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Nursing Research in Canada: A Status Report

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FINAL REPORT

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MAIN MESSAGES

An analysis of the development of nursing research in Canada over the past 7-10 years was conducted, using a framework designed for this project. The following are highlights of these findings.

- Since 1990, 15 PhD programs have been developed in Canadian university-based schools of nursing.¹
- The number of doctoral students in nursing enrolled in Canadian universities rose from eight in 1990 to 390 in 2005.
- Between 1990 and 2006, 244 students graduated from these programs.
- Although financial support by the main funding agencies for doctoral and postdoctoral students has increased over the past 7-10 years, the amount falls short of that needed given the increased enrollment.
- The number of research-prepared faculty in university schools/faculties of nursing falls short of the number required to support the number of students enrolled in PhD programs.
- Funding for nursing research has increased considerably in the last 10-15 years, largely due to an increased investment by federal and provincial governments, and in part to: the MRC/NHRDP nursing program; the evolution of NHRDP and MRC to CIHR; the establishment of the Nursing Research Fund administered by CHSRF; and targeted provincial and charitable organizational funding for nursing research.
- Research activity has evolved from primarily “solo efforts” to the development of teams focused on a particular topic or theme.
- The first nursing research center in Canada was established in 1979. Since then, a number of these centers and research training centers have been established across the country.
- Research output of faculty in terms of publications and presentation, both in nursing and non-nursing scientific journals and in professional and inter-professional forums, has increased substantially over the past 10 years.
- Three major categories of funded nursing research were identified from an analysis of a CIHR database: Selected Health Issues, Health Service/ Organization, and Health Promotion.
- Of these three categories, the largest number of studies focused on Health Issues, specifically chronic illness.
- Issues of accessibility to services and eliminating disparities to receiving care were prominent themes in all of the studies reviewed.
- Minority/disadvantaged groups, the elderly, and women were the focus of many of the studies.
- The strong concordance between the focus of nursing research in this past decade and the concerns identified in national and international reports on health care serve as evidence that research undertaken by nurses is responsive to these named priorities.
- Although there is some evidence to support the impact of nursing research on health and the health care system, documentation of the impact is limited.
- A major limitation identified in the analysis of nursing research activity in Canada relates to inadequate and/or inconsistent documentation in all areas, in particular research output and research impact.

¹ (last available statistics)

EXECUTIVE SUMMARY

Research capacity in nursing has experienced inconsistent growth over the past four decades. The barriers to capacity development have included: lack of financial support due in large part to the policies of major health research funding agencies (which until recently focused primarily on funding of bio medical research); lack of doctoral and postdoctoral programs in nursing in Canada prior to 1990; and lack of infrastructure in university and academic teaching hospitals to support research in nursing. Several initiatives beginning in the 1980s, however, have had a positive impact on strengthening research capacity in nursing.

In this report a framework was developed to assess more recent research capacity in nursing. The framework considered initial inputs for **capacity development** in terms of research training programs, the number of doctoral and postdoctoral students, and financial support for graduate students. **Research productivity** included research prepared faculty, financial support for nursing research, and the establishment of teams, centers and chairs. **Research output** comprised a third component of the framework and included publications, awards, and presentations. Finally, **research impact** was a fourth component of the framework, which included impacts on patient care outcomes, practice guidelines, policy, and education.

The framework was populated with available data in an attempt to describe the current research capacity in nursing in Canada.

Qualitative analysis of a CIHR database of over 1000 titles and abstracts revealed that nursing research covered a wide range of topics across the continuum of health, health care and populations. Sixty seven percent of the total number of studies reviewed dealt with health issues, health service organization, and health promotion. Research related to patient safety, instrument development, research and dissemination, and environment accounted for another 10% of the studies reviewed.

