places available in Ontario programs for the years 2002 and beyond. Other than the goals outlined in the planning report for 3,300 places in collaborative programs, no more specific information was forthcoming. As well, in the year 2003, there will be 2 graduating cohorts from Ontario high schools as the last Ontario Academic Credit (OAC) class exits along with the new Grade 12 high school graduates. Whatever places are available should be easily filled from this double cohort of high school graduates, but what happens to the demand for nursing school places after 2003, remains to be seen.

Although we do not have precise information on the quotas for the years 2002 and subsequently, we do know how many places were filled in 2001/02. The numbers of places filled in 2001/02 were 1,412 students entered the last diploma programs; 1,258 students entered the new collaborative programs and 922 students entered in generic degree programs. All together, 3,592 were admitted into a nursing program in 2001/02.

Using current enrolment data and taking an optimistic view that 3,300 places will be provided and filled in collaborative programs by the year 2003, outputs of Ontario nursing programs are projected to be 2,394 in 2002; 2,394 in 2003; 1,675 in 2004; and 1,744 in 2005. Assuming combined generic and collaborative degree intakes of 3,520 in 2002/03, 4,000 in 2003/04 and 4,250 in 2004/05, output could reach between 2,500 and 2,800 in 2006, between 2,800 and 3,200 in 2007 and between 2,975 and 3,400 in 2008. A steady output of 3,200 is assumed after 2008.

Manitoba The diploma program was phased out between 1995 and 1997 in Manitoba, as the last diploma students commenced study in 1995 and graduated in 1997. The output of Manitoba nursing programs before and after the elimination of the diploma program was as follows.

| | | | | | | |
|-------|---------|------|--------|------|-------|-----|
| 1991: | diploma | 473; | degree | 60; | total | 533 |
| 1992: | diploma | 449; | degree | 69; | total | 518 |
| 1993: | diploma | 421; | degree | 67; | total | 488 |
| 1994: | diploma | 359; | degree | 74; | total | 433 |
| 1995: | diploma | 270; | degree | 82; | total | 352 |
| 1996: | diploma | 121; | degree | 99; | total | 200 |
| 1997: | diploma | 76; | degree | 111; | total | 187 |
| 1998: | diploma | --- | degree | 101; | total | 101 |
| 1999: | diploma | --- | degree | 119; | total | 119 |
| 2000: | diploma | --- | degree | 146; | total | 146 |
| 2001: | diploma | --- | degree | 155; | total | 155 |

These data show how, in the immediate years surrounding elimination of the diploma programs, output decreased sharply, from annual outputs of more than 500 nurses at the beginning of the '90s to just over 100 in the year immediately following the phase out in 1998. The educational reforms of the last few years have considerably altered the earlier pattern of nursing education provision. The current situation will be briefly described, because it is on the basis of the current organization that the projections of future output were made. Nursing education is delivered on a number of sites in Manitoba. The University of Manitoba provides the generic nursing degree on its Fort Garry, Winnipeg campus and at its Brandon site also. It also offers a BN degree on-site at Norway House, and in conjunction with Keewatin Community College, it offers a joint BN program in Thompson and The Pas. Students at Red River College (RRC) can take a joint BN degree with the University of Manitoba and RRC. The University of Manitoba's Faculty of Nursing is responsible for the single province-wide degree program in nursing. In 1999/2000, a diploma program was reintroduced at RRC and has an annual quota of 90 places. Graduates from this program will come on stream in 2002. In 2001, a diploma program in French was inaugurated at Collège St. Boniface with 25 places per annum, of which 21 were filled. Graduates from this program will start coming on stream in 2004. Given that province-wide admission to degree programs was 187 in 1998 (class of 2002), 247 in 1999 (class of 2003), 488 in 2000 (class of 2004) and 499 in the year 2001 (class of 2005), output has been projected to be:

| | | | | | | |
|-------|---------|-----|--------|------|-------|-----|
| 2002: | diploma | 72; | degree | 165; | total | 237 |
| 2003: | diploma | 72; | degree | 200; | total | 272 |
| 2004: | diploma | 89; | degree | 390; | total | 479 |
| 2005: | diploma | 89; | degree | 400; | total | 489 |
| 2006: | diploma | 89; | degree | 400; | total | 489 |
| etc. | | | | | | |

Thus, 10 years after the diploma nursing program began to be phased out in 1995, (to be subsequently reintroduced on a much smaller scale in 1999), in the year 2004, nursing output levels in Manitoba will begin to approach the levels of the early 1990s.

Saskatchewan The diploma program was phased out between 1995 and 1999. No students were admitted to the diploma program after 1995. According to CNA data, the last diplomas were awarded in 1999. To get an idea of the changes in output that occurred with the phasing out of diploma programs, graduation data are provided from 1991 to the year 2001.

| | | | |
|-------|--------------|-------------|-----------|
| 1991: | diploma 303; | degree 61; | total 364 |
| 1992: | diploma 304; | degree 67; | total 371 |
| 1993: | diploma 292; | degree 68; | total 360 |
| 1995: | diploma 198; | degree 59; | total 257 |
| 1996: | diploma 89; | degree 75; | total 164 |
| 1997: | diploma 67; | degree 63; | total 130 |
| 1998: | diploma 50; | degree 55; | total 105 |
| 1999: | diploma 14; | degree 133; | total 147 |
| 2000: | diploma --; | degree 138; | total 138 |
| 2001: | diploma --; | degree 147; | total 147 |

In Saskatchewan, as with all the other provinces, the period of the switch over to degree programs entailed very substantial drops in annual output. Projections of future output are based on the most recently available data on quotas for entry to nursing programs and enrolment, as well as information on current arrangements for providing nursing education. At present, the only type of educational program for becoming a nurse in Saskatchewan is a collaborative degree program. The generic degree program (all courses, etc. provided exclusively by the degree awarding university) no longer exists. All future nurses enrol in “The Nursing Education Program (NEPS),” which is a collaborative program of the University of Saskatchewan and the Saskatchewan Institute of Applied Science and Technology (SIAST). The program is a four-year degree program leading to a B.S.N. from the University of Saskatchewan. SIAST offers the first and second years of study at sites in Saskatoon and Regina; the University of Saskatchewan offers years three and four in both cities also. From 1996/97 to 1999/98 inclusive, there were 180 places available per annum in NEPS. For the academic year 2000/01, the quota was increased to 260 places per annum, and that is the annual quota for the time being. Output projections were based on the quotas in each year and known enrolment numbers. Within the annual quotas are provisions for fast-tracking or completing degree requirements in less than the standard four years. Some students may graduate a little earlier than projected, but this will not affect the long-term number of graduates that emerge from the educational programs, only the precise date of their graduation. The output is projected to be 145 in 2002, 145 in 2003 and 210 from 2004 onwards. Current quota levels at 260 places per year are far below the output of the first half of the '90s, and that is before attrition from commencement of study to graduation. For the foreseeable future, Saskatchewan will not be educating as many nurses as it did in the early '90s.

Alberta The goal of the Alberta Association of Registered Nurses (AARN) was to complete the transition to university graduation in nursing as the sole route to qualification as an RN by the year 2004. To that end, collaborative programs started in earnest around 1996, although some collaborative programs started operating several years earlier. A feature of collaborative programs in Alberta is an option to exit with a diploma or continue on and exit with a degree.

Originally, it had been expected that by the year 2004, the diploma exit would no longer be available to future RNs. At the present time, the proportion of new graduates exiting with a diploma is far lower than it used to be, but the diploma is still a feature of nursing education in Alberta. Before proceeding to projections for the coming years, a summary of graduation data over the time period when collaborative programs were being phased in is given below.

1990: diploma 742; degree 130; total 872
 1991: diploma 800; degree 119; total 919
 1992: diploma 743; degree 149; total 892
 1993: diploma 541; degree 160; total 701
 1994: diploma 383; degree 160; total 543
 1995: diploma 413; degree 287; total 700
 1996: diploma 274; degree 370; total 644
 1997: diploma 73; degree 580; total 653
 1998: diploma 70; degree 507; total 578
 1999: diploma 71; degree 447; total 518
 2000: diploma 88; degree 459; total 547
 2001: diploma 133; degree 467; total 600

Note: The graduation figures for Alberta come from CNA data. In a couple of years, new registrant data were substituted where the regular statistical series data were clearly erroneous.

As can be seen from the data, the output from Alberta nursing programs in 2001 was approximately two thirds of the output in 1991, 10 years earlier. The projections of future output are based on numbers from Alberta Learning on quotas for RN places in nursing programs from 1999/2000 to 2004/05. Alberta has introduced, or is in the process of introducing, several new programs leading to RN qualification. These include accelerated programs of 2-years duration for individuals who already have some university education, new diploma exit programs, etc. The manner in which Alberta Learning present the data makes it impossible to figure out in which year students will graduate, as program intakes of different durations are all added together. Nevertheless, the numbers do give an up to date count of places to be provided. The numbers, as presented by Alberta Learning, are as follows:

RN Admission, Enrolment & Graduation, Alberta, 1999/2000 to 2000/2001

| Academic year | 1999/00 | 2000/01 | 2001/02 | 2002/03 | 2003/04 | 2004/05 |
|--------------------------------|---------|------------------|-------------------|-------------------|-------------------|-------------------|
| 1 st year quota | 792 | 975 | 1105 | 1105 | 1105 | 1105 |
| 1 st year enrolment | 849 | 1078 | 1208 ¹ | 1208 ¹ | 1208 ¹ | 1208 ¹ |
| Graduates | 530 | 499 ¹ | 665 ¹ | 745 ¹ | 992 ¹ | 1077 ¹ |

Source: Alberta Learning, April 2001

Note: Quotas exclude the University of Lethbridge, which does not have limited enrolment. Includes new nursing proposals funded through the new Access Fund commencing in 1999/2000, 2000/01 and 2001/02

¹Estimated

Based on the intakes proposed by Alberta Learning, and assuming that all places provided will be filled, projected output is estimated to be: 610 in 2002, 630 in 2003, 780 in 2004 and 885 per annum thereafter. Note, these projections differ from those made by Alberta Learning. Also, the number of graduates for the years 2000 and 2001 are already known (see Table 15). It may well be that some students may take less time to graduate than assumed in these more recent projections, because some are, or will be, enrolled in accelerated programs, but the data were not provided for this factor to be taken into consideration when making the projections. Another fact to note is that the projections made for this report allow for a higher attrition rate than do those of Alberta Learning. Alberta Learning assumes a steady state output of 1,077 per annum, whereas these projections allow for a steady state output of 885 per annum. If these output levels are achieved, within a few years, Albertan educational institutions will graduate almost as many nurses in the year 2005 and after as in the early part of the decade of the '90s.

British Columbia Nursing education in B.C. is quite similar to that in Alberta. Though students are enrolled either in a four-year generic or collaborative degree program, there is an option to exit after three years with a diploma. As in the rest of Canada, during the mid '90s, nursing enrolment declined and, subsequently, output fell. B.C. was the only province for which it was possible to obtain data showing both the number of funded positions in nursing programs and the number of filled positions. This enables an examination of the extent to which enrolment decline was due to student lack of interest in nursing programs during a certain number of years. Because these data have intrinsic interest and relevance to our understanding of the trend data presented for all the other provinces, they are briefly summarised here.

The data refer to total enrolment in all years of study in collaborative degree programs in B.C. (i.e. they exclude generic nursing enrolments). The data illustrate the extent to which provision of places for studying nursing decreased and how difficult it was to fill even the reduced number of places made available at a time when nursing was not perceived as an attractive career option. The extraordinary turn around suggested by the statistics for 2000/01 – a 17 per cent over subscription of funded places, compared with a 10 per cent under subscription just a year earlier – shows how high the current demand for nursing education is.

| Year | Funded Positions | Enrolled Students | Enrolled % Funded |
|---------|------------------|-------------------|-------------------|
| 1985/86 | 1261 | 1274 | 101% |
| 1990/91 | 1823 | 1720 | 94% |
| 1994/95 | 1985 | 1906 | 96% |
| 1995/96 | 2005 | 1851 | 92% |
| 1996/97 | 1926 | 1776 | 92% |
| 1997/98 | 1932 | 1719 | 89% |
| 1998/99 | 1924 | 1733 | 90% |
| 1999/00 | 2026 | 1833 | 90% |
| 2000/01 | 2216 | 2598 | 117% |
| 2001/02 | 2598 | .. | .. |
| 2002/03 | 2989 | .. | .. |

.. data not yet available

Before turning to projections of output for the next few years, data are provided on graduation levels since 1994. Because of major inconsistencies in the regular data series, figures used are new registrations as reported by the Registered Nurse Association of British Columbia (RNABC).

1994: diploma 612; degree 89; total 701
 1995: diploma 483; degree 101; total 584
 1996: diploma 522; degree 181; total 703
 1997: diploma 369; degree 301; total 670
 1998: diploma 362; degree 297; total 659
 1999: diploma 262; degree 305; total 567
 2000: diploma 262; degree 353; total 615
 2001: diploma 262; degree 312; total 574

In the last few years, B.C. has been expanding the provision of nursing places as fast as clinical placements, sufficient teaching staff, etc., can be found to implement the expansion. It is estimated that in 1995 there were approximately 880 new entry positions for all types of nursing programs, generic and collaborative. In the year 2002/03, there will be 977 new entry slots in collaborative programs, 120 in generic degree programs and an estimated 50 or so at Trinity Western University, a private university. This means a total of 1,147 new slots. Provision is expected to equal or exceed that level in subsequent years. Given the high demand for nursing education, the projections assume that all places will be taken up and that the success rate will be approximately 70 per cent. This is based on past success rates, but the current high interest in nursing as a career may lead to an improved success rate in the future. It was not possible to make projections that distinguish degree versus diploma graduates. The projections are as follows: number of nursing graduates in 2002: 640, 2003: 693, 2004: 735, 2005: 770 and 2006: 800. It is expected that graduation will continue at that level or higher in the years after 2006. At the beginning of the '90s, B.C. was graduating more than 800 nurses a year, so current levels of entry into nursing will finally bring the graduation level in 2006 back to the levels achieved in the early '90s.

National projections of numbers of nursing graduates from 2002 onwards

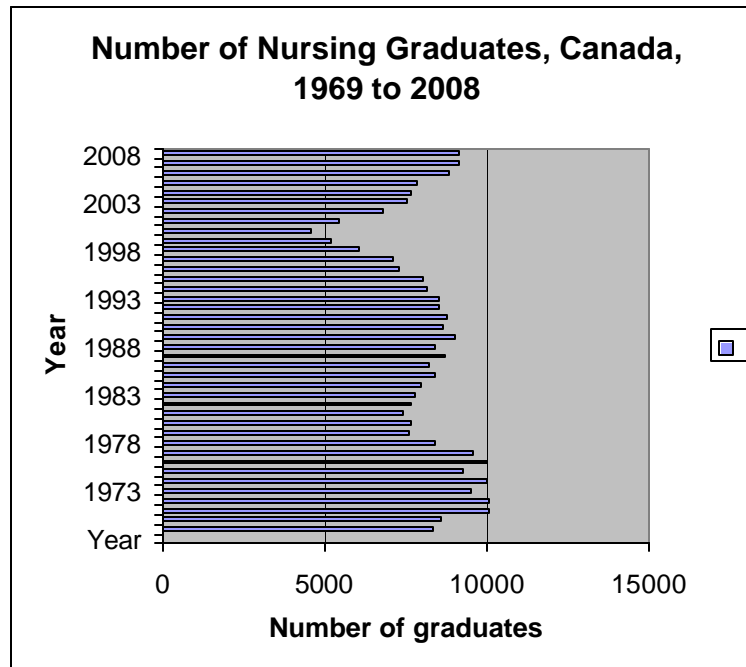
Compiling the projections made for the individual provinces produces a projection of the expected number of graduates in the coming years. In order to show some continuity, the actual data for the most recent complete three years are also shown. The compilation is given in Table 15.

Table 15
Number of Nursing Graduates by Province, 1999 to 2008
(1999 to 2001, Actual Data; 2002 to 2008, Projections)

| | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|------------------|------|------|------|------|------|------|------|------|------|------|
| Nfld & Lab. | 40 | 163 | 162 | 180 | 180 | 180 | 192 | 220 | 220 | 220 |
| P.E.I. | 25 | 18 | 31 | 26 | 36 | 36 | 36 | 47 | 47 | 47 |
| Nova Scotia | 137 | 138 | 148 | 142 | 207 | 200 | 219 | 219 | 219 | 219 |
| New Brunswick | 169 | 134 | 172 | 196 | 209 | 271 | 277 | 297 | 300 | 300 |
| Quebec | 1482 | 1120 | 1407 | 2200 | 2800 | 3100 | 3000 | 3000 | 3000 | 3000 |
| Ontario | 2005 | 1574 | 2038 | 2394 | 2394 | 1675 | 1744 | 2650 | 3000 | 3200 |
| Manitoba | 119 | 146 | 155 | 237 | 272 | 479 | 489 | 489 | 489 | 489 |
| Saskatchewan | 147 | 138 | 147 | 145 | 145 | 210 | 210 | 210 | 210 | 210 |
| Alberta | 518 | 547 | 600 | 610 | 630 | 780 | 885 | 885 | 885 | 885 |
| British Columbia | 567 | 615 | 574 | 640 | 693 | 735 | 770 | 800 | 800 | 800 |
| Territories | 12 | 6 | 15 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| Canada | 5221 | 4599 | 5449 | 6782 | 7578 | 7678 | 7834 | 8829 | 9182 | 9382 |

Source: Projections by E. Ryten

Figure 2



To close this section a graph showing the number of graduates from 1969 to the year 2008 is given. This graph gives a pictorial overview of the extraordinary decline in output over the last few years, followed by the projected increase in output in the next few years.