Of the three major themes, that of health issues was the largest and included studies related to: 1) chronic illness; 2) reproductive health; 3) pain; and 4) end of life/palliative care. Health services/organization constituted the second largest theme and focused on issues related to delivery and structure of health care. Reducing disparities and improving access to health care were a major focus of the research. As well, the effects of hospital restructuring and different models of care delivery on patient outcomes were included. The health promotion theme was the third-largest category of studies. This category targeted specific issues such as tobacco use, Aids/HIV, abuse, and obesity.

While there were several challenges in data availability and quality, the emerging picture of research capacity development was positive. The numbers of graduate programs in nursing and doctoral and postdoctoral students have increased dramatically, although from an international perspective, Canada is still behind several countries. Funding for graduate students, research programs and projects, chairs, and centers (research and training) has also increased.

Although there has been considerable progress, some challenges remain. First, the data required to assess research capacity are not centrally collected except for the CNA/CASN database and the Registered Nurse database at CIHI. These databases track the number of nursing faculty and students. From these data, it is clear that Canada has a significant shortage of research-prepared faculty who are available to supervise the research of graduate students. A special initiative is recommended to more rapidly prepare nurse scientists at the doctoral level.

Data related to the funding of doctoral and postdoctoral students, career scientists, research programs, projects, chairs, teams and centers are distributed across many databases of research funding organizations, and many of these databases use different approaches to data classification. A few do not have a designated code for nursing. Harmonizing these databases would benefit all disciplines interested in assessing their respective research activity.

Overall, the focus of nursing research reviewed was very consistent with the major health and health care issues identified by international groups such as WHO and ICN. Furthermore, the studies addressed key issues identified in the 2003 Health Accord and the Health Council of Canada reports. Since these are pressing issues for Canadians and since nursing is one of the few health disciplines conducting research in these areas, increased funding for nursing research could lead to more timely progress toward better health and health care.

Over the past two decades modest investments in nursing research have had a significant impact on capacity. However, research capacity is not built in one generation, but takes many decades of adequate support to become a robust industry with the potential to improve the health of Canadians and their health care.

1.0 PREFACE

In 2004 a meeting of five national nursing organizations – the Canadian Nurses Association (CNA), Canadian Association of Schools of Nursing (CASN), Canadian Nurses Foundation (CNF), Academy of Canadian Executive Nurses (ACEN), and the Canadian Association of Nurse Researchers (CANR) – was organized by the Office of Nursing Policy, Health Canada to examine the status of nursing science and research in Canada. Following this meeting, the Canadian Consortium for Nursing Research and Innovation (herein referred to as the Consortium) was formed for the purpose of providing a strong, unified voice to promote research in nursing. CASN assumed the role of secretariat.

As an important first step, an update of the status of nursing research in Canada was seen as necessary to inform discussions about the future of nursing science and research. The Consortium received funding from the Canadian Health Services Research Foundation (CHSRF) to complete such an analysis and to develop a framework for building nursing research capacity. This report is the result of that project. The historical development of nursing research is described in this report; however, data concerning research productivity are not available for those early years. The intent of the current report is to present data for the years 2000 to 2007. In selected instances where data were available for the years prior to 2000 or after 2008, these data were included. The current report contains data and information from 2000 to 2007. The results suggest that investments made in nursing research have had a significant impact on research productivity. In 2008, nursing research is demonstrating that it has the capacity to address priority issues in health and health care in Canada. Areas that need strengthening are identified. However, nursing research needs another substantial investment in order to move to the next level of discovery and develop a future cadre of researchers.

2.0 INTRODUCTION & BACKGROUND

Building research capacity in health services has been recognized internationally as important in order to produce a sound evidence base for decision-making in policy and practice ⁽¹⁾. The assessment of research capacity is therefore critical for nursing if nursing is to assume a central role in the delivery of health services ⁽²⁾. This report presents information with respect to the status of nursing research capacity and the direction which that research has taken, and provides recommendations for future development.

Nursing research in Canada has experienced inconsistent growth over the past four decades. A number of papers, book chapters, and reports offer a picture of the early development of nursing research in Canada ^(3, 4, 5). During the 1950s and until the mid-1960s, little or no funding was awarded for research projects in university schools of nursing. The lack of funding and support for infrastructure was a major barrier to the development of nursing research during these early years.