The projections of output show a very rapid increase in the next few years. Already, this year (2002), there should be an increase from 5,449 to nearly 6,800. Indeed, the actual number of graduates in 2002, when it is known, will be the first test of the soundness of the projections. If the projections are on track, by 2003, the number of graduates will have increased to approximately 7,600. By the year 2007, five years from now, the annual number of graduates should exceed 9,000. By then, new programs not currently known, may have driven the output even higher. All this depends on whether the current surge of new programs continues and whether the high demand for nursing education continues into the future. If these projections turn out to be reasonably accurate, by the year 2007, output will have doubled from the low point seen in 2000. In the estimations of supply for 2011 and 2016, annual output is estimated at 9,400 in each year after 2007.

Chapter 4

Projections of Demand for RNs in the Years 2011 and 2016

The statistics in the first section of this report dealing with trends in the employment of nurses show that the rate at which RNs are employed goes through periods of rapid growth, slow growth, no growth and negative growth. In light of unforeseeable ups and downs that certainly are not under the control of the nursing profession (i.e., sudden changes in hospital budgets), how can informed judgements be made about the future?

In what follows, a distinction is made between those events influencing the demand for nursing services that cannot be predicted in advance and those events that can be foreseen with some degree of confidence. Projected future demand clearly cannot take into account events transpiring totally out of the blue. They can allow for what is obviously on the horizon. In this analysis, possible future short-term changes to the funding of health care in Canada, as occurred in the early years of the '90s are not assessed. Such events could occur, but because the demand projections are not exercises in fortune telling or predicting the future, these events cannot form part of the future scenarios. The projections are the working out of "what if?" scenarios and extrapolating them into the future. What if birth rates decrease by x amount? What if immigration is 150,000 per year? What if death rates decrease by y per cent? The number of "what if?" variables that could be used is enormous, but the most important ones are related to the age/gender utilization rates of nursing services. However, one variable that could make a significant difference is assumptions made about the RNs' scope of practice. In the following projections, it is assumed that RNs will continue to be responsible for functions across the whole spectrum of activities for which they currently take responsibility. Issues related to substitution will be briefly discussed in a later chapter, but a full examination of substitution and scope of practice is well beyond the scope of this study.

Underlying Assumptions

Two sets of projections have been made for this report. The first set relates to the estimated demand for RNs in the year 2011 and the second estimates the demand for RNs in the year 2016. These dates were chosen so as to be not so far in the distant future that all estimates would be entirely speculative. For the year 2011, an updated projection of demand enables us to revisit the projections for 2011 made five years ago.

The projections are not based on straightforward extrapolation of the past growth in nursing employment into the future. Given the history of the last decade, that would make no sense at all. It has already been seen that the slow-downs and decreases in nursing employment were not due to a shift in demand for nursing services but rather a response to the sudden withdrawal of funding that bore no relationship to the demand for nursing services. Instead, demand is independently estimated from supply and is presumed to be derived from social and economic forces that generate the need for RN services.

Population change is an example of a social force containing its own dynamics that may lead to either increases or decreases in the need for RN services. Changes in funding of health care cannot alter the relationship between population age and demand for health services. Calculations of changes in demand for nursing services will be based on changes in the overall level of population, but even more importantly, on changes in the age/gender composition of the population. There are very large differences in the utilization of health care services, including nursing services, by people in different age/gender categories. It is these utilization rate differences that are used to estimate changes in the demand for nursing services.

There is no dispute about the fact that different demographic segments of the population utilize the health care system at different rates. The difficulty is to find reasonably accurate and reliable measurements of these differentials so as to be able to use them in projections. It makes an enormous difference to the calculations if people aged 65+ utilize twice as many services as 10-14 year olds or if they utilize 10 times as many. The actual differentials need to be ascertained.

In the 1997 report, a way of quantifying the relationship between the age and gender distribution of the population and utilization of nursing services was developed. The projections in this report use the same methodology for projecting demand in the revised 2011 and the 2016 projections. Because there is no national database that quantifies the consumption of nursing services by different segments of the population, a data set covering consumption of services in hospitals was used as a proxy measure. The utilization of nurses in hospitals is a function of the number of inpatients and outpatients using hospital services and the intensity and type of services utilized. As the number of patient days consumed increases or decreases, so too does the need for nursing services. Statistics on the number of days of hospitalisation by age and gender capture the differential consumption of health care services, including nursing services, by various demographic groups. By calculating the differential utilization rates of people at different stages of life, there is a basis for calculating changes in the amount of services required by populations at different points in time and with different age/gender compositions.

The underlying assumption is that average utilization of services at any given age remains constant. For projections covering a relatively short time span, this is not an unreasonable assumption. The other underlying assumption in these projections is that the same age/gender differentials in average consumption of nursing care exist in arenas of health care delivery outside the hospital as in hospitals. Other than a relatively small group of nurses whose principal function is education (5-6,000 out of 232,000), there is no reason to suspect that the age/gender differential rates of utilization observed in hospitals are not also reasonably representative of care delivered on sites other than hospitals.

Table 16
Derivation of Future Demand for Nursing Services in Canada
(Rate of Increase Required to Meet Population Change by 2011 and by 2016)

| Age | Gender | 1993 | | | Population 2011 ('000s) | Population 2016 ('000s) | Nursing Services in 2011 | Nursing Services in 2016 |
|--|--------|--------------|------------------|--------------------------|-------------------------|-------------------------|--------------------------|--------------------------|
| | | Pop. ('000s) | Rate of Utiliz.* | Nursing Services ('000s) | | | | |
| < 5 yrs. | M | 1032.4 | 56.3 | 581.7 | 855.1 | 877.0 | 481.4 | 493.8 |
| | F | 981.5 | 41.0 | 396.5 | 811.3 | 831.7 | 332.6 | 341.0 |
| 5-14 yrs. | M | 2014.2 | 17.2 | 344.0 | 1837.7 | 1813.4 | 316.1 | 311.9 |
| | F | 1921.9 | 15.5 | 296.4 | 1741.8 | 1718.5 | 270.0 | 266.4 |
| 15-19 yrs. | M | 992.3 | 28.9 | 287.9 | 1117.8 | 1001.3 | 323.0 | 289.4 |
| | F | 946.3 | 41.7 | 395.9 | 1057.2 | 944.2 | 440.9 | 393.7 |
| 20-24 yrs. | M | 1048.7 | 31.6 | 333.1 | 1143.6 | 1154.2 | 361.4 | 364.7 |
| | F | 1017.7 | 60.4 | 619.1 | 1097.8 | 1107.1 | 663.1 | 668.7 |
| 25-34 yrs. | M | 2525.0 | 36.8 | 938.8 | 2311.6 | 2383.3 | 850.7 | 877.1 |
| | F | 2465.4 | 81.0 | 2014.3 | 2244.8 | 2313.1 | 1818.3 | 1873.6 |
| 35-44 yrs. | M | 2334.8 | 47.6 | 1125.2 | 2343.3 | 2369.7 | 1115.4 | 1128.0 |
| | F | 2327.4 | 65.4 | 1536.5 | 2305.2 | 2321.5 | 1507.6 | 1518.3 |
| 45-64 yrs. | M | 2892.0 | 123.2 | 3597.9 | 4797.1 | 4924.8 | 5910.0 | 6067.4 |
| | F | 2905.4 | 117.6 | 3447.0 | 4851.5 | 4957.8 | 5705.4 | 5830.4 |
| 65-74 yrs. | M | 911.5 | 421.8 | 3871.1 | 1239.5 | 1561.5 | 5228.2 | 6586.4 |
| | F | 1104.2 | 350.9 | 3890.3 | 1368.9 | 1711.6 | 4803.5 | 6006.0 |
| 75+ yrs. | M | 514.7 | 1048.5 | 5428.2 | 865.8 | 959.6 | 9077.9 | 10061.4 |
| | F | 862.8 | 1116.3 | 9682.5 | 1371.7 | 1469.5 | 15312.3 | 16404.0 |
| Total | M | 14265.6 | | 16507.9 | 16511.5 | 17044.8 | 23664.2 | 26180.0 |
| | F | 14532.6 | | 22278.5 | 16850.2 | 17375.0 | 30853.5 | 33302.0 |
| | T | 28798.2 | | 38786.4 | 33361.7 | 34419.8 | 54517.7 | 59482.0 |
| Year 2011 compared with 1993: population = +15.8%; nursing service requirements= +40.6% Year 2016 compared with 1993: population = +19.5%; nursing service requirements= +53.4% | | | | | | | | |

Sources: All data for 1993: Ryten, 1997. Population projections for 2011 & 2016:
 "CANSIM, Matrix 6900," Statistics Canada, 2000.

Note: Figures represent the medium-growth projection and are based on 2000 population estimates. Data posted on web site April 2002. Projections of future nursing service requirements: E. Ryten.

* Rates of nursing service utilization are based on hospital days per 100,000 population. For further details, see text.

Derivation of Future Demand in 2011 and 2016

The base data come from 1993 and are given in Table 16. The data used to measure utilization by age and by gender are the number of hospital days consumed per 100,000 population for nine age groups. The rates are given for males and females separately within each age group. Readers can observe the large difference in utilization by age and by gender. By glancing at the figures for utilization by age and gender one can immediately appreciate why an ageing population results in an increase in the demand for health care far in excess of overall population growth.

The calculations of demand for 2011 and 2016 take the expected populations in those years, disaggregated by age and gender, and calculates the consumption of nursing services, assuming the same consumption by age and gender as prevailed in 1993. The calculations are not meant to be a quantification of an absolute amount of service, but rather an attempt to ascertain a per cent change in the amount of nursing service required between two time periods. The number of nurses required at the target dates is calculated by assuming that if the demand for services increases by a given percentage, the delivery of those services will entail a corresponding per cent increase in the number of nurses.

On the basis of the calculations in Table 16, population is expected to increase by 15.8 per cent between 1993 and the year 2011, but the demand for nursing services is expected to increase by 40.6 per cent by 2011. The difference between 15.8 per cent and 40.6 per cent is entirely due to ageing of the population.

For the year 2106, the growth of population between 1993 and 2016 is expected to be 19.5 per cent, but the growth in demand for nursing services is expected to be 53.4 per cent, again population ageing accounts for most of the increased demand for services.

The population projections used in Table 16 are of very recent vintage, and it is of some interest for us to compare the demand projections made in 1997, based on population projections current at that time. In fact, Statistics Canada's newer population projections estimate the population in the year 2011 at over **2 million fewer people** than was expected merely five years ago. Naturally, the new estimates of nurses required in 2011 are lower than the numbers reported in 1997. Table 17 provides the two population projections for the year 2011 made in 1997 and 2001. The demand calculations based on the two different population projections are also shown.

The earlier population projection estimated the population in 2011 to increase by 23 per cent compared with the population in 1993, whereas the more recent projections suggest that growth between 1993 and 2011 will be only 16 per cent. Calculations of future nursing requirements in 2011 are now estimated to be an increase of 40.6 per cent on the base number of working nurses in 1993. In 1997, the future requirements for 2011 were estimated to be a 46 per cent increase over the number in the base year 1993. Readers may seem puzzled that the more recent calculations do not diminish in the same proportion as the change in the population projections. Again the reason for this is found in the demographic composition of the two sets of population projections. The expected reduced population numbers are among the youngest, low health care consuming age groups. Especially large reductions were made to the projected number of people aged up to 14 years. However, very little modification was made to the projections of people aged 65+. Coupled with this is the fact that the oldest age groups consume very large quantities of health care when compared with the youngest.

There were 235,630 RNs working as nurses in 1993. The previous projection of requirements for working RNs in 2011 was 235,630 times 1.46 = 344,000 (rounded to the nearest thousand). The more recent projection of requirements is 235,630 times 1.406 = 331,000 (rounded to the nearest thousand).

This comparison of projections for 2011 made at two different time points illustrates a very important point: projections periodically need to be revisited. When projections are carefully made, every attempt is made to utilize accurate values for the variables determining the projection outcome. For example, no one knows exactly what the birth rate is going to be in the future or the exact number of immigrants who will be admitted to Canada. The further away the projection target date, the more likely they are to contain significant errors. For this reason, a study such as this, which reviews the data every few years, makes a lot of sense.

The next section of this report examines the supply of nurses in the future. In order to assess the adequacy of supply in the face of the calculations of requirements made for the years 2011 and 2016, projections of supply of RNs at those dates will be made.

Table 17
Comparison of Demand Projections for Year 2011 Made in 1997 and in 2002

| Age & Gender | | Population Projections for 2011: | |
|--------------|---|----------------------------------|--------------|
| | | Made in 1997 | Made in 2001 |
| < 5 yrs | M | 1017.0 | 855.1 |
| | F | 963.1 | 811.3 |
| 5-14 | M | 2118.7 | 1837.7 |
| | F | 2002.8 | 1741.8 |
| 15-19 | M | 1161.6 | 1117.8 |
| | F | 1097.6 | 1057.2 |
| 20-24 | M | 1192.2 | 1143.6 |
| | F | 1140.1 | 1097.8 |
| 25-34 | M | 2441.1 | 2311.6 |
| | F | 2367.8 | 2244.8 |
| 35-44 | M | 2511.6 | 2343.3 |
| | F | 2475.8 | 2305.2 |
| 45-64 | M | 4943.3 | 4797.1 |
| | F | 5006.4 | 4851.5 |
| 65-74 | M | 1274.4 | 1239.5 |
| | F | 1412.5 | 1368.9 |
| 75+ | M | 881.8 | 865.8 |
| | F | 1412.4 | 1371.7 |
| Total | M | 17541.7 | 16511.5 |
| | F | 17878.5 | 16850.2 |
| | T | 35420.2 | 33361.7 |

Projections made in 1997: population = +23%; service requirements = +46%
Projections made in 2001: population = +16%; service requirements = +41%

Source: Ryten, 1997 and Table 16

Chapter 5

The Supply of Nurses in 2011 and 2016

In order to ascertain whether Canada will have enough nurses to meet the need for nursing services in the years 2011 and 2016, it is necessary to estimate how many nurses will be available in Canada in those years. This section of the report provides the projections of RN supply at those dates. A brief description is given of the methodology used and then the data obtained from applying the methodology are presented.

The projections take the situation (numbers of RNs by age) in the year 2001 as the starting point for making projections at the target dates. Projections are made for the total number of RNs who will be registered in the years 2011 and 2016, as well as the subset of all RNs who will be working as nurses. The projections calculate two sources of RNs at the target dates, those already registered in the year 2001 who will still be registered in the years 2011 and 2016 and those RNs added to the pool of RNs between 2001 and 2011 and 2016.

The projections are made in three stages.

- Estimates are made of the number of RNs registered and working as nurses who will be registered and working as RNs in 2011 and in 2016. These numbers are referred to as the number of RNs retained from the 2001 complement.
- The second stage involves making estimates of new additions to the pool of RNs retained from the 2001 complement.
- The third stage adds together the retained and the newly added RNs to obtain totals at the target date. At all stages, projections are made by age of the RNs in 2011 or 2016 so it is possible to have estimates of the age structure of the stock of RNs at the target date.

Each of these stages involves various steps that will be described as the data are presented.

Note: Figures used in tables may not compare due to rounding off numbers.

Calculating Retention of Current RNs to the Years 2011 and 2016

To calculate the number of RNs who will still be registered and the number who will be working as RNs at the target dates, estimates were made of the proportion of RNs at each age level who will still be registered in 2011 and in 2016. Taking the age in 2001, the age in 2011 was set at 10 years older and 15 years older in the case of target date 2016. To the numbers at each age in 2011 or 2016, a retention rate was applied to arrive at the number of RNs still expected to be registered in 2011 or 2016 by age.

Table 18 presents estimates for 2011 while Table 19 presents them for the year 2016.