During the 1970s some research activity was noted, but a substantial portion of nursing research was carried out by graduate students and faculty. In the United States, although the number of doctoral programs and nurses prepared at the doctoral level increased in the 1970s, many nurses with doctoral preparation were not actively involved in research ⁽⁶⁾. Although lack of dedicated funding was still a major issue in Canada, some funding was available through voluntary organizations, private foundations, and the Canadian Nurses Foundation.

In 1971 a landmark event occurred: the launching of the first national conference on nursing research in Canada. The major emphasis in this conference was on nursing education and administration – not surprising in light of the fact that many Canadian nurse scholars at that time completed PhD programs in Education or Administration. This was followed in 1978

by a Kellogg- sponsored national seminar on doctoral preparation for Canadian nurses ⁽⁵⁾. A further milestone was achieved in this decade: the establishment of the first Center for Nursing Research in Canada at McGill University in 1979, supported by Health and Welfare Canada.

The 1980s witnessed the beginning of some involvement in nursing research by federal funding agencies such as the Medical Research Council of Canada (MRC) and the National Health Research and Development Program (NHRDP) of Health Canada. Simultaneously, a shift was noted in the nature of the research being undertaken, with a movement away from studying nursing education to the study of human responses to illness ⁽⁷⁾. Studies in this era, for the most part, were internally funded by academic units or health organizations, and approximately 1/3 of studies received external funding ⁽⁷⁾. Research manpower in nursing was limited, with only 193 nurses reported as having PhD preparation ⁽²⁾.

Despite the challenges facing nursing research in Canada during the 1970s, 1980s, and 1990s, it is worth underscoring the breakthroughs that did occur. This report demonstrates the growth in nursing research capacity in Canada, with particular reference to the past 10 years, and highlights the barriers that continue to exist in relation to ongoing development.

Cooke ⁽¹⁾ notes that in the assessment of research capacity, “little has been discussed or concluded about how to measure the effectiveness of research capacity building” (p.1). One of the factors contributing to this difficulty in Canada has been the continuing erosion of standardized data collection. While the Canadian Association of Schools of Nursing (CASN) and the Canadian Nurses Association (CNA) have both individually and collectively made serious attempts to collect such data, compliance with the process has been uneven.

2.1 PURPOSE AND OBJECTIVES

The purpose of the current project was to assess the current state of nursing research in Canada in order to develop a framework for capacity building, conduct a gap analysis using the framework, and make recommendations for future steps. The specific objectives were:

- To review the development of nursing research in Canada, with particular emphasis on the past 1999-2009.
- To identify facilitators and barriers in nursing research development with respect to:
 - human resources
 - groups/centers/institutes
 - career awards/chairs
 - funding of projects and programs
 - training programs
 - evaluating productivity
 - infrastructure
- To develop a framework for capacity-building in nursing research.
- To develop recommendations for priorities and approaches to building capacity in nursing research in Canada.

The project was conducted over a 12-month period. The development of a framework and the collection of data and information to populate the framework constituted the major activity. Gaps in the research and recommendations for future steps were identified. In addition, qualitative analysis was carried out to identify major areas of funded nursing research over the past decade.

3.0 METHODS

A variety of methods was used to elicit information on the salient characteristics of a research capacity development framework. Literature, published and unpublished, related to capacity development in general and specific to research capacity development, was reviewed along with materials related to the history of nursing research development in Canada and the United States. Web sites and factual documents were included in the search. Interviews with key informants, e.g. researchers, deans/directors, provided additional suggestions for framework components.