Table 18
Calculation of Number of RNs in 2001 Who Will still be Registered
and Employed as Nurses in 2011

| Age of RNs in Years | | # of RNs in 2001 | Retention Rate to 2011 | # RNs Retained to 2011 | % Employed in Nursing | # of 2001 RNs Employed in Nursing in 2011 |
|---------------------|--------------|------------------|------------------------|------------------------|-----------------------|---|
| In 2001 | In 2011 | | | | | |
| 20 | 30 | 2 | 97% | 2 | 93% | 2 |
| 21 | 31 | 148 | 97% | 144 | 93% | 134 |
| 22 | 32 | 550 | 97% | 534 | 93% | 496 |
| 23 | 33 | 1347 | 97% | 1307 | 93% | 1215 |
| 24 | 34 | 2306 | 97% | 2237 | 93% | 2080 |
| 25 | 35 | 2978 | 97% | 2889 | 93% | 2686 |
| 26 | 36 | 3534 | 97% | 3428 | 93% | 3188 |
| 27 | 37 | 3910 | 97% | 3793 | 93% | 3527 |
| 28 | 38 | 4179 | 97% | 4054 | 93% | 3770 |
| 29 | 39 | 4387 | 97% | 4255 | 93% | 3958 |
| 30 | 40 | 4771 | 97% | 4628 | 93% | 4304 |
| 31 | 41 | 5039 | 97% | 4888 | 93% | 4546 |
| 32 | 42 | 5376 | 97% | 5215 | 93% | 4850 |
| 33 | 43 | 5644 | 97% | 5475 | 93% | 5091 |
| 34 | 44 | 5936 | 97% | 5758 | 93% | 5355 |
| 35 | 45 | 6410 | 97% | 6218 | 93% | 5782 |
| 36 | 46 | 6889 | 97% | 6682 | 93% | 6215 |
| 37 | 47 | 7723 | 97% | 7491 | 93% | 6967 |
| 38 | 48 | 7724 | 97% | 7492 | 93% | 6968 |
| 39 | 49 | 7583 | 97% | 7356 | 93% | 6841 |
| 40 | 50 | 7538 | 97% | 7312 | 93% | 6800 |
| 41 | 51 | 7693 | 97% | 7462 | 93% | 6940 |
| 42 | 52 | 7612 | 97% | 7384 | 93% | 6867 |
| 43 | 53 | 8009 | 97% | 7769 | 93% | 7225 |
| 44 | 54 | 8634 | 97% | 8375 | 93% | 7789 |
| 45 | 55 | 8825 | 97% | 8560 | 90% | 7704 |
| 46 | 56 | 9217 | 94% | 8664 | 88% | 7624 |
| 47 | 57 | 9540 | 93% | 8872 | 87% | 7719 |
| 48 | 58 | 9464 | 93% | 8802 | 86% | 7570 |
| 49 | 59 | 9505 | 90% | 8555 | 86% | 7357 |
| 50 | 60 | 8880 | 85% | 7548 | 85% | 6416 |
| 51 | 61 | 8470 | 80% | 6776 | 81% | 5489 |
| 52 | 62 | 8028 | 75% | 6021 | 79% | 4757 |
| 53 | 63 | 7629 | 70% | 5340 | 78% | 4165 |
| 54 | 64 | 7674 | 60% | 4604 | 74% | 3407 |
| 55 | 65 | 6645 | 40% | 2658 | 72% | 1914 |
| 56+ | 65+ | 33068 | 10% | 3307 | 15% | 496 |
| | n.r. | 46 | | 35 | | 32 |
| | Total | 252913 | | 201890 | | 178244 |

Source: Year 2011 data: Calculations by E. Ryten; 2001 data, CNA

Note: See text for explanation of calculations. Figures used in tables may not compare due to calculations and rounding of numbers.

Table 19
Calculation of Number of RNs in 2001 Who Will Still be Registered
And Employed in Nursing in the Year 2016

| Age of RNs in Years | | # of RNs in 2001 | Retention Rate to 2016 | # RNs Retained to 2016 | % Employed in Nursing | # of 2001 RNs Employed in Nursing in 2016 |
|---------------------|--------------|------------------|------------------------|------------------------|-----------------------|---|
| In 2001 | In 2016 | | | | | |
| 20 | 35 | 2 | 94% | 2 | 93% | 2 |
| 21 | 36 | 148 | 94% | 139 | 93% | 129 |
| 22 | 37 | 550 | 94% | 517 | 93% | 481 |
| 23 | 38 | 1347 | 94% | 1266 | 93% | 1178 |
| 24 | 39 | 2306 | 94% | 2168 | 93% | 2016 |
| 25 | 40 | 2978 | 94% | 2799 | 93% | 2603 |
| 26 | 41 | 3534 | 94% | 3322 | 93% | 3089 |
| 27 | 42 | 3910 | 94% | 3675 | 93% | 3418 |
| 28 | 43 | 4179 | 94% | 3928 | 93% | 3653 |
| 29 | 44 | 4387 | 94% | 4124 | 93% | 3835 |
| 30 | 45 | 4771 | 94% | 4485 | 93% | 4171 |
| 31 | 46 | 5039 | 94% | 4737 | 93% | 4405 |
| 32 | 47 | 5376 | 94% | 5053 | 93% | 4700 |
| 33 | 48 | 5644 | 94% | 5305 | 93% | 4934 |
| 34 | 49 | 5936 | 94% | 5580 | 93% | 5189 |
| 35 | 50 | 6410 | 94% | 6025 | 93% | 5604 |
| 36 | 51 | 6889 | 94% | 6476 | 93% | 6022 |
| 37 | 52 | 7723 | 94% | 7260 | 93% | 6751 |
| 38 | 53 | 7724 | 94% | 7261 | 93% | 6752 |
| 39 | 54 | 7583 | 94% | 7128 | 93% | 6629 |
| 40 | 55 | 7538 | 94% | 7086 | 90% | 6377 |
| 41 | 56 | 7693 | 92% | 7078 | 88% | 6228 |
| 42 | 57 | 7612 | 88% | 6699 | 87% | 5828 |
| 43 | 58 | 8009 | 82% | 6567 | 86% | 5648 |
| 44 | 59 | 8634 | 78% | 6735 | 86% | 5792 |
| 45 | 60 | 8825 | 73% | 6442 | 85% | 5476 |
| 46 | 61 | 9217 | 66% | 6083 | 81% | 4927 |
| 47 | 62 | 9540 | 57% | 5438 | 79% | 4296 |
| 48 | 63 | 9464 | 52% | 4921 | 78% | 3839 |
| 49 | 64 | 9505 | 44% | 4182 | 74% | 3095 |
| 50 | 65 | 8880 | 37% | 3286 | 72% | 2366 |
| >50 | >65 | 71514 | | 3180 | 15% | 477 |
| | n.r. | 46 | | 20 | | 15 |
| | Total | 252913 | | 148966 | | 129925 |

Source: Year 2016 data: Calculations by E. Ryten; 2001 Data: CNA

Note. Figures used in tables may not compare due to rounding off numbers.

Number of RNs retained to 2011

There were 252,913 RNs in Canada in 2001. They ranged in age from 20 to more than 65 years of age. By the year 2011, the youngest nurses of 2001 will be 30 years old. All RNs in 2001 who were 56 or older in 2001 will be 65 or older in 2011. It is estimated that 97 per cent of all RNs who were 45 or younger in 2001, less than 56 years old in 2011, will still be registered in 2011. This is a somewhat generous assumption about retention of RN status over the 10-year period, but it is not far off observed coefficients. Because there is such a high demand for nurses now and for the foreseeable future, this coefficient has been estimated on the high side. Retention rates are expected to gradually drop off for nurses who will be aged 56 and older in 2011 (see Table 18). Applying the retention coefficients by age produces a total retention of RNs of 201,890 in 2011. This amounts to the loss of 50,000 nurses over the 10-year period or an average of 5,000 per year. Compare this figure with the output of Canadian nursing schools in the last few years, and it is readily apparent why the nursing pool has not shown any growth in recent years.

From the retained pool of 202,000 RNs, a second set of calculations produces estimates of the number of retained RNs who will be working in nursing in the year 2011 by their age in that year. Up to age 54, it is estimated based on data for the current RN pool that approximately 93 per cent of all RNs will be working in nursing in 2011. After age 54, the percentage of RNs working as nurses gradually declines for each additional year of age until it is estimated that only 15 per cent of RNs aged more than 65 will actually be working as nurses. Doing the arithmetic leads to an estimate of 178,000 RNs of the 2001 complement still working as nurses in the year 2011.

Number of RNs retained to 2016

The method employed for estimating the number of RNs of the 2001 complement retained to the year 2016 was exactly the same as that for estimating retention to 2011. The method was adapted to allow for the 15-year time elapse between 2001 and 2016. For this reason, retention rates to the year 2016 were lower than those used for the 2011 estimates. The 2016 retention estimates arrive at an estimate of 149,000 out of 253,000 RNs from the 2001 complement. Readers should note that in the five years between 2011 and 2016 there will be an extremely heavy exodus of nurses from the nursing pool. **The retention estimates leading up to 2011 suggest a loss of 50,000 nurses, over 10 years, as well as an additional loss of 53,000 in the following 5 years or an average of more than 10,000 per year in those years.** The large cohort of nurses educated in the '70s and early '80s will be retiring in the second decade of this century. The years following 2011 will be very, very challenging from the point of view of assuring an adequate supply of nurses.

From calculations, the number of nurses retained and working as nurses in the year 2016 is estimated to be approximately 130,000.

Calculating New Entrants and Additions to the Pool of Nurses Between 2001 & 2011 and Between 2001 & 2016

The calculations of the number of new entrants to the nursing pool between 2001 and 2011 and between 2001 and 2016 involved the following steps:

- Estimating the output from Canadian nursing schools from 2002 to 2015;
- Estimating the number of graduates from nursing schools outside Canada who will qualify for registration and practice in Canada from 2002 to 2015;
- Estimating the proportion of graduates from Canadian nursing programs who will become registered nurses;
- Estimating the age at entry to practice of Canadian educated nurses and nurses educated outside Canada;
- Summing the number of new entrants from all sources, Canadian and foreign, by age in 2011 or in 2016; and
- Calculating by age, the proportion of new entrants who will be working as nurses at the target dates, 2011 and 2016.

Data will now be presented related to each of these stages and the results of all the calculations will be presented in statistical tables.

Output of Canadian nursing schools and related issues

In Table 15, estimates were made on the output of Canadian nursing programs from 2002 to 2008. In the projections of this section, the numbers in Table 14 are used as the basis for estimating annual additions from Canadian sources. For each of the years 2009 to 2015, output by age was factored into the projections at the same level as in 2008. There is no available information to make a projection on any other basis.

Not all nursing graduates become RNs and not all of those who become RNs become nurses in Canada. One of the determinants of the number of nurses who will actually work as nurses is the proportion of each graduating cohort working in nursing. Hitherto, no data have ever been available showing the proportion of graduating cohorts of nurses in practice. In order to base the projections on realistic numbers, the CNA database was used to generate statistics on the year of initial graduation (the year diploma or basic degree was earned) of all RNs in 2001 who graduated in nursing in Canada. These numbers are expressed as a percentage of the total number of initial nursing qualifications earned by year. The data for all RNs in 2001 who graduated in 1963 or later are presented in Table 20. Graduates before 1963 were not included, because data was not collected on nursing graduates prior to 1963.

There are several features of this table that warrant attention. First of all, the nature of cohorts is manifested here. The total number of graduates each year is the maximum number of nurses that any single year's output can contribute to the nursing pool. Those numbers are reported in the third column. The number of members of the cohort of each year's graduates still registered in the year 2001 is given in column 2. The ratio of column 2 to column 3, expressed as a percentage, is shown in column 4. Column 5 lists the number of years that have elapsed since each cohort graduated.

The nurses who graduated at very young ages in the '60s were still registered in sizeable numbers nearly 40 years after they graduated. The nurses educated in the '70s had registration rates ranging from a low of 74 per cent to a high of 87 per cent; the nurses educated in the '80s had registration rates in 2001 ranging from a low of 79 per cent for the graduates of 1989 to a high of 89 per cent. It is the nurses educated in the '90s whose registration rates are remarkably low. These are the nurses in the very early stages of their careers. They are the products of small graduating cohorts and their registration rate is lower than that of nurses educated in the '80s and even of the '70s, nurses who were educated as long as 30 years ago. The registration rates in the year 2001 of the nursing graduates of the '90s provide a means of assessing just how many of the new graduates did not enter nursing in Canada. We know from other data that large numbers of Canadian nurses showed an interest in moving to the United States and, to a lesser extent, other countries in the last decade. **Of the 81,044 graduates of Canadian nursing schools who graduated in the 11 years from 1990 to 2000, only 64,394, 79 per cent, were registered in the year 2001. This means 16,650 very recent graduates are not registered and available to deliver nursing services in Canada.**

How does this relate to projections of supply in the future? The principal relevance is choosing a coefficient to estimate the proportion of each year's graduating cohort that will become registered as RNs. Based on the data in Table 20, a coefficient of 85 per cent was chosen. The calculations in the following tables are made using an 85 per cent entry rate, but calculations were also made using a 95 per cent entry rate. The results of a 95 per cent coefficient and an 85 per cent coefficient will be reported in the text. Needless to say, the tables show an 85 per cent rate of entry, rather than a 95 per cent entry rate, due to the statistician's opinion that this is a more realistic number.

Table 20
Graduating Cohort Retention Rates (% of Graduating Cohorts Registered
In 2001: Graduates from 1963 to 2000)

| Year of Graduation | Graduates of Canadian Nursing Schools | | % of cohort registered in 2001 | Years since graduation |
|--------------------|---------------------------------------|---------|--------------------------------|------------------------|
| | Registered in 2001 | Total # | | |
| 1963 | 3067 | 6935 | 44.2 | 38 |
| 1964 | 3784 | 7261 | 52.1 | 37 |
| 1965 | 4401 | 7360 | 59.8 | 36 |
| 1966 | 4504 | 7387 | 61.0 | 35 |
| 1967 | 4957 | 7522 | 65.9 | 34 |
| 1968 | 5504 | 7891 | 69.8 | 33 |
| 1969 | 6100 | 8359 | 73.0 | 32 |
| 1970 | 6520 | 8625 | 75.6 | 31 |
| 1971 | 7979 | 10058 | 79.3 | 30 |
| 1972 | 8532 | 10083 | 84.6 | 29 |
| 1973 | 7950 | 9514 | 83.6 | 28 |
| 1974 | 8061 | 9990 | 80.7 | 27 |
| 1975 | 7894 | 9278 | 85.1 | 26 |
| 1976 | 7997 | 9996 | 80.0 | 25 |
| 1977 | 7057 | 9588 | 73.6 | 24 |
| 1978 | 7298 | 8422 | 86.7 | 23 |
| 1979 | 6526 | 7580 | 86.1 | 22 |
| 1980 | 6707 | 7639 | 87.8 | 21 |
| 1981 | 6359 | 7396 | 86.0 | 20 |
| 1982 | 5786 | 7644 | 75.7 | 19 |
| 1983 | 6298 | 7823 | 80.5 | 18 |
| 1984 | 6777 | 7963 | 85.1 | 17 |
| 1985 | 7447 | 8380 | 88.9 | 16 |
| 1986 | 6194 | 8225 | 75.3 | 15 |
| 1987 | 7513 | 8722 | 86.1 | 14 |
| 1988 | 7276 | 8412 | 86.5 | 13 |
| 1989 | 7165 | 9023 | 79.4 | 12 |
| 1990 | 7167 | 8683 | 82.5 | 11 |
| 1991 | 7043 | 8760 | 80.4 | 10 |
| 1992 | 6433 | 8530 | 75.4 | 9 |
| 1993 | 6103 | 8546 | 71.4 | 8 |
| 1994 | 6195 | 8201 | 75.5 | 7 |
| 1995 | 6006 | 8026 | 74.8 | 6 |
| 1996 | 5889 | 7283 | 80.9 | 5 |
| 1997 | 5903 | 7115 | 83.0 | 4 |
| 1998 | 5303 | 6080 | 87.2 | 3 |
| 1999 | 4465 | 5221 | 85.5 | 2 |
| 2000 | 3887 | 4599 | 84.5 | 1 |

Source: CNA and Table 14; Calculations by E. Ryten

New registrations of RNs educated outside Canada

The number of additions to the pool of nurses in Canada is very difficult to project. There are no known statistical regularities that can be projected into the future. For this reason, there are far greater uncertainties associated with these projections than with those covering the output of Canadian nursing programs. All we can go on is recent history, but regulations regarding admission to Canada of people with nursing qualifications can change overnight.

It is not just a question of the number of would-be immigrants with nursing qualifications. It is also a matter of numbers passing the RN qualifying examinations. Although passing rates on the RN examinations are very high for graduates of Canadian nursing programs, they are very variable for nurses from other parts of the world.

Depending on the country of nursing education, the pass rate varies from very low to very high. So, it is not just a question of attracting immigrants who are nurses, but also a question of how many will become RNs when in Canada. In order to arrive at some decisions regarding estimates of the number of foreign-educated nurses who will be added to the pool of nurses each year, statistics are given on the number of new registrants from abroad, the numbers taking the RN Examinations and the numbers passing. Table 21 provides data on the number of registrations of nurses educated outside of Canada in each province from 1983 to 2000. The data are as reported by the provinces.