In order to populate the framework, data were gathered from leading nursing research organizations such as the Canadian Nurses Association (CNA), Canadian Association of Schools of Nursing (CASN), and the Canadian Institute of Health Information (CIHI) on various factors such as the characteristics of faculty, number of PhD students, and number of doctoral programs. To address research productivity, data on funded research were obtained from Canadian Institutes of Health Research (CIHR), Canadian Health Services Research Foundation (CHSRF), Heart and Stroke Foundation of Canada, National Cancer Institute of Canada (NCIC), Alzheimer's society, Kidney Foundation of Canada, and the Canadian Nurses Foundation (CNF). Where necessary, contact was made directly with funding agency personnel in order to obtain clarification and validation of data. Attempts were made to collect data from Social Science and Humanities Research Council (SSHRC); however, nursing as a discreet category is not identified in its database. Efforts to collect provincial data met with little success despite, in some instances, repeated attempts. Although several provincial governments do fund nursing research, the data that were available were often incomplete, which made provincial comparisons impossible. A brief survey was distributed by CASN to member faculties and schools with graduate programs to elicit data on the number of postdoctoral students, chairs, research centres, and institutes.

In order to determine which existing research databases would be most useful in determining the directions taken by nursing research in the past decade, three selection criteria were used: 1) the database had to include a nursing discipline code; 2) the database had to be large enough to allow major themes to be identified; and 3) the database had to be broad enough to reflect the diversity of nursing research. The CIHR database met all three criteria and therefore was selected for analysis.

Only studies indicating a nurse as the nominated principal investigator were imported into the qualitative statistical package NVivo7 by QSR. NVivo facilitated the organization and coding of study titles, and several themes emerged allowing for categorization. These categories were examined and refined over a period of several weeks by a panel consisting of two nurse researchers and one graduate student trained in qualitative analysis, in order to ensure consistency of the data coding.

4.0 FRAMEWORK FOR ASSESSING NURSING RESEARCH CAPACITY

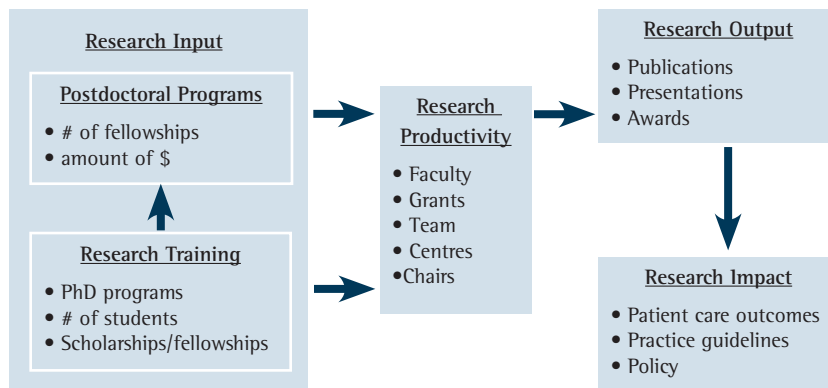
Research capacity-building must take place at an individual and organizational level ^(1, 8, 9, 10, 11). "It is the ongoing process of empowering individuals, institutions, organizations and nations to define and prioritize problems systematically, to develop scientifically, evaluate appropriate solutions and share and apply the knowledge generated " ⁽¹⁰⁾. The ultimate goal of research capacity- building is that of the generation and application of new knowledge to improve the health of individuals and families ⁽¹²⁾. The need for a framework, according to Cooke, is that it enables planning and measuring progress and determining appropriate outcomes. Such a framework should include both process and outcome measures, capture changes in both ends and means, and measure not only the ultimate goals but also the steps and mechanisms to achieve them. Every evaluation of a capacity development effort should contribute to the effort itself and, ultimately, to the organization's performance ⁽¹¹⁾.

Cooke ⁽¹⁾ identified six principles that form the basis of a framework for assessing research capacity-building. These were generated through an analysis of the literature, policy documents, and empirical studies, along with input from the Research and Development Support Unit in the United Kingdom. These principles state that research capacity-building should: develop skills and confidence; support linkages and partnerships; ensure the research is “close to practice”; develop appropriate dissemination; invest in infrastructure; and build elements of sustainability and continuity.