Table 21
Number of New RN Registrants From Foreign Countries
by Examination & Endorsement by Province of Registration, 1983 - 2000

| Year | NF | PEI | NS | NB | QC | ON | MN | SK | AB | BC | TE | CDA |
|------|----|-----|----|----|-----|------|----|----|-----|-----|----|------|
| 1983 | 25 | 0 | 18 | 26 | 36 | 419 | 44 | 13 | 215 | 187 | 0 | 983 |
| 1984 | 17 | 0 | 31 | 10 | 37 | 318 | 36 | 8 | 233 | 197 | 0 | 887 |
| 1985 | 17 | 3 | 22 | 14 | 40 | 293 | 23 | 15 | 102 | 109 | 0 | 638 |
| 1986 | 14 | 1 | 25 | 9 | 27 | 295 | 30 | 8 | 93 | 174 | 0 | 676 |
| 1987 | 13 | 3 | 16 | 0 | 42 | 340 | 30 | 11 | 101 | 269 | 0 | 825 |
| 1988 | 24 | 3 | 13 | 6 | 43 | 410 | 33 | 21 | 147 | 261 | 0 | 961 |
| 1989 | 46 | 2 | 24 | 10 | 56 | 566 | 42 | 17 | 167 | 373 | 0 | 1303 |
| 1990 | 43 | 4 | 17 | 18 | 77 | 826 | 59 | 14 | 174 | 448 | 0 | 1680 |
| 1991 | 27 | 3 | 25 | 7 | 83 | 1223 | 55 | 25 | 248 | 593 | 0 | 2289 |
| 1992 | 14 | 6 | 13 | 6 | 149 | 755 | 36 | 10 | 101 | 499 | 0 | 1589 |
| 1993 | 3 | 6 | 15 | 6 | 117 | 600 | 34 | 10 | 98 | 316 | 0 | 1205 |
| 1994 | 4 | 1 | 5 | 6 | 88 | 491 | 9 | 15 | 54 | 255 | 0 | 928 |
| 1995 | 3 | 2 | 12 | 7 | 51 | 494 | 12 | 7 | 45 | 242 | 0 | 875 |
| 1996 | 6 | 3 | 7 | 6 | 31 | 356 | 6 | 5 | 38 | 195 | 0 | 653 |
| 1997 | 4 | 4 | 16 | 6 | 73 | 271 | 32 | 0 | 90 | 158 | 0 | 654 |
| 1998 | 5 | 0 | 12 | 5 | 69 | 434 | 9 | 12 | 56 | 161 | 1 | 764 |
| 1999 | 5 | 1 | 12 | 6 | 24 | 309 | 14 | 22 | 51 | 209 | 0 | 653 |
| 2000 | 7 | 7 | 24 | 11 | 17 | 628 | 27 | 49 | 72 | 230 | 0 | 1072 |

Source: Regulating authority for nurses in each province (annual data compilation)

From these data, the variation in the numbers of newly registered foreign nurses can be seen. In 1991, there were 2,289 newly registered foreign nurses in Canada; in 1999, there were only 653. Readers will appreciate that this data series provides little guidance in estimating the numbers who may be registered from abroad in the future. To further elucidate this question, Table 22 reports on the number of nurses from abroad who wrote and passed the RN examinations in the last 6 years. Time did not allow for compilation of data for earlier years. The pass rates for first-time nurse candidates educated outside Canada were 62 per cent in 2001; 54 per cent in 2000; 49 per cent in 1999; 45 per cent in 1998; 47 per cent in 1997; and 46 per cent in 1996. The pass rates for repeaters educated abroad were much lower: 39 per cent in 2001; 35 per cent in 2000; 33 per cent in 1999; 27 per cent in 1998; 26 per cent in 1997; and 35 per cent in 1996. What this means is that sizeable proportions of immigrant nurses do not qualify as RNs and are, hence, not available to practise as RNs.

The data do show that the total numbers qualifying as RNs has been increasing in the most recent years. Targeted recruitment abroad in the most recent years, as the magnitude of the nursing shortage was acknowledged, has probably contributed to this increase. As there are no signs that the search for nurses from abroad will slow down any time soon, the numbers chosen for use in the projections were 1,429 in 2001 and 1,200 per year thereafter for the duration of the projection exercise. Why weren't the very high levels of registration of foreign nurses observed in the early '90s used as a guideline for how far recruitment abroad could go? Because there is a worldwide nursing shortage with several developed countries recruiting nurses (where they can be found), it is a matter of judgement that it would be exceedingly difficult for Canada to recruit abroad at previous levels. Once again, it must be repeated that there is a good deal of uncertainty attached to these numbers. Given pass rates on the RN examinations, it is just as likely that the levels of recruitment abroad will not reach sufficient numbers to deliver 1,200 new RN registrants per year as it is that the numbers will turn out to have been underestimated.

Table 22
Number of Candidates, Successes and Failures, Educated in Canada or Educated Outside Canada, Taking the RN Licensing Examinations, 1996 to 2001

| Location of Nursing Education | Year | First-time Writers | | | Repeaters | | | Total | | |
|-------------------------------|------|--------------------|--------|--------|---------------|--------|--------|---------------|--------|--------|
| | | Total Writers | Passed | Failed | Total Writers | Passed | Failed | Total Writers | Passed | Failed |
| Educated in Canada | 2001 | 5113 | 4693 | 420 | 518 | 305 | 213 | 5631 | 4998 | 633 |
| | 2000 | 4599 | 4203 | 396 | 635 | 394 | 241 | 5234 | 4597 | 637 |
| | 1999 | 5221 | 4694 | 527 | 892 | 542 | 350 | 6113 | 5236 | 877 |
| | 1998 | 6080 | 5471 | 609 | 892 | 514 | 378 | 6972 | 5985 | 987 |
| | 1997 | 7115 | 6524 | 591 | 693 | 441 | 252 | 7808 | 6965 | 843 |
| | 1996 | 7283 | 6861 | 422 | 604 | 419 | 185 | 7887 | 7280 | 607 |
| Educated Outside Canada | 2001 | 1585 | 985 | 600 | 1137 | 442 | 695 | 2722 | 1427 | 1295 |
| | 2000 | 1108 | 599 | 509 | 1038 | 363 | 675 | 2146 | 962 | 1184 |
| | 1999 | 771 | 381 | 390 | 928 | 310 | 618 | 1699 | 691 | 1008 |
| | 1998 | 548 | 247 | 301 | 709 | 188 | 521 | 1257 | 435 | 822 |
| | 1997 | 466 | 219 | 247 | 647 | 171 | 476 | 1113 | 390 | 723 |
| | 1996 | 653 | 303 | 350 | 675 | 233 | 442 | 1528 | 536 | 992 |
| All Examinees | 2001 | 6698 | 5678 | 1020 | 1655 | 747 | 908 | 8353 | 6425 | 1928 |
| | 2000 | 5707 | 4802 | 905 | 1673 | 757 | 916 | 7380 | 5559 | 1821 |
| | 1999 | 5992 | 5075 | 917 | 1820 | 852 | 968 | 7812 | 5927 | 1885 |
| | 1998 | 6628 | 5718 | 910 | 1601 | 702 | 899 | 8229 | 6420 | 1809 |
| | 1997 | 7581 | 6743 | 838 | 1340 | 612 | 728 | 8921 | 7355 | 1566 |
| | 1996 | 7936 | 7164 | 772 | 1279 | 652 | 627 | 9415 | 7816 | 1399 |

Source: RN Examinee data: CNA 1996 to 2001 and OIIQ in 2000 & 2001; Compilation of data by E. Ryten

Age at First Registration as an RN

In Chapter 2, trends in the age at registration of new Canadian graduates in nursing and new entrants from outside Canada were given. In the projections of future output, the age distribution of all RN examinees in 1999 was used to disaggregate the annual numbers of new entrants by age. That age distribution is given in Table 11. The age distribution used in the projections of new entrants from outside Canada is given in Table 13.

Calculations of new additions to pool of RNs, 2011 & 2016

The results of the calculations to estimate the number of new additions to the pool of nurses by age in the target years will be presented in a series of tables illustrating each step of the calculations for the years 2011 and 2016.

Data on new additions from Canadian educational institutions

In an earlier chapter, mention was made of the fact that the data collection procedures for CNA's database involve counting registrations that are renewed early in the calendar year. The effect of this is that graduates who pass the RN examinations in any session after the first one in January or February are not recorded in the data till the year after they have first obtained RN registration. Since this affects the vast majority of examinees, the database takes a year to catch up with newly qualifying cohorts. The statistics related to RN examinees of the year 2001 are

affected by this phenomenon. Although 5,242 graduates of Canadian nursing programs passed the RN examinations in 2001, (4,937 first-time candidates and 305 repeaters), CNA/CIHI's database records only 508 registrants who graduated in nursing in 2001. What this means for the projections is that to arrive at totals for 2011 and 2016, additions were computed from 2001 to 2010 in the case of the target date 2011 and from 2001 to 2015 in the case of the target year 2016. Because there are 508 graduates for 2001 already recorded in the database, an adjustment factor was applied for both sets of projections with 508 registrants subtracted from the 2001 quota of additions to the nursing pool. No additions were made for the years 2011 or 2016, on the understanding that those registrants would not be recorded in the database until the years 2012 and 2017 respectively. Table 23 shows the annual number of new registrants from Canadian educational institutions from 2001 to 2010 by their age in 2011. Totals are given for additions over the entire 10-year period to 2011.

The results show that Canadian nursing programs are projected to contribute approximately 69,000 new nurses to the pool of RNs in 2011.

Data on new additions from nurses educated outside Canada and projections to 2011

Table 24 shows the additions of nurses from abroad from 2001 to 2010 by year and age in the year 2011. They show that foreign nurses are expected to add approximately 11,700 new nurses to the pool of RNs by 2011.

Table 25 adds together the number of new RNs from domestic and foreign sources by age and calculates the number at each age expected to be working as nurses in 2011. The calculations arrive at an increase of 80,600 new RNs, of whom it is expected that 75,000 will be working as nurses.

Table 26 adds together the number of nurses retained from the 2001 complement and the new additions to the RN pool up to 2011. This table shows that the projected total pool of RNs in 2011 is 283,000, of whom 253,000 will be working as RNs. The age structure of the nursing pool in the year 2011 will be weighted towards nurses in their fifties, presaging very large numbers of retirements in the immediately following years. In 2011, no working age cohort younger than 47 will contain more than 7,000 individuals.

The adequacy of the expected supply in the year 2001 will be examined in the next chapter.

The 2016 Projection

Table 27 shows the expected number of new RNs between 2001 and 2015 educated in Canada. This number is expected to be 109,000. Table 28 calculations project an addition of 18,000 RNs from other countries between 2001 and 2015. The total number of expected new additions to the RN pool by 2016 is 118,000. The calculations are given in Table 29. Table 30 provides the projection of the total number of RNs expected in Canada in 2016. Adding together the numbers retained from 2001 and the numbers added since 2001, the total is expected to be approximately 276,000. Of these RNs, it is expected that 248,000 will be working as RNs in the year 2016. An assessment of the adequacy of the supply in 2016 is given in the next chapter.

Table 23
New Registrants, 2001 to 2010: 85% of Canadian Graduates

| Age in 2011 | Year of Registration | | | | | | | | | | | adj. | 2011 | |
|--------------|----------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|-------------|--------------|------|
| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | s.t. | 2001 | TOTAL | |
| 20 | | | | | | | | | | 3 | | 3 | 3 | |
| 21 | | | | | | | | | 3 | 293 | | 296 | 296 | |
| 22 | | | | | | | | 3 | 293 | 648 | | 944 | 944 | |
| 23 | | | | | | | 3 | 293 | 648 | 1228 | | 2171 | 2171 | |
| 24 | | | | | | 3 | 287 | 646 | 1228 | 1414 | | 3577 | 3577 | |
| 25 | | | | | 3 | 276 | 633 | 1226 | 1414 | 955 | | 4505 | 4505 | |
| 26 | | | | 3 | 244 | 608 | 1199 | 1411 | 955 | 618 | | 5038 | 5038 | |
| 27 | | | 3 | 240 | 540 | 1153 | 1381 | 953 | 618 | 415 | | 5302 | 5302 | |
| 28 | | 2 | 236 | 529 | 1023 | 1328 | 933 | 617 | 415 | 315 | | 5398 | 5398 | |
| 29 | 2 | 212 | 522 | 1003 | 1178 | 897 | 604 | 414 | 315 | 303 | | 5449 | 5449 | |
| 30 | 170 | 467 | 990 | 1155 | 796 | 580 | 405 | 315 | 303 | 268 | | 5449 | -1 | 5448 |
| 31 | 375 | 886 | 1140 | 780 | 515 | 390 | 308 | 302 | 268 | 176 | | 5140 | -7 | 5133 |
| 32 | 712 | 1020 | 770 | 505 | 346 | 296 | 296 | 268 | 176 | 112 | | 4500 | -88 | 4412 |
| 33 | 819 | 689 | 498 | 339 | 263 | 284 | 262 | 176 | 112 | 114 | | 3557 | -91 | 3466 |
| 34 | 554 | 446 | 335 | 257 | 252 | 252 | 172 | 112 | 114 | 126 | | 2620 | -79 | 2541 |
| 35 | 358 | 299 | 254 | 247 | 224 | 166 | 110 | 114 | 126 | 117 | | 2015 | -48 | 1967 |
| 36 | 241 | 227 | 244 | 219 | 147 | 106 | 111 | 126 | 117 | 95 | | 1633 | -29 | 1604 |
| 37 | 183 | 218 | 216 | 144 | 94 | 107 | 123 | 117 | 95 | 70 | | 1368 | -14 | 1354 |
| 38 | 175 | 194 | 142 | 92 | 95 | 119 | 114 | 95 | 70 | 81 | | 1177 | -22 | 1155 |
| 39 | 156 | 127 | 91 | 93 | 105 | 110 | 93 | 70 | 81 | 94 | | 1019 | -20 | 999 |
| 40 | 102 | 81 | 92 | 103 | 98 | 89 | 69 | 81 | 94 | 69 | | 877 | -18 | 859 |
| 41 | 65 | 82 | 102 | 96 | 79 | 66 | 79 | 93 | 69 | 55 | | 786 | -9 | 777 |
| 42 | 66 | 91 | 94 | 78 | 59 | 76 | 91 | 69 | 55 | 61 | | 739 | -6 | 733 |
| 43 | 73 | 84 | 77 | 57 | 68 | 88 | 67 | 55 | 61 | 61 | | 691 | -6 | 685 |
| 44 | 68 | 69 | 57 | 66 | 78 | 64 | 53 | 61 | 61 | 41 | | 617 | -6 | 611 |
| 45 | 55 | 51 | 65 | 76 | 57 | 51 | 59 | 61 | 41 | 45 | | 562 | -13 | 549 |
| 46 | 41 | 59 | 75 | 56 | 46 | 57 | 59 | 40 | 45 | 31 | | 510 | -7 | 503 |
| 47 | 47 | 68 | 55 | 45 | 51 | 57 | 40 | 45 | 31 | 25 | | 463 | -11 | 452 |
| 48 | 54 | 50 | 44 | 50 | 51 | 38 | 44 | 31 | 25 | 44 | | 430 | -7 | 423 |
| 49 | 40 | 39 | 49 | 50 | 34 | 43 | 30 | 25 | 44 | 27 | | 380 | -2 | 378 |
| 50 | 32 | 44 | 49 | 33 | 38 | 29 | 24 | 44 | 27 | 20 | | 340 | -5 | 335 |
| 51 | 35 | 44 | 33 | 37 | 26 | 23 | 43 | 26 | 20 | 19 | | 306 | -2 | 304 |
| 52 | 35 | 29 | 36 | 25 | 21 | 41 | 26 | 20 | 19 | 16 | | 269 | -3 | 266 |
| 53 | 24 | 33 | 25 | 20 | 36 | 25 | 20 | 19 | 16 | 16 | | 233 | -4 | 229 |
| 54 | 26 | 23 | 20 | 36 | 22 | 19 | 18 | 16 | 16 | 5 | | 200 | -3 | 197 |
| 55 | 18 | 18 | 35 | 22 | 17 | 18 | 15 | 16 | 5 | 16 | | 179 | -2 | 177 |
| 56 | 14 | 32 | 21 | 17 | 16 | 15 | 15 | 5 | 16 | 0 | | 150 | -2 | 148 |
| 57 | 25 | 19 | 16 | 15 | 13 | 15 | 5 | 16 | 0 | 9 | | 133 | -1 | 132 |
| 58 | 15 | 15 | 15 | 13 | 13 | 4 | 15 | 0 | 9 | | | 100 | -1 | 99 |
| 59 | 12 | 14 | 13 | 13 | 4 | 15 | 0 | 9 | | | | 78 | -1 | 77 |
| 60 | 11 | 11 | 13 | 4 | 13 | 0 | 9 | | | | | 61 | | 61 |
| 61 | 9 | 11 | 4 | 13 | 0 | 9 | | | | | | 46 | | 46 |
| 62 | 9 | 3 | 13 | 0 | 8 | | | | | | | 33 | | 33 |
| 63 | 3 | 11 | 0 | 8 | | | | | | | | 22 | | 22 |
| 64 | 9 | 0 | 8 | | | | | | | | | 17 | | 17 |
| 65 | 0 | 7 | | | | | | | | | | 7 | | 7 |
| 66 | 5 | | | | | | | | | | | 5 | | 5 |
| Total | 4639 | 5774 | 6451 | 6536 | 6669 | 7517 | 7817 | 7987 | 8003 | 8003 | 69396 | -508 | 68888 | |

Source: 2001 data: CNA; Calculations by E. Ryten

Note. Figures used in tables may not compare due to rounding off numbers.