The distinction between these two approaches is that Cooke ⁽¹⁾ is attempting to answer the question “what is capacity-building,” which requires a conceptual framework. The framework proposed for assessing capacity for nursing research in Canada presented here takes a pragmatic approach, attempting to answer “How can we describe nursing research capacity?”

The elements of the framework consist of four main categories: 1) research input; 2) research productivity; 3) research output; and 4) research impact. Each category consists of several elements. These were populated with available data to provide a description of the status of nursing research in Canada over the past 10 years. In Phase 2 of the project, the directions taken in nursing research over the past decade were identified and gaps were noted. Recommendations were made for future research capacity development.

Figure 1: A Framework for Research Capacity



4.1 RESEARCH INPUT

The first component of the framework refers to the training and preparation of future researchers. The importance of this element to research capacity-building is well supported in the literature ^(1, 13, 14, 15). It is generally accepted that a minimum of a doctoral degree is required to undertake independent research. But in the past, not all nursing research was conducted by PhD-prepared nurses. Post-doctoral study provides a more intensive research experience and increases the likelihood of a productive research career.

Doctoral programs in nursing in Canada were slow to develop compared to other countries. The United States had 45 doctoral programs in nursing in 1990 as did several other countries, including Finland, Japan and Thailand ⁽²⁾. Canada began to offer doctoral programs in 1990, although work toward the development of doctoral programs began in the 1980s. Many Canadian nurses obtained PhD degrees in nursing from American Universities prior to having the opportunity to study in Canada. From 1990 to 1994, six universities in Canada opened doctoral programs in nursing. These included McGill University, which by 1993 offered a joint PhD program with the University of Montreal, as well as the universities of Alberta, Toronto, British Columbia, and McMaster. Currently there are 15 PhD programs in nursing in Canada ⁽¹⁶⁾.

By 2005 there were 390 students enrolled in nursing doctoral programs in Canada. Between 1990 and 2005, 206 students graduated from these programs, ⁽¹⁶⁾ with another 38 students graduating in 2006. The following table provides information regarding the enrolment and graduate rates for Doctoral Programs in Nursing in Canada between 1990 and 2006:

	Enrolment	Graduates
1990	8	1
1991	8	0
1992	18	2
1993	35	1
1994	57	1
1995	53	0
1996	97	3
1997	112	4
1998	156	18
1999	174	33
2000	125	10
2001	161	20
2002	271	18
2003	289	31
2004	327	25
2005	390	39
2006	N/A	38

Source: *Canadian Association of Schools of Nursing*

According to the Survey of Schools of Nursing, 36 postdoctoral fellows enrolled in Canadian Schools of Nursing in 2007.

Financial support for doctoral and postdoctoral students in nursing is an important aspect of research capacity development. An encouraging picture emerges when examining data from the major funding agencies, with all showing an increase in both numbers and amounts of monies awarded to nurses for doctoral and postdoctoral study. In 2000-2001, CIHR awarded 14 nurses doctoral and postdoctoral fellowships totaling approximately \$400,000. In 2003, there were 33 awards amounting to over \$1 million (Figures 2 & 3). From 2003 to 2007 the number of awards remained fairly constant at 25-27 per year. Despite this increase in support for nurses studying at the doctoral/postdoctoral levels and the likely outcome of more nurses available to supervise doctoral students, these numbers are not likely to be sufficient, given the dramatic increase in graduate enrollment as seen in Table 1.

The Canadian Health Services Research Foundation (CHSRF), through the Nursing Research Fund, awarded a total of \$450,000 in training funds (including postdoctoral awards) in 2006. This contrasted with the amount awarded in 1999 of less than \$200,000, prior to the federal announcement of the Nursing Research Fund (Figure 4). A total of 18 postdoctoral fellows in nursing received funding from CHSRF between 1999 and 2006 (Figure 5) under the CADRE open Postdoctoral Award competition. The number of doctoral fellowships issued by the Heart and Stroke Foundation rose steadily from four in 1999 to 8 in 2005/06 (Figures 6 & 7). NCIC funded six doctoral students in the time period of 1999 to 2007 for a total investment of

\$306,459; NCIC Research studentships are limited and designed for those who are engaged in full-time study in a PhD program in a Canadian institution. The applicant must have completed at least two years of research training at the graduate level. Figure 8 shows doctoral awards by the Alzheimer's Society.