Table 24
New Registrants From Foreign Sources, 2001 to 2010
By Year of Registration and Age in 2011

| 2011 | Year of registration | | | | | | | | | | s.t. | adj. 2001 | 2011 TOTAL |
|-------|----------------------|------|------|------|------|------|------|------|------|------|-------|--------------|---------------|
| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | | | |
| 21 | | | | | | | | | | 1 | 1 | | 1 |
| 22 | | | | | | | | | 1 | 1 | 2 | | 2 |
| 23 | | | | | | | | 1 | 1 | 7 | 9 | | 9 |
| 24 | | | | | | 1 | 1 | 7 | 14 | 23 | | | 23 |
| 25 | | | | | 1 | 1 | 7 | 14 | 38 | 61 | | | 61 |
| 26 | | | | | 1 | 7 | 14 | 38 | 39 | 100 | | | 100 |
| 27 | | | | 1 | 7 | 14 | 38 | 39 | 51 | 151 | | | 151 |
| 28 | | | 1 | 7 | 14 | 38 | 39 | 51 | 68 | 219 | | | 219 |
| 29 | | 1 | 7 | 14 | 38 | 39 | 51 | 68 | 90 | 309 | | | 309 |
| 30 | 1 | 7 | 14 | 38 | 39 | 51 | 68 | 90 | 103 | 412 | -1 | | 411 |
| 31 | 1 | 7 | 14 | 38 | 39 | 51 | 68 | 90 | 103 | 98 | 509 | -7 | 502 |
| 32 | 8 | 14 | 38 | 39 | 51 | 68 | 90 | 103 | 98 | 85 | 594 | -88 | 506 |
| 33 | 17 | 38 | 39 | 51 | 68 | 90 | 103 | 98 | 85 | 50 | 639 | -91 | 548 |
| 34 | 46 | 39 | 51 | 68 | 90 | 103 | 98 | 85 | 50 | 69 | 699 | -79 | 620 |
| 35 | 47 | 51 | 68 | 90 | 103 | 98 | 85 | 50 | 69 | 54 | 715 | -48 | 667 |
| 36 | 61 | 68 | 90 | 103 | 98 | 85 | 50 | 69 | 54 | 42 | 720 | -29 | 691 |
| 37 | 81 | 90 | 103 | 98 | 85 | 50 | 69 | 54 | 42 | 34 | 706 | -14 | 692 |
| 38 | 107 | 103 | 98 | 85 | 50 | 69 | 54 | 42 | 34 | 34 | 676 | -22 | 654 |
| 39 | 123 | 98 | 85 | 50 | 69 | 54 | 42 | 34 | 34 | 29 | 618 | -20 | 598 |
| 40 | 117 | 85 | 50 | 69 | 54 | 42 | 34 | 34 | 29 | 34 | 548 | -18 | 530 |
| 41 | 101 | 50 | 69 | 54 | 42 | 34 | 34 | 29 | 34 | 33 | 480 | -9 | 471 |
| 42 | 59 | 69 | 54 | 42 | 34 | 34 | 29 | 34 | 33 | 27 | 415 | -6 | 409 |
| 43 | 82 | 54 | 42 | 34 | 34 | 29 | 34 | 33 | 27 | 38 | 407 | -6 | 401 |
| 44 | 64 | 42 | 34 | 34 | 29 | 34 | 33 | 27 | 38 | 22 | 357 | -6 | 351 |
| 45 | 50 | 34 | 34 | 29 | 34 | 33 | 27 | 38 | 22 | 27 | 328 | -13 | 315 |
| 46 | 40 | 34 | 29 | 34 | 33 | 27 | 38 | 22 | 27 | 24 | 308 | -7 | 301 |
| 47 | 40 | 29 | 34 | 33 | 27 | 38 | 22 | 27 | 24 | 18 | 292 | -11 | 281 |
| 48 | 34 | 34 | 33 | 27 | 38 | 22 | 27 | 24 | 18 | 23 | 280 | -7 | 273 |
| 49 | 41 | 33 | 27 | 38 | 22 | 27 | 24 | 18 | 23 | 10 | 263 | -2 | 261 |
| 50 | 39 | 27 | 38 | 22 | 27 | 24 | 18 | 23 | 10 | 5 | 233 | -5 | 228 |
| 51 | 32 | 38 | 22 | 27 | 24 | 18 | 23 | 10 | 5 | 7 | 206 | -2 | 204 |
| 52 | 45 | 22 | 27 | 24 | 18 | 23 | 10 | 5 | 7 | 2 | 183 | -3 | 180 |
| 53 | 26 | 27 | 24 | 18 | 23 | 10 | 5 | 7 | 2 | 6 | 148 | -4 | 144 |
| 54 | 32 | 24 | 18 | 23 | 10 | 5 | 7 | 2 | 6 | 4 | 131 | -3 | 128 |
| 55 | 28 | 18 | 23 | 10 | 5 | 7 | 2 | 6 | 4 | 6 | 109 | -2 | 107 |
| 56 | 22 | 23 | 10 | 5 | 7 | 2 | 6 | 4 | 6 | 1 | 86 | -2 | 84 |
| 57 | 28 | 10 | 5 | 7 | 2 | 6 | 4 | 6 | 1 | 2 | 71 | -1 | 70 |
| 58 | 12 | 5 | 7 | 2 | 6 | 4 | 6 | 1 | 2 | 2 | 47 | -1 | 46 |
| 59 | 6 | 7 | 2 | 6 | 4 | 6 | 1 | 2 | 2 | 1 | 37 | -1 | 36 |
| 60 | 8 | 2 | 6 | 4 | 6 | 1 | 2 | 2 | 1 | 1 | 33 | | 33 |
| 61 | 3 | 6 | 4 | 6 | 1 | 2 | 2 | 1 | 1 | | 26 | | 26 |
| 62 | 8 | 4 | 6 | 1 | 2 | 2 | 1 | 1 | | | 25 | | 25 |
| 63 | 5 | 6 | 1 | 2 | 2 | 1 | 1 | | | | 18 | | 18 |
| 64 | 8 | 1 | 2 | 2 | 1 | 1 | | | | | 15 | | 15 |
| 65 | 1 | 2 | 2 | 1 | 1 | | | | | | 7 | | 7 |
| 66 | 2 | 2 | 1 | 1 | | | | | | | 6 | | 6 |
| 67 | 2 | 1 | 1 | | | | | | | | 4 | | 4 |
| 68 | 1 | 1 | | | | | | | | | 2 | | 2 |
| 69 | 1 | | | | | | | | | | 1 | | 1 |
| Total | 1429 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 12229 | -508 | 11721 |

Source: 2001 Data: Regulating authority for RNs in each province; calculations by E. Ryten

Note. Figures used in tables may not compare due to rounding off numbers.

Table 25
Additions of RNs From All Sources, 2001-2010
(New RNs Working in Nursing 2011)

| Age in 2011 | Total New RNs in 2011 | | | % emp in nurs. | Total Emp. 2011 |
|--------------|-----------------------|--------------|--------------|-------------------|--------------------|
| | Canadian | Foreign | TOTAL | | |
| 20 | 3 | | 3 | 0.93 | 3 |
| 21 | 296 | 1 | 297 | 0.93 | 277 |
| 22 | 944 | 2 | 946 | 0.93 | 880 |
| 23 | 2171 | 9 | 2180 | 0.93 | 2028 |
| 24 | 3577 | 23 | 3600 | 0.93 | 3348 |
| 25 | 4505 | 61 | 4566 | 0.93 | 4246 |
| 26 | 5038 | 100 | 5138 | 0.93 | 4779 |
| 27 | 5302 | 151 | 5453 | 0.93 | 5071 |
| 28 | 5398 | 219 | 5617 | 0.93 | 5224 |
| 29 | 5449 | 309 | 5758 | 0.93 | 5355 |
| 30 | 5448 | 411 | 5859 | 0.93 | 5449 |
| 31 | 5133 | 502 | 5635 | 0.93 | 5241 |
| 32 | 4412 | 506 | 4918 | 0.93 | 4574 |
| 33 | 3466 | 548 | 4014 | 0.93 | 3733 |
| 34 | 2541 | 620 | 3161 | 0.93 | 2940 |
| 35 | 1967 | 667 | 2634 | 0.93 | 2450 |
| 36 | 1604 | 691 | 2295 | 0.93 | 2135 |
| 37 | 1354 | 692 | 2046 | 0.93 | 1902 |
| 38 | 1155 | 654 | 1809 | 0.93 | 1683 |
| 39 | 999 | 598 | 1597 | 0.93 | 1486 |
| 40 | 859 | 530 | 1389 | 0.93 | 1292 |
| 41 | 777 | 471 | 1248 | 0.93 | 1161 |
| 42 | 733 | 409 | 1142 | 0.93 | 1062 |
| 43 | 685 | 401 | 1086 | 0.93 | 1010 |
| 44 | 611 | 351 | 962 | 0.93 | 895 |
| 45 | 549 | 315 | 864 | 0.93 | 804 |
| 46 | 503 | 301 | 804 | 0.93 | 748 |
| 47 | 452 | 281 | 733 | 0.93 | 682 |
| 48 | 423 | 273 | 696 | 0.93 | 648 |
| 49 | 378 | 261 | 639 | 0.93 | 594 |
| 50 | 335 | 228 | 563 | 0.93 | 523 |
| 51 | 304 | 204 | 508 | 0.93 | 473 |
| 52 | 266 | 180 | 446 | 0.93 | 415 |
| 53 | 229 | 144 | 373 | 0.93 | 347 |
| 54 | 197 | 128 | 325 | 0.93 | 302 |
| 55 | 177 | 107 | 284 | 0.93 | 264 |
| 56 | 148 | 84 | 232 | 0.90 | 209 |
| 57 | 132 | 70 | 202 | 0.88 | 178 |
| 58 | 99 | 46 | 145 | 0.87 | 126 |
| 59 | 77 | 36 | 113 | 0.86 | 98 |
| 60 | 61 | 33 | 94 | 0.86 | 81 |
| 61 | 46 | 26 | 72 | 0.85 | 61 |
| 62 | 33 | 25 | 58 | 0.81 | 47 |
| 63 | 22 | 18 | 40 | 0.79 | 31 |
| 64 | 17 | 15 | 32 | 0.78 | 25 |
| 65 | 7 | 7 | 14 | 0.74 | 10 |
| >65 | 5 | 13 | 18 | 15.00 | 3 |
| Total | 68888 | 11721 | 80609 | | 74887 |

Source: Table 23 & Table 24; Calculations by E. Ryten

Note. Figures used in tables may not compare due to rounding off numbers.

Table 26
Projected RNs in 2011 All & Emp. Canadian and Foreign by Age

| Age in 2011 | New Additions 2001-2010 | Retained from 2001 | Total RNs | Employed Retained from 2001 | New since 2001, Employed | Total Emp. In Nursing |
|--------------|-------------------------|--------------------|---------------|-----------------------------|--------------------------|-----------------------|
| 20 | 3 | | 3 | | 3 | 3 |
| 21 | 297 | | 297 | | 277 | 277 |
| 22 | 946 | | 946 | | 880 | 880 |
| 23 | 2180 | | 2180 | | 2028 | 2028 |
| 24 | 3600 | | 3600 | | 3348 | 3348 |
| 25 | 4566 | | 4566 | | 4246 | 4246 |
| 26 | 5138 | | 5138 | | 4779 | 4779 |
| 27 | 5453 | | 5453 | | 5071 | 5071 |
| 28 | 5617 | | 5617 | | 5224 | 5224 |
| 29 | 5758 | | 5758 | | 5355 | 5355 |
| 30 | 5859 | 2 | 5861 | 2 | 5449 | 5451 |
| 31 | 5635 | 144 | 5779 | 134 | 5241 | 5375 |
| 32 | 4918 | 534 | 5452 | 496 | 4574 | 5070 |
| 33 | 4014 | 1307 | 5321 | 1215 | 3733 | 4948 |
| 34 | 3161 | 2237 | 5398 | 2080 | 2940 | 5020 |
| 35 | 2634 | 2889 | 5523 | 2686 | 2450 | 5136 |
| 36 | 2295 | 3428 | 5723 | 3188 | 2135 | 5323 |
| 37 | 2046 | 3793 | 5839 | 3527 | 1902 | 5429 |
| 38 | 1809 | 4054 | 5863 | 3770 | 1683 | 5453 |
| 39 | 1597 | 4255 | 5852 | 3958 | 1486 | 5444 |
| 40 | 1389 | 4628 | 6017 | 4304 | 1292 | 5596 |
| 41 | 1248 | 4888 | 6136 | 4546 | 1161 | 5707 |
| 42 | 1142 | 5215 | 6357 | 4850 | 1062 | 5912 |
| 43 | 1086 | 5475 | 6561 | 5091 | 1010 | 6101 |
| 44 | 962 | 5758 | 6720 | 5355 | 895 | 6250 |
| 45 | 864 | 6218 | 7082 | 5782 | 804 | 6586 |
| 46 | 804 | 6682 | 7486 | 6215 | 748 | 6963 |
| 47 | 733 | 7491 | 8224 | 6967 | 682 | 7649 |
| 48 | 696 | 7492 | 8188 | 6968 | 648 | 7616 |
| 49 | 639 | 7356 | 7995 | 6841 | 594 | 7435 |
| 50 | 563 | 7312 | 7875 | 6800 | 523 | 7323 |
| 51 | 508 | 7462 | 7970 | 6940 | 473 | 7413 |
| 52 | 446 | 7384 | 7830 | 6867 | 415 | 7282 |
| 53 | 373 | 7769 | 8142 | 7225 | 347 | 7572 |
| 54 | 325 | 8375 | 8700 | 7789 | 302 | 8091 |
| 55 | 284 | 8560 | 8844 | 7704 | 264 | 7968 |
| 56 | 232 | 8664 | 8896 | 7624 | 209 | 7833 |
| 57 | 202 | 8872 | 9074 | 7719 | 178 | 7897 |
| 58 | 145 | 8802 | 8947 | 7570 | 126 | 7696 |
| 59 | 113 | 8555 | 8668 | 7357 | 98 | 7455 |
| 60 | 94 | 7548 | 7642 | 6416 | 81 | 6497 |
| 61 | 72 | 6776 | 6848 | 5489 | 61 | 5550 |
| 62 | 58 | 6021 | 6079 | 4757 | 47 | 4804 |
| 63 | 40 | 5340 | 5380 | 4165 | 31 | 4196 |
| 64 | 32 | 4604 | 4636 | 3407 | 25 | 3432 |
| 65 | 14 | 2658 | 2672 | 1914 | 10 | 1924 |
| >65 | 18 | 3342 | 3360 | 496 | 3 | 499 |
| n.r. | | | | 32 | | 32 |
| Total | 80609 | 201890 | 282499 | 178244 | 74887 | 253133 |

Source: Table 15, Table 18 & Table 25; Calculations by E. Ryten

Note. Figures used in tables may not compare due to rounding off numbers.

Table 27
New Registrants Educated in Canada, 2001 to 2015

| Age in 2016 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | sub-total | adj. 2001 | Total |
|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----------|-----------|--------|
| 20 | | | | | | | | | | | | | | | 3 | 3 | | 3 |
| 21 | | | | | | | | | | | | | | | 3 | 293 | 296 | 296 |
| 22 | | | | | | | | | | | | | 3 | 293 | 648 | 944 | | 944 |
| 23 | | | | | | | | | | | | 3 | 293 | 648 | 1228 | 2172 | | 2172 |
| 24 | | | | | | | | | | | 3 | 293 | 648 | 1228 | 1414 | 3585 | | 3585 |
| 25 | | | | | | | | | | 3 | 293 | 648 | 1228 | 1414 | 955 | 4540 | | 4540 |
| 26 | | | | | | | | | 3 | 293 | 648 | 1228 | 1414 | 955 | 618 | 5158 | | 5158 |
| 27 | | | | | | | | 3 | 293 | 648 | 1228 | 1414 | 955 | 618 | 415 | 5573 | | 5573 |
| 28 | | | | | | | | 3 | 293 | 648 | 1228 | 1414 | 955 | 618 | 415 | 315 | 5888 | 5888 |
| 29 | | | | | | | 3 | 287 | 646 | 1228 | 1414 | 955 | 618 | 415 | 315 | 303 | 6183 | 6183 |
| 30 | | | | | | 3 | 276 | 633 | 1226 | 1414 | 955 | 618 | 415 | 315 | 303 | 268 | 6424 | 6424 |
| 31 | | | | 3 | 244 | 608 | 1199 | 1411 | 955 | 618 | 415 | 315 | 303 | 268 | 176 | 6516 | | 6516 |
| 32 | | | 3 | 240 | 540 | 1153 | 1381 | 953 | 618 | 415 | 315 | 303 | 268 | 176 | 112 | 6477 | | 6477 |
| 33 | | 2 | 236 | 529 | 1023 | 1328 | 933 | 617 | 415 | 315 | 303 | 268 | 176 | 112 | 114 | 6372 | | 6372 |
| 34 | 2 | 212 | 522 | 1003 | 1178 | 897 | 604 | 414 | 315 | 303 | 268 | 176 | 112 | 114 | 126 | 6246 | | 6246 |
| 35 | 170 | 467 | 990 | 1155 | 796 | 580 | 405 | 315 | 303 | 268 | 176 | 112 | 114 | 126 | 117 | 6095 | -1 | 6094 |
| 36 | 375 | 886 | 1140 | 780 | 515 | 390 | 308 | 302 | 268 | 176 | 112 | 114 | 126 | 117 | 95 | 5705 | -7 | 5698 |
| 37 | 712 | 1020 | 770 | 505 | 346 | 296 | 296 | 268 | 176 | 112 | 114 | 126 | 117 | 95 | 70 | 5023 | -88 | 4935 |
| 38 | 819 | 689 | 498 | 339 | 263 | 284 | 262 | 176 | 112 | 114 | 126 | 117 | 95 | 70 | 81 | 4047 | -91 | 3956 |
| 39 | 554 | 446 | 335 | 257 | 252 | 252 | 172 | 112 | 114 | 126 | 117 | 95 | 70 | 81 | 94 | 3077 | -79 | 2998 |
| 40 | 358 | 299 | 254 | 247 | 224 | 166 | 110 | 114 | 126 | 117 | 95 | 70 | 81 | 94 | 69 | 2424 | -48 | 2376 |
| 41 | 241 | 227 | 244 | 219 | 147 | 106 | 111 | 126 | 117 | 95 | 70 | 81 | 94 | 69 | 55 | 2001 | -29 | 1972 |
| 42 | 183 | 218 | 216 | 144 | 94 | 107 | 123 | 117 | 95 | 70 | 81 | 94 | 69 | 55 | 61 | 1727 | -14 | 1713 |
| 43 | 175 | 194 | 142 | 92 | 95 | 119 | 114 | 95 | 70 | 81 | 94 | 69 | 55 | 61 | 61 | 1516 | -22 | 1494 |
| 44 | 156 | 127 | 91 | 93 | 105 | 110 | 93 | 70 | 81 | 94 | 69 | 55 | 61 | 61 | 41 | 1305 | -20 | 1285 |
| 45 | 102 | 81 | 92 | 103 | 98 | 89 | 69 | 81 | 94 | 69 | 55 | 61 | 61 | 41 | 45 | 1139 | -18 | 1121 |
| 46 | 65 | 82 | 102 | 96 | 79 | 66 | 79 | 93 | 69 | 55 | 61 | 61 | 41 | 45 | 31 | 1025 | -9 | 1016 |
| 47 | 66 | 91 | 94 | 78 | 59 | 76 | 91 | 69 | 55 | 61 | 61 | 41 | 45 | 31 | 25 | 942 | -6 | 936 |
| 48 | 73 | 84 | 77 | 57 | 68 | 88 | 67 | 55 | 61 | 61 | 41 | 45 | 31 | 25 | 44 | 876 | -6 | 870 |
| 49 | 68 | 69 | 57 | 66 | 78 | 64 | 53 | 61 | 61 | 41 | 45 | 31 | 25 | 44 | 27 | 789 | -6 | 783 |
| 50 | 55 | 51 | 65 | 76 | 57 | 51 | 59 | 61 | 41 | 45 | 31 | 25 | 44 | 27 | 20 | 709 | -13 | 696 |
| 51 | 41 | 59 | 75 | 56 | 46 | 57 | 59 | 40 | 45 | 31 | 25 | 44 | 27 | 20 | 19 | 644 | -7 | 637 |
| 52 | 47 | 68 | 55 | 45 | 51 | 57 | 40 | 45 | 31 | 25 | 44 | 27 | 20 | 19 | 16 | 588 | -11 | 577 |
| 53 | 54 | 50 | 44 | 50 | 51 | 38 | 44 | 31 | 25 | 44 | 27 | 20 | 19 | 16 | 16 | 527 | -7 | 520 |
| 54 | 40 | 39 | 49 | 50 | 34 | 43 | 30 | 25 | 44 | 27 | 20 | 19 | 16 | 16 | 5 | 455 | -2 | 453 |
| 55 | 32 | 44 | 49 | 33 | 38 | 29 | 24 | 44 | 27 | 20 | 19 | 16 | 16 | 5 | 16 | 410 | -5 | 405 |
| 56 | 35 | 44 | 33 | 37 | 26 | 23 | 43 | 26 | 20 | 19 | 16 | 16 | 5 | 16 | 0 | 358 | -2 | 356 |
| 57 | 35 | 29 | 36 | 25 | 21 | 41 | 26 | 20 | 19 | 16 | 16 | 5 | 16 | 0 | 9 | 314 | -3 | 311 |
| 58 | 24 | 33 | 25 | 20 | 36 | 25 | 20 | 19 | 16 | 16 | 5 | 16 | 0 | 9 | | 262 | -4 | 258 |
| 59 | 26 | 23 | 20 | 36 | 22 | 19 | 18 | 16 | 16 | 5 | 16 | 0 | 9 | | | 225 | -3 | 222 |
| 60 | 18 | 18 | 35 | 22 | 17 | 18 | 15 | 16 | 5 | 16 | 0 | 9 | | | | 188 | -2 | 186 |
| 61 | 14 | 32 | 21 | 17 | 16 | 15 | 15 | 5 | 16 | 0 | 9 | | | | | 159 | -2 | 157 |
| 62 | 25 | 19 | 16 | 15 | 13 | 15 | 5 | 16 | 0 | 9 | | | | | | 133 | -1 | 132 |
| 63 | 15 | 15 | 15 | 13 | 13 | 4 | 15 | 0 | 9 | | | | | | | 100 | -1 | 99 |
| 64 | 12 | 14 | 13 | 13 | 4 | 15 | 0 | 9 | | | | | | | | 78 | -1 | 77 |
| 65 | 11 | 11 | 13 | 4 | 13 | 0 | 9 | | | | | | | | | 61 | | 61 |
| >65 | 35 | 32 | 25 | 21 | 8 | | 9 | | | | | | | | | 130 | | 130 |
| Total | 4639 | 5773 | 6452 | 6537 | 6670 | 7517 | 7817 | 7987 | 8003 | 8003 | 8003 | 8003 | 8003 | 8003 | 8003 | 109410 | -508 | 108902 |

Source: 2001 Data: CNA; Calculations by E. Ryten

Note. Figures used in tables may not compare due to rounding off numbers.

Table 28
New Registrants From Foreign Sources, 2001 to 2015 by Age in 2016

| Age in 2016 | Year of Registration | | | | | | | | | | | | | | | Total in 2016 | | |
|--------------|----------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|-----|---|
| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | | | |
| 21 | | | | | | | | | | | | | | | | 1 | 1 | |
| 22 | | | | | | | | | | | | | | | | 1 | 1 | 2 |
| 23 | | | | | | | | | | | | | | 1 | 1 | 7 | 9 | |
| 24 | | | | | | | | | | | | 1 | 1 | 7 | 14 | 23 | 23 | |
| 25 | | | | | | | | | | | 1 | 1 | 7 | 14 | 38 | 61 | 61 | |
| 26 | | | | | | | | | | 1 | 1 | 7 | 14 | 38 | 39 | 100 | 100 | |
| 27 | | | | | | | | | 1 | 1 | 7 | 14 | 38 | 39 | 51 | 151 | 151 | |
| 28 | | | | | | | | 1 | 1 | 7 | 14 | 38 | 39 | 51 | 68 | 219 | 219 | |
| 29 | | | | | | | | 1 | 1 | 7 | 14 | 38 | 39 | 51 | 68 | 90 | 309 | |
| 30 | | | | | | | | 1 | 1 | 7 | 14 | 38 | 39 | 51 | 68 | 90 | 412 | |
| 31 | | | | | 1 | 1 | 7 | 14 | 38 | 39 | 51 | 68 | 90 | 103 | 98 | 510 | 510 | |
| 32 | | | | 1 | 1 | 7 | 14 | 38 | 39 | 51 | 68 | 90 | 103 | 98 | 85 | 595 | 595 | |
| 33 | | | 1 | 1 | 7 | 14 | 38 | 39 | 51 | 68 | 90 | 103 | 98 | 85 | 50 | 645 | 645 | |
| 34 | | 1 | 1 | 7 | 14 | 38 | 39 | 51 | 68 | 90 | 103 | 98 | 85 | 50 | 69 | 714 | 714 | |
| 35 | 1 | 1 | 7 | 14 | 38 | 39 | 51 | 68 | 90 | 103 | 98 | 85 | 50 | 69 | 54 | 768 | 768 | |
| 36 | 1 | 7 | 14 | 38 | 39 | 51 | 68 | 90 | 103 | 98 | 85 | 50 | 69 | 54 | 42 | 809 | 809 | |
| 37 | 8 | 14 | 38 | 39 | 51 | 68 | 90 | 103 | 98 | 85 | 50 | 69 | 54 | 42 | 34 | 843 | 843 | |
| 38 | 17 | 38 | 39 | 51 | 68 | 90 | 103 | 98 | 85 | 50 | 69 | 54 | 42 | 34 | 34 | 872 | 872 | |
| 39 | 46 | 39 | 51 | 68 | 90 | 103 | 98 | 85 | 50 | 69 | 54 | 42 | 34 | 34 | 29 | 892 | 892 | |
| 40 | 47 | 51 | 68 | 90 | 103 | 98 | 85 | 50 | 69 | 54 | 42 | 34 | 34 | 29 | 34 | 888 | 888 | |
| 41 | 61 | 68 | 90 | 103 | 98 | 85 | 50 | 69 | 54 | 42 | 34 | 34 | 29 | 34 | 33 | 884 | 884 | |
| 42 | 81 | 90 | 103 | 98 | 85 | 50 | 69 | 54 | 42 | 34 | 34 | 29 | 34 | 33 | 27 | 863 | 863 | |
| 43 | 107 | 103 | 98 | 85 | 50 | 69 | 54 | 42 | 34 | 34 | 29 | 34 | 33 | 27 | 38 | 837 | 837 | |
| 44 | 123 | 98 | 85 | 50 | 69 | 54 | 42 | 34 | 34 | 29 | 34 | 33 | 27 | 38 | 22 | 772 | 772 | |
| 45 | 117 | 85 | 50 | 69 | 54 | 42 | 34 | 34 | 29 | 34 | 33 | 27 | 38 | 22 | 27 | 695 | 695 | |
| 46 | 101 | 50 | 69 | 54 | 42 | 34 | 34 | 29 | 34 | 33 | 27 | 38 | 22 | 27 | 24 | 618 | 618 | |
| 47 | 59 | 69 | 54 | 42 | 34 | 34 | 29 | 34 | 33 | 27 | 38 | 22 | 27 | 24 | 18 | 544 | 544 | |
| 48 | 82 | 54 | 42 | 34 | 34 | 29 | 34 | 33 | 27 | 38 | 22 | 27 | 24 | 18 | 23 | 521 | 521 | |
| 49 | 64 | 42 | 34 | 34 | 29 | 34 | 33 | 27 | 38 | 22 | 27 | 24 | 18 | 23 | 10 | 459 | 459 | |
| 50 | 50 | 34 | 34 | 29 | 34 | 33 | 27 | 38 | 22 | 27 | 24 | 18 | 23 | 10 | 5 | 408 | 408 | |
| 51 | 40 | 34 | 29 | 34 | 33 | 27 | 38 | 22 | 27 | 24 | 18 | 23 | 10 | 5 | 7 | 371 | 371 | |
| 52 | 40 | 29 | 34 | 33 | 27 | 38 | 22 | 27 | 24 | 18 | 23 | 10 | 5 | 7 | 2 | 339 | 339 | |
| 53 | 34 | 34 | 33 | 27 | 38 | 22 | 27 | 24 | 18 | 23 | 10 | 5 | 7 | 2 | 6 | 310 | 310 | |
| 54 | 41 | 33 | 27 | 38 | 22 | 27 | 24 | 18 | 23 | 10 | 5 | 7 | 2 | 6 | 4 | 287 | 287 | |
| 55 | 39 | 27 | 38 | 22 | 27 | 24 | 18 | 23 | 10 | 5 | 7 | 2 | 6 | 4 | 6 | 258 | 258 | |
| 56 | 32 | 38 | 22 | 27 | 24 | 18 | 23 | 10 | 5 | 7 | 2 | 6 | 4 | 6 | 1 | 225 | 225 | |
| 57 | 45 | 22 | 27 | 24 | 18 | 23 | 10 | 5 | 7 | 2 | 6 | 4 | 6 | 1 | 2 | 202 | 202 | |
| 58 | 26 | 27 | 24 | 18 | 23 | 10 | 5 | 7 | 2 | 6 | 4 | 6 | 1 | 2 | 2 | 163 | 163 | |
| 59 | 32 | 24 | 18 | 23 | 10 | 5 | 7 | 2 | 6 | 4 | 6 | 1 | 2 | 2 | 1 | 143 | 143 | |
| 60 | 28 | 18 | 23 | 10 | 5 | 7 | 2 | 6 | 4 | 6 | 1 | 2 | 2 | 1 | 1 | 116 | 116 | |
| 61 | 22 | 23 | 10 | 5 | 7 | 2 | 6 | 4 | 6 | 1 | 2 | 2 | 1 | 1 | | 92 | 92 | |
| 62 | 28 | 10 | 5 | 7 | 2 | 6 | 4 | 6 | 1 | 2 | 2 | 1 | 1 | | | 75 | 75 | |
| 63 | 12 | 5 | 7 | 2 | 6 | 4 | 6 | 1 | 2 | 2 | 1 | 1 | | | | 49 | 49 | |
| 64 | 6 | 7 | 2 | 6 | 4 | 6 | 1 | 2 | 2 | 1 | 1 | | | | | 38 | 38 | |
| 65 | 8 | 2 | 6 | 4 | 6 | 1 | 2 | 2 | 1 | 1 | | | | | | 33 | 33 | |
| >65 | 31 | 23 | 17 | 13 | 7 | 6 | 4 | 2 | 1 | | | | | | | 104 | 104 | |
| Total | 1429 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 | 18229 | | |

Source: 2001 Data: Regulating authority for RNs in each province; Calculations by E. Ryten

Note. Figures used in tables may not compare due to rounding off numbers.

Table 29
Additions of RNs All Sources 2001 – 2015

| Age in 2016 | All RNs in 2016 | | RNs Total | % Emp. in Nurs. | # in 2016 Employed Nursing |
|--------------|-------------------|------------------|---------------|-----------------|-------------------------------|
| | Canadian Educated | Foreign Educated | | | |
| 20 | 3 | | 3 | 0.93 | 3 |
| 21 | 296 | 1 | 297 | 0.93 | 277 |
| 22 | 944 | 2 | 946 | 0.93 | 880 |
| 23 | 2172 | 9 | 2181 | 0.93 | 2028 |
| 24 | 3585 | 23 | 3608 | 0.93 | 3356 |
| 25 | 4540 | 61 | 4601 | 0.93 | 4279 |
| 26 | 5158 | 100 | 5258 | 0.93 | 4890 |
| 27 | 5573 | 151 | 5724 | 0.93 | 5324 |
| 28 | 5888 | 219 | 6107 | 0.93 | 5679 |
| 29 | 6183 | 309 | 6492 | 0.93 | 6037 |
| 30 | 6424 | 412 | 6836 | 0.93 | 6357 |
| 31 | 6516 | 510 | 7026 | 0.93 | 6534 |
| 32 | 6477 | 595 | 7072 | 0.93 | 6577 |
| 33 | 6372 | 645 | 7017 | 0.93 | 6526 |
| 34 | 6246 | 714 | 6960 | 0.93 | 6473 |
| 35 | 6094 | 768 | 6862 | 0.93 | 6381 |
| 36 | 5698 | 809 | 6507 | 0.93 | 6052 |
| 37 | 4935 | 843 | 5778 | 0.93 | 5374 |
| 38 | 3956 | 872 | 4828 | 0.93 | 4490 |
| 39 | 2998 | 892 | 3890 | 0.93 | 3618 |
| 40 | 2376 | 888 | 3264 | 0.93 | 3035 |
| 41 | 1972 | 884 | 2856 | 0.93 | 2657 |
| 42 | 1713 | 863 | 2576 | 0.93 | 2395 |
| 43 | 1494 | 837 | 2331 | 0.93 | 2168 |
| 44 | 1285 | 772 | 2057 | 0.93 | 1913 |
| 45 | 1121 | 695 | 1816 | 0.93 | 1689 |
| 46 | 1016 | 618 | 1634 | 0.93 | 1519 |
| 47 | 936 | 544 | 1480 | 0.93 | 1377 |
| 48 | 870 | 521 | 1391 | 0.93 | 1294 |
| 49 | 783 | 459 | 1242 | 0.93 | 1155 |
| 50 | 696 | 408 | 1104 | 0.93 | 1027 |
| 51 | 637 | 371 | 1008 | 0.93 | 937 |
| 52 | 577 | 339 | 916 | 0.93 | 852 |
| 53 | 520 | 310 | 830 | 0.93 | 772 |
| 54 | 453 | 287 | 740 | 0.93 | 688 |
| 55 | 405 | 258 | 663 | 0.93 | 616 |
| 56 | 356 | 225 | 581 | 0.90 | 523 |
| 57 | 311 | 202 | 513 | 0.88 | 452 |
| 58 | 258 | 163 | 421 | 0.87 | 367 |
| 59 | 222 | 143 | 365 | 0.86 | 314 |
| 60 | 186 | 116 | 302 | 0.86 | 260 |
| 61 | 157 | 92 | 249 | 0.85 | 212 |
| 62 | 132 | 75 | 207 | 0.81 | 168 |
| 63 | 99 | 49 | 148 | 0.79 | 117 |
| 64 | 77 | 38 | 115 | 0.78 | 90 |
| 65 | 61 | 33 | 94 | 0.74 | 69 |
| >65 | 129 | 104 | 233 | 0.40 | 26 |
| Total | 108901 | 18229 | 127130 | | 117825 |

Source: Table 27 & Table 28; Calculations by E. Ryten

Note. Figures used in tables may not compare due to rounding off numbers.