One potential barrier to nurses obtaining doctoral fellowships is the requirement by the majority of funding agencies that the applicant must be enrolled in full-time study. Given that the majority of nursing doctoral students are women, many of whom are not able to undertake their studies on a full time basis due to family responsibilities, this presents a major obstacle. While it is difficult to say precisely how many doctoral and postdoctoral students are being supported through national research funding organizations, in part because of differences in reporting, the question must nevertheless be asked: what percentage of the current 390 students enrolled in doctoral programs receives financial support? Although funding for graduate study may be available through provincial programs, foundations, and universities, full-time study is also generally required. It is estimated, therefore, that a large number of students in nursing doctoral programs are not in receipt of scholarships or fellowships.

Figures 2-5 include data on postdoctoral awards, which appear to have increased over the past 15 years. CHSRF awarded 65 postdoctoral fellowships, including nursing and health service research focused projects, from 1999 to 2006 (Figure 5). The Heart and Stroke Foundation reports one postdoctoral award in 2000/01 (Figure 6) and the Alzheimer's Society one postdoctoral award between 2000 and 2007 (one award in 2001 approved at \$38, 500 per year for two years - Source: *Alzheimer Society of Canada*.)

One of the obstacles for nurses wishing to undertake postdoctoral study is the requirement of most funding agencies that they not hold a faculty position. However, at this time in nursing, most postdoctoral fellows hold faculty positions. CHSRF recently waived this requirement. In the future, this type of flexibility will be essential in developing the next generation of nurse career scientists.

4.2 RESEARCH PRODUCTIVITY

This category deals with several aspects of research capacity including human resources, research funding, the development of infrastructure, and establishing of chairs, centers, and institutes. Data from CASN/CNA, research funding agencies and academic institutions were utilized. However, due to incomplete data sources and missing data, the numbers reported in some areas will be significantly underestimated.

The development of research capacity extends beyond the development of an individual's research skills to the support of teams, networks, institutions, and systems. The U.K. Department of Health defines research capacity-building as "a process of individual and institutional development which leads to higher levels of skills and greater ability to perform useful research" ⁽¹⁷⁾. Cooke ⁽¹⁾ cites the Australian National Information Service, which defines research capacity-building as "an approach to the development of sustainable skills, organization structure, resources and commitment to health improvement in health and other sectors to multiply health gains many times over". Research capacity, therefore, can be seen as a means to inform practice and lead to health gains and as an end in itself in the development of skills and structures, which enable research activities to take place ⁽¹⁾. The development of nursing research capacity in Canada in its early stages faced challenges and barriers at all levels, from scarce opportunities for individual development to institutional and system biases. Nursing has had to defend the role of research and the need for research capacity.

4.2.1 Human Resources

In 2005, there were 4,205 faculty members in Schools of Nursing in Canada ⁽¹⁶⁾. Of these, 534 had doctoral preparation, 256 in nursing and 278 in another discipline. Taken together, this represents only 12.7% of all School of Nursing faculty members. This constitutes a serious challenge to the research training of doctoral students and places limits on the numbers of admissions possible to PhD programs in nursing. In 2005, only 57 faculty members in Canadian Schools of Nursing reported having postdoctoral preparation: 38 with postdoctoral experience in nursing and 19 in another discipline (Table 4). The consequences of these low numbers of research-prepared faculty in university schools and faculties of nursing for the development of research capacity in nursing was an issue raised in the 1993 final evaluation report of the joint NHRDP/MRC initiative.

The age of faculty members in schools of nursing must also be considered when examining the issue of resources and research capacity development. According to the CNA/CASN data for the years 2002–2005, 42.5% of faculty were over 50 years of age and 6% were over 60. Several schools