Table 30
Projected Number of RNs and RNs Working as Nurses in 2016

| Age in 2016 | Total RNs | | Total | RNs Working as Nurses | | |
|--------------|--------------------|-----------------|---------------|-----------------------|-----------------|---------------|
| | Retained from 2001 | Added 2001-2015 | | Retained from 2001 | Added 2001-2015 | Total |
| 20 | | 3 | 3 | | 3 | 3 |
| 21 | | 297 | 297 | | 277 | 277 |
| 22 | | 946 | 946 | | 880 | 880 |
| 23 | | 2181 | 2181 | | 2028 | 2028 |
| 24 | | 3608 | 3608 | | 3356 | 3356 |
| 25 | | 4601 | 4601 | | 4279 | 4279 |
| 26 | | 5258 | 5258 | | 4890 | 4890 |
| 27 | | 5724 | 5724 | | 5324 | 5324 |
| 28 | | 6107 | 6107 | | 5679 | 5679 |
| 29 | | 6492 | 6492 | | 6037 | 6037 |
| 30 | | 6836 | 6836 | | 6357 | 6357 |
| 31 | | 7026 | 7026 | | 6534 | 6534 |
| 32 | | 7072 | 7072 | | 6577 | 6577 |
| 33 | | 7017 | 7017 | | 6526 | 6526 |
| 34 | | 6960 | 6960 | | 6473 | 6473 |
| 35 | 2 | 6862 | 6864 | 2 | 6381 | 6383 |
| 36 | 139 | 6507 | 6646 | 129 | 6052 | 6181 |
| 37 | 517 | 5778 | 6295 | 481 | 5374 | 5855 |
| 38 | 1266 | 4828 | 6094 | 1178 | 4490 | 5668 |
| 39 | 2168 | 3890 | 6058 | 2016 | 3618 | 5634 |
| 40 | 2799 | 3264 | 6063 | 2603 | 3035 | 5638 |
| 41 | 3322 | 2856 | 6178 | 3089 | 2657 | 5746 |
| 42 | 3675 | 2576 | 6251 | 3418 | 2395 | 5813 |
| 43 | 3928 | 2331 | 6259 | 3653 | 2168 | 5821 |
| 44 | 4124 | 2057 | 6181 | 3835 | 1913 | 5748 |
| 45 | 4485 | 1816 | 6301 | 4171 | 1689 | 5860 |
| 46 | 4737 | 1634 | 6371 | 4405 | 1519 | 5924 |
| 47 | 5053 | 1480 | 6533 | 4700 | 1377 | 6077 |
| 48 | 5305 | 1391 | 6696 | 4934 | 1294 | 6228 |
| 49 | 5580 | 1242 | 6822 | 5189 | 1155 | 6344 |
| 50 | 6025 | 1104 | 7129 | 5604 | 1027 | 6631 |
| 51 | 6476 | 1008 | 7484 | 6022 | 937 | 6959 |
| 52 | 7260 | 916 | 8176 | 6751 | 852 | 7603 |
| 53 | 7261 | 830 | 8091 | 6752 | 772 | 7524 |
| 54 | 7128 | 740 | 7868 | 6629 | 688 | 7317 |
| 55 | 7086 | 663 | 7749 | 6377 | 616 | 6993 |
| 56 | 7078 | 581 | 7659 | 6228 | 523 | 6751 |
| 57 | 6699 | 513 | 7212 | 5828 | 452 | 6280 |
| 58 | 6567 | 421 | 6988 | 5648 | 367 | 6015 |
| 59 | 6735 | 365 | 7100 | 5792 | 314 | 6106 |
| 60 | 6442 | 302 | 6744 | 5476 | 260 | 5736 |
| 61 | 6083 | 249 | 6332 | 4927 | 212 | 5139 |
| 62 | 5438 | 207 | 5645 | 4296 | 168 | 4464 |
| 63 | 4921 | 148 | 5069 | 3839 | 117 | 3956 |
| 64 | 4182 | 115 | 4297 | 3095 | 90 | 3185 |
| 65 | 3286 | 94 | 3380 | 2366 | 69 | 2435 |
| >65 | 3180 | 161 | 3341 | 477 | 14 | 491 |
| n.r. | 20 | | 20 | 15 | 12 | 27 |
| Total | 148966 | 127058 | 276024 | 129925 | 117825 | 247750 |

Source: Table 15, Table 19 & Table 29; Calculations by E. Ryten

Chapter 6

Will Supply of Nurses be Adequate in 2011 and 2016?

In this section, the figures calculated for demand in the years 2011 and 2016 will be compared with the projected supply of nurses in those years. The purpose of such comparisons is to assess whether there is likely to be an adequate supply, a shortage or surplus of nurses at the target dates. The point of asking such questions 10 to 15 years in advance is to have a sufficiently long lead-time to design and implement appropriate actions to address the findings.

Demand and Supply: The Projections

Although the assumptions underlying the projections are not repeated here, readers need to realize there are varying degrees of uncertainty attached to the values used for different variables in the projections. For example, the number of new RNs coming from Canadian educational institutions is based on the positive climate currently existing with respect to prospects for a career in nursing. This has led to a situation where most nursing schools can fill all available places for the study of nursing, a very different scenario from that of five to 10 years ago. No one can be sure how long this positive situation will continue. However, for purposes of this study, the expected annual output in excess of 9,000 graduates within a few years has been projected to continue through the entire projection cycle, i.e. until 2016. The projections also assume that in each year to 2016, 1,200 nurses educated abroad will become RNs in Canada. High rates of RN participation in the labour force as nurses are projected to continue indefinitely into the future. On the whole, this set of projections of nursing supply has used optimistic assumptions. Should the optimism turn out to have been misplaced, the number of RNs in the target years may be lower than the numbers in the projections. On the other hand, should provincial governments continue to expand the quotas of nursing programs and should students come forward to fill the new places, output could turn out to be higher than projected. All this is to say that there is nothing inevitable about any particular outcome and that governments and others have a number of years to implement policies to alter the future supply of nurses, should they wish to do so.

With all these provisos in mind, the comparison of demand and supply in the target years are presented in Table 31.

The projections of future demand for nursing services were made on the basis of population need. Age/gender utilization rates and the changing demographics of Canada's population were determinants for projections of the number of nurses required in the future. The estimated number of nurses required in the future is compared with projected supply, and on the basis of the difference between the numbers, a judgement is made as to whether supply will be adequate, insufficient or in excess of requirements. The definitions of balance, shortage and surplus are as follows: Allowing for the uncertainties associated with all projections, projected supply that is within plus or minus 5 per cent of projected requirements will be defined as being in balance, i.e. neither a shortage nor a surplus. If future supply is insufficient (defined as less than 95 per cent of projected demand), this will be considered to be a shortage. Future supply in excess (defined as more than 105 per cent) of projected demand, will be considered to be a surplus.

Table 31
Employment Prospects for RNs in 2011 and in 2016

| DEMAND | 2011 | 2016 |
|--|----------------|-----------------|
| 1. Between 1993 & target date, supply must increase: | 40.6% | 53.4% |
| 2. Number of RNs employed in 1993 | 235630 | 235630 |
| 3. Number of employed RNs required (to nearest 1000) | 331000 | 361000 |
| Range ± 5%: Requirements | 315000-348000 | 343000-379000 |
| SUPPLY | | |
| 4. Projected # of employed RNs retained from 2001 | 178000 | 130000 |
| 5. Projected # of employed RNs added since 2001 | 75000 | 118000 |
| 6. Projected number of employed RNs at target date: Total (4 + 5) | 253000 | 248000 |
| 7. Number of employed RNs in 2001 | 231512 | 231512 |
| 8. Additional employed RNs needed by target date (3 - 7) | 100000 | 130000 |
| Range ± 5%: Additional Requirements | (83000-116000) | (111000-147000) |
| 9. Additional employed RNs available by target date (6 -7) | 22000 | 17000 |
| SURPLUS OR DEFICIT (3 - 6) | -78000 | -113000 |

Table 31 shows how the calculations were made and reports large deficits both for 2011 and 2016. To appreciate the magnitudes involved, it should be remembered that the annual output of Canada's nursing programs is expected to reach a high of 9,400 to 9,600 in a few years time. This level of output is more than double the output of 4,599 in 2000, the low point of the decline in output from nursing programs. At the present time, it is difficult to envisage output expanding much beyond 9,500 per annum in time to impact supply for either 2011 or 2016 in a major way.

How serious is the deficit in annual output from Canadian nursing programs? Each year, enough nurses must be added to the system, not only to provide for increased service requirements but also to replace departing nurses. The calculations show that in 2011, 331,000 employed RNs will be required, a 100,000 increase over the number employed in 2001. The calculations of employed nurses retained to 2011 arrive at retention of 178,000 out of 232,000, or a loss of 54,000 over a 10-year period. This is only 5,400 per annum, by no means a particularly large number of annual departures. Adding together the annual production requirements of 10,000 and the replacement needs of 5,400, for the supply in 2011 to be balanced in 10 years, the system would have to provide 15,400 new employed RNs yearly till 2011. Calculations given in table 20 show that only approximately 85 per cent of new graduates become RNs and work in nursing. It is difficult to envisage how nursing programs in Canada (even including nurse immigration) could produce new output in the order of 18,000 per year ($15,400 \div .85 = 18,118$), the numbers required to clear impending shortages. This is the iron logic of cohorts: it is now impossible to go back and rectify the mistakes of the '90s when output from nursing programs was almost halved. The low graduating cohorts of those years will negatively impact nursing supply for 30 or more years to come. The students who graduate up to the year 2004 or 2005 are already in the system, meaning that any further increases in output from nursing programs cannot begin to affect supply until the year 2006. Even if 95 per cent of graduates were to become RNs and become employed as nurses in Canada instead of the 85 per cent seen in recent years, this would only add another 7,000 nurses in the totals projected for 2011.

What about the prospects for the year 2016? Unfortunately, the situation looks as though it will worsen between the years 2011 and 2016. The projections show 253,000 RNs working in nursing in 2011 but only 248,000 in 2016, five years later. A shortage in the order of 78,000 in 2011 will increase to a shortage of 113,000 by 2016. This is in spite of the fact that there will have been five more years of expanded output from Canadian nursing programs. The reason for the worsening situation in 2016 is found in tables 10 and 14. Table 14 shows the number of graduates from Canadian nursing programs from 1963 to 2011. Table 10 provides a breakdown by single year of age of the RN population in Canada in 2001 and compares it with the age structure of RNs in 1980 and 1995. In the late '60s and first half of the '70s, Canada's nursing schools produced record numbers of graduates. For example, the years 1971 and 1972 were the only ones in which there have ever been more than 10,000 graduates in a single year. On average, members of these numerically large cohorts graduated at much younger ages than do current graduates. They were typically less than 25 years of age at graduation. In table 10, these same graduates show up aged 26 to 30 in 1980, 41 to 45 in 1995 and 47 to 52 in 2001. By 2016, this group will be aged 62 to 67. A glance at table 10 shows that, compared with all other age cohorts, this cohort has been the largest contributor to the RN complement over its entire working life to date. These large cohorts will start reducing their participation as working RNs in the next few years and will have retired or be close to retirement by 2016. This particular phenomenon had absolutely nothing to do with the nursing crisis of the '90s and was an inevitable consequence of the age structure of the RN complement. Statistics on the age structure of RNs have been available since 1963, so the fact that retirement levels were going to experience a large increase towards the end of the first decade of this century should be well known. The projection of large increases in retirement starting a very few years from now is not subject to the uncertainties associated with projecting immigration levels or the proportion of admitted students who will graduate in nursing and some of the other variables used in the projections. It is a certainty.

The remarks related to trying to eliminate the projected shortage of 78,000 nurses in 2011 can be extended to what would be involved in trying to forestall an impending shortage of 113,000 nurses in 2016. Here the need would be to add 130,000 additional nurses over a 15-year period **and** provide for the replacement of 100,000 ($231,512 - 129,925 = 101,587$) RNs working as nurses who will retire or quit nursing between 2001 and 2016. Note, that calculations given above show that 54,000 of the 232,000 RNs working as nurses in 2001 will have retired or quit by 2011. This means that, in the short space of five years, from 2011 to 2016, there will be a further withdrawal of 46,000 RNs currently working as nurses in 2001, an average of 9,200 per year between 2011 and 2016. From 2001 to 2016, an average of 15,300 ($230,000 \div 15$) new additions to the stock of RNs working as nurses would be required each year to forestall the shortage. This amounts to a combined output from nursing programs and nurse immigration of approximately 18,000 nurses per year.

This is the same annual number of new entrants calculated for achieving a balance between demand and supply in the 10-year period from 2001 to 2011. In the case of the target year 2011, the annual retirement numbers were overly large in proportion to the size of the total nurse complement, but the numbers of graduates from Canadian nursing schools will be low. For the year 2016, it is roughly the opposite. Annual retirement levels will be very high and even though output from nursing schools will have increased considerably, they will not be able to compensate for the increased outflow of RNs from the nursing labour force. Under these circumstances, even with 15 years lead-time, it will be very difficult to totally avoid major

nursing shortages. For example, even if the proportion of nursing graduates that become working RNs in Canada increases from 85 per cent to 95 per cent over the entire projection period of 2001 to 2016, by 2016, there would only be 12,000 additional RNs working as nurses.

What can be done to try to avoid the looming shortages? If they cannot be entirely forestalled, how can their scope be reduced as much as possible in the years ahead? Answering this question will be easier with an understanding of how this situation arose. To arrive at this understanding, it will be useful to introduce the concept of “effective demand” in contradistinction to “demand” because an understanding of the difference between the two may help to clarify some of the more puzzling developments of the last decade in the labour market for nurses in Canada. A distinction needs to be made between demand for nursing services as measured by the population’s needs for health care (the measure of demand used in the projections) and effective demand.

Effective Demand vs. Demand

Economists define effective demand as the amount of services buyers are willing or able to purchase at prevailing prices. No matter what needs may exist, if no one is willing or permitted to pay to meet the costs of the need, that need will not be translated into effective demand. In a publicly funded health care system in which clients are not able to purchase services outside the public sector (the system prevailing overwhelmingly in Canada), the buyer is the government. What happens when there is a sudden change in long established funding patterns and the buyer reduces resources assigned to pay for nursing services? The answer is that effective demand will be immediately impacted (i.e., fewer nursing services purchased), whereas the underlying demand for services based on population need is not. This is a roundabout way of saying that just because hospitals’ budgets are reduced, a corresponding reduction does not occur in either the number of babies born, heart attacks, cancer cases, etc., or in the number of nurses needed to deal with them. This is what happened, more or less, in Canada during most of the '90s. How do supply and demand become reconciled?

In a study conducted in the context of nursing shortages, the late economist Noah M. Meltz (1988) described the mechanisms by which demand and supply are brought into balance with each other.

“The economic definition of a labour shortage is **an excess of demand for a particular type of labour at the going wage rate**. From a labour market perspective, the crucial question is how the market mechanism will remove the shortage and how long it will take.

Remove the shortage it will, in one way or another. In any market, if there is excess demand, there will be pressure for prices (in case of labour, wage rates) to rise to reduce or eliminate the shortage. The reduction occurs in two ways.

1. The increased wage stimulates an increase in supply—here, the number of nurses willing to work. More RNs may decide to put in overtime or return to the labour force. More people may enrol in nursing programs. More people trained elsewhere may immigrate. Another possibility is job-sharing, whereby one job is filled by two or more people each of whom wants to work only part-time.

2. Simultaneously, the increased wage rate reduces the demand. Nurses have become relatively more expensive, so employers consider other ways to achieve their ends. Perhaps they can reduce their requirements for skill or experience levels. Perhaps they can have part of the work done by members of a less expensive occupation; in the case of RNs, this would mean a greater use of RNAs (registered nursing assistants, forerunners to LPNs) and aides. Or perhaps, they can increase their use of labour-saving equipment.

This two-way movement will alleviate a shortage, but not overnight. Many of these actions take time, particularly for an occupation such as nursing, in which wages are set for a fixed period (say, by a union contract), for which quite lengthy training is needed, and for which substitution of less expensive, less qualified labour is partly inhibited by regulation or custom” (p. 9).

This analysis of effective demand and how, over time, demand and supply are brought into balance makes some seemingly contradictory occurrences comprehensible. How could employers, on the one hand, cut nursing jobs and, on the other, insist on compulsory overtime? This contradictory behaviour appears less irrational when it is realized that one policy (cutting jobs) is responding to a reduction in effective demand, whereas the other policy (insistence on compulsory overtime) is responding to continuing or increasing demand for nursing services based on population requirements. The relevance of this to dealing with impending shortages is the effect that the sudden reduction in nurse employment opportunities combined with worsened work environments had on integrating new nurses into the nursing workforce and educating nurses. The nurses most hit by the reduction in employment opportunities were recent graduates. This was an inevitable consequence of union contracts incorporating seniority clauses. Many moved to the United States or other countries. It is likely that a goodly proportion of those who moved abroad early in their careers have been permanently lost to the Canadian labour force. When nursing students found out what was happening on the work front, many quit their nursing studies altogether. Many programs could not fill their quota of places, and many cut their quota. All this took place at a time when the real, population-based demand for nursing services had not changed at all. The impact of nurses moving abroad (reflected in the statistics showing that only 85 per cent of recent graduates are registered as RNs in Canada) and the non-education of sufficient nurses for several years in a row totals many thousands of nurses.

Understanding this is vital to avoiding a similar emptying of the classrooms should there ever be a temporary funding crisis again. The classrooms were emptied because students, teachers, governments all interpreted the consequences of the funding crisis as a sign that there were too many nurses.

It is also very important not to assume that all of the current problems of nursing supply are a fallout of the funding crisis of the '90s. The demographic composition of the nursing workforce has long contained within itself the makings of a nursing supply crisis. If Canada educated and integrated into the nursing workforce 9,000 to 10,000 new nurses annually, as long as 30 years ago, why were nursing outputs so much lower in the '80s, years before the problems of the '90s? The fact that so many nurses are more than 30 years of age at the time of graduation is also equivalent to reducing output from nursing schools due to the shortened average professional life of today's graduates. Even if the crisis of the '90s had never occurred, Canada would be facing nursing shortages in both 2011 and 2016, albeit of a smaller magnitude, because of the impending retirement of the larger graduating cohorts who are being replaced by smaller ones.

With this understanding of the twin causes of the crisis in nursing supply, it is time to turn to how shortages can be dealt with.

Dealing with Shortages

The quote from Meltz mentioned the options available for dealing with shortages. It is now time to briefly examine them one by one.

Substitution

Substituting highly trained personnel with a less qualified and cheaper type of worker is a way of reducing costs and dealing with shortages. No doubt, some employers would adopt such a policy, were suitable substitutes to be available. Possible substitutes for RNs are LPNs (licensed practical nurses) and similar. Discussions of health care delivery in Canada are replete with arguments in favour of substitution.

The problem with the promotion of substitution as a solution to RN shortages is that the discussion rarely goes beyond the theoretical. In order for one type of labour to substitute for another, there must be a large enough supply of the labour that is taking on the new roles. In the case of finding substitutes for RNs, because the projected shortages are very large, there need to be equally large numbers of available substitutes. For licensed practical nurses (LPNs) to meet a significant portion of nursing service requirements that cannot be met by RNs due to the nursing shortage, the LPN complement would have to be growing at an extremely rapid rate. But, in fact, the number of LPNs has been stagnant or decreasing for nearly 20 years. In 1983, there were 83,539 LPNs in Canada. By 1999, this number was down to 66,100. LPNs are already in a shortage coping with their traditional roles. The prospect of LPNs making a dent in the RN shortage over the time span covered by the projections in this report is very slim. This is a practical, not a theoretical point. No doubt, enrolment in LPN programs needs to be expanded, perhaps even to a greater extent than is required by RN programs. This would be necessary just for LPN numbers to return to their earlier levels, let alone to take on expanded functions currently performed by RNs. In short, just because substitution is a theoretical possibility, does not make it a practical one in the short to medium term.

Importing nurses

Currently, several developed nations are engaged in recruiting nurses wherever they can find them. The largest recruiter is the United States, but recruiting countries include the United Kingdom, Australia, etc. Many of these countries recognize they are likely faced with long-term shortages of nurses. Canada is, thus, not alone in trying to alleviate its nursing shortage through foreign recruitment. Canada has been reasonably successful in its recruitment efforts abroad as the statistics previously reported in this report have made clear.

The international competition for nurses has meant that nurses from recruiting countries are themselves being recruited and further contributing to shortages in their own countries. As the closest neighbour of the United States and with similar nursing education, it is not surprising that Canadian nurses are particularly attractive to American recruiters. The question arises whether Canada is a net gainer or loser in the international game of nurse recruitment. To examine this question, Table 32 provides data showing Canada's net balance with respect to nurse immigration and emigration.

At the height of the funding crisis in nursing, 1996 and 1997, more than 10,000 nurses requested verification of their credentials to the United States or another country. Data are available only until the year 2000, but the numbers requesting verification are still very high three years after the worst of the funding crisis was over. There were more than 3,500 in both 1999 and 2000. By the year 2000, hospitals were trying to hire nurses and not finding as many as they needed, so it was not inability to find nursing employment in Canada that was leading so many to leave Canada or at least, seriously contemplate it. Exactly how many of the nurses that requested credentials verification for jurisdictions abroad actually moved abroad is not known, but clearly many of them did or there would be higher proportions of recent graduating classes showing up as RNs in the CNA database.

In the years immediately preceding the nursing crisis, there were relatively large numbers of nurses from abroad being registered in Canada. In those years, the number of new registrants from other countries and the numbers of RNs moving abroad were roughly balanced, with a probable small positive balance in Canada's favour, as it cannot be assumed that everyone requesting verification of credentials actually moved abroad. Since 1992, it is almost certain that there has been a net loss when comparing the numbers of new registrants gained through immigration and the losses incurred through emigration of RNs. In some years the net loss must have been in the thousands. Because of the worldwide competition for nurses, it will be more difficult than in the past to recruit large numbers of nurses from other countries who can pass the RN examinations. For this reason, at least in the coming years, Canada will not be able to greatly relieve its nursing shortage by recruiting overseas.

Table 32
Immigration and Emigration of Nurses
Comparison of Numbers of First-time Registrants from Other Countries with Number of RNs Requesting Transfer of Credentials

| Year | New Registrants from Abroad | RNs Requesting Verification of Credentials | | |
|------|-----------------------------|--|--------------------|-------|
| | | To USA | To Other Countries | Total |
| 1983 | 983 | n.r. | n.r. | n.r. |
| 1984 | 887 | n.r. | n.r. | n.r. |
| 1985 | 638 | n.r. | n.r. | n.r. |
| 1986 | 676 | n.r. | n.r. | n.r. |
| 1987 | 825 | n.r. | n.r. | n.r. |
| 1988 | 961 | 930 | 102 | 1032 |
| 1989 | 1303 | 1218 | 137 | 1355 |
| 1990 | 1680 | 1466 | 173 | 1639 |
| 1991 | 2289 | 1788 | 143 | 1931 |
| 1992 | 1589 | 4653 | 180 | 4833 |
| 1993 | 1205 | 2005 | 119 | 2124 |
| 1994 | 925 | 3912 | 185 | 4097 |
| 1995 | 875 | 3922 | 338 | 4260 |
| 1996 | 653 | 5040 | 393 | 5433 |
| 1997 | 654 | 4336 | 458 | 4794 |
| 1998 | 764 | 2876 | 360 | 3236 |
| 1999 | 653 | 3231 | 372 | 3603 |
| 2000 | 1072 | 3108 | 440 | 3548 |

n.r. = not reported

Source: Regulating authorities for RNs in the provinces

Improved utilization of the available nurse complement

In all spheres of human activity, it is possible to improve efficiency, which includes making better use of available nurses. The consequences of nurse dissatisfaction over employment conditions during the last few years and the effect this dissatisfaction has had on labour force behaviour is well understood, and steps have been made and are continuing to be made to deal with issues such as compulsory over-time, casual employment, etc. There is one area in which it should be possible to take action that could lead to an increased supply of nursing services to the health care system. In a situation of nursing shortages, it should be possible for all nurses who want to work full-time to do so. The conversion of jobs from part-time to full-time, for those who want to work full-time, could produce immediate increases in nursing service delivery. A policy of relying much more heavily on full-time workers would also contribute to integrating new graduating cohorts into the nursing workforce. At the start of one's career, it is likely that full-time work is being sought. It is not known exactly what the potential is for significant increases in the number of nursing service hours delivered that could be achieved through increased levels of voluntary full-time working.

Educating more nurses

Since the issue of the 1997 report, all over Canada, the number of places for the study of nursing has increased. Because of the importance of the topic, an entire section of this report has been devoted to tracing, province by province, developments with respect to the provision of nursing places, admission, enrolment and graduation, as best they could be ascertained in a very short space of time. The content of that section will not be repeated here. The turnaround in the number of places provided and the eagerness with which the places are being snapped up is remarkable. This is an extremely positive development compared with the situation five years ago. However, even at the current level of provision of places for the study of nursing, which is considerably higher than five years ago, the provision is still not high enough. Earlier in this section, estimates were provided for the number of annual new additions to the stock of RNs required to forestall nursing shortages in 2011 and 2016. It is not recommended that the number of places be increased to try to deal with the **entire** nursing shortage by 2011 or 2016 through additional outputs from the educational system. There are several reasons for this. The first is that it is quite unrealistic to think of a very rapid doubling of the current (2002) level of provision of places. Even more important, in the long run, is avoiding periods of either very sharp increases or decreases in output over short spaces of time. Doing this repeatedly over long periods of time leads to a roller coaster of surpluses and shortages in supply. Ideally, levels of output would increase gradually each year in line with increased needs. However, the current situation, (partly the result of one of these roller coaster rapid down swings in output) does necessitate some further increase in output from Canadian nursing programs. The current level of provision of places merely amounts to restoring levels of provision from many years ago when Canada's population was much smaller, and its age distribution more heavily weighted to younger age groups. The question is trying to figure out what a reasonable level of output from nursing programs would be. A simple formula is suggested here, though this is a topic that merits serious attention from governmental and educational authorities concerned with issues of nursing supply. Suppose that a target of 340,000 RNs was set for the year 2011. Assume further that, on average, each new RN entering the system will provide 35 years of service. Under these assumptions, in a steady state situation, each year slightly fewer than 10,000 new RNs would need to be added to the system. A calculation can be made of how many students need to be admitted into nursing programs in order to graduate enough nurses to pass the RN examinations and practise as nurses in Canada. If completion rates of nursing programs are 75 per cent (current

rates, as far as could be ascertained, vary from 60 per cent to above 80 per cent) and 98 to 99 per cent pass the RN examinations, educational programs need to admit approximately 13,500 students annually to register 10,000 new RNs a year. It does not matter whether these are accelerated programs, three-year programs or four-year programs. The duration of a program affects the date of exit; it does not change the overall number of graduates (though under some conditions, shorter programs may be associated with higher success rates) emerging from the program. This example has used the output of 10,000 per annum as a possible target figure because, in the statistician's judgement, this would have been a more or less appropriate goal for nursing outputs given population projections for the next 15 years, were it not for the accumulated deficits. Somehow the deficits created by low outputs of the last decade and the departure of so many nurses to other countries have to be dealt with. Given these considerations, it is recommended that nursing programs expand further to try to attain output of at least 12,000 yearly. Provinces with growing populations should make correspondingly larger increases in expanding nursing programs. It will take several years for such a goal to be realized, by which time the number of annual retirements will be rising rapidly. In line with this recommendation, provincial governments that have instituted new programs with funding commitments for only a few years should be encouraged to make the funding commitments permanent. The outcome of the removal of enrolment limitations on all nursing programs in the province of Quebec should be monitored closely. What will the graduation rate from these programs be? Will the high level of interest manifested by the numbers taking advantage of the removal of enrolment caps continue into the future? How do the educational institutions cope with clinical placements, appointment of faculty members, etc., in programs with no enrolment caps? If it turns out that output can be substantially expanded in a very short space of time with the removal of enrolment caps, perhaps this is a route to go for a few years. It is not recommended as a long-term means of dealing with nurse shortages.

Facilitating Entry of new RNs into the Nursing Workforce

Canada invests in the education of nurses so they will join the nursing workforce and deliver care to patients. Every potential nurse who changes career or who practises nursing in another country is a loss. As mentioned earlier, if from now onwards 95 per cent of new graduates became or remained RNs in Canada instead of 85 per cent, there would be 8,000 additional RNs working as nurses by 2011, and by 2016 there would be 12,000 more RNs working as nurses. Policies resulting in such a change would have an immediate and continuing positive impact on the supply of nurses. Hospitals and other employers of nurses should cooperate with nursing schools to secure job placement for members of their graduating classes while they are still in their final year of study.

Ontario is currently engaged in trying to recruit back to Canada some of the nurses who moved to the United States in the last decade or so. Perhaps a national, coordinated effort could be made to assist in the return of nurses who wish to come back and work in Canada.

Recommendations

This report revisits a study done in 1997. Since then, there have been changes to the funding of the health care system and changes to nursing education. Governments have increased funding to educational institutions, and a variety of innovative programs have been introduced. Students are applying for and snapping up available places. This is a different scenario from that of 1997. The expansion of programs and enrolment could lead to annual outputs from nursing programs in excess of 9,000 per annum in a few years time. Nevertheless, Canada is faced with a very serious nursing shortage for many years to come. Additional action is needed to meet the projected needs for nursing services.

- To make up for the extremely low outputs of recent years, as well as to prepare for the exit of large numbers of RNs, starting towards the end of this decade, it is recommended that attempts be made to increase entry to the point where up to 12,000 graduates emerge per year. Because of the long lead-time between planning a program and graduating students, implementation should not be delayed.
- In future, funding of nursing education should be tied to medium and long-term needs for nursing services. Students enrolled in nursing programs today will provide service over the next three or four decades.
- To avoid losing significant numbers of newly qualified RNs to other careers or to emigration, every effort must be made to facilitate their immediate entry into practice.
 - The nursing profession should set a specific target to raise the entry of new graduates into RN status and practice in Canada to 95 per cent of each graduating cohort, rather than the 85 per cent or less that has been the norm in recent years.
 - Further research should be undertaken to understand barriers and facilitators of integration into the nursing workforce, gender differences, reason for increasing age at entry to practice, and career paths choices. Appropriate policies can then be developed based on this research.
- Meaningful data is required to keep abreast of developments relevant to nursing workforce issues and support successful nursing human resource planning. All efforts should be made to collect and maintain nursing data that is up-to-date, pan-Canadian, complete and valid. This includes data on education, registration, immigration/emigration and RN examination.

Appendix

Sources for material used in the projections of the number of nursing graduates from 2002 to 2015

For all provinces, the statistical series of CNA on admissions, enrolment and graduation were used. These series are compiled from annual questionnaire returns from educational institutions, colleges and universities, providing initial nursing education.

In addition, in order to study trends, the reports from provincial registrars showing new registrations by source were consulted for the years 1995 to 2000.

Media clippings dealing with nursing supply issues, particularly nursing shortages were often useful in describing new educational initiatives that were being undertaken or proposed to deal with the nursing shortage. Newspaper reports on the nursing shortage are very numerous and have covered the entire country.

In the following paragraphs, sources specific to each province are mentioned.

Newfoundland and Labrador The principal source for the numbers used for Newfoundland was a report written in October 2001 entitled, *Registered Nurse Supply Report 2000/2001, Newfoundland and Labrador* by Andrew Wells, Management Engineer, Health and Community Services Human Resource Sector Study.

Colleen Kelly, Association of Registered Nurses of Newfoundland and Labrador also provided information.

P.E.I. Data were provided by the Association of Nurses of P.E.I.

Nova Scotia Lucille Wittstock, Associate Director Undergraduate Student Affairs, Dalhousie University School of Nursing provided data. Jean Macinnis of the Department of Nursing provided data for St. Francis Xavier University.

New Brunswick Clarice Thibault, École de science infirmière, Université de Moncton, provided historical and current data for the Université de Moncton. Rosemary Derkson provided data for the University of New Brunswick.

Quebec The Ordre des infirmières et infirmiers du Québec (OIIQ) provided a wealth of data used in this section of the report. Pierrette Lange-Sondack, registrar of the OIIQ, supplied up-to-date admission and enrolment data related to diploma and university programs of nursing.

Ontario Information was obtained from the *Report of the Nursing Education Implementation Committee* of July 1999. Nelsa Roberto, Senior Policy Advisor, Colleges Branch, Ministry of Training, Colleges and Universities, Ontario provided considerable assistance and data. Marg Harrington, Policy Analyst, Office of Health Sciences, Council of Ontario Universities, provided data on the intake into nursing in the year 2001/02. Data on the applicant pool to nursing programs was obtained from The Ontario Universities Applications Centre. Ross Hamilton and Barbara Gough of the Ministry of Training, Colleges and Universities provided data.

Manitoba A report entitled, *Report on the Manitoba Nursing Education Strategy (MNES) Deliverables, 1997 – 2001*, which was issued in February 2002 by the Faculty of Nursing of the University of Manitoba, was used extensively. Joan Blakely of the College of Registered Nurses of Manitoba provided further information.

Saskatchewan The data used in the section on Saskatchewan relied heavily on the *Nursing Education Program of Saskatchewan (NEPS) Advisory Committee Report* of September 2001.

Alberta Patricia Marck, Nursing Consultant-Practice, Alberta Association of Registered Nurses located the data from Alberta Learning used in the projections of output from Alberta.

British Columbia Data for British Columbia were supplied by Sandra Regan, Nursing Policy Consultant, Registered Nurses Association of British Columbia and Johanne Fort, Project Officer, Health & Human Services Programs, College & Program Planning, Ministry of Advanced Education, Training and Technology, British Columbia.

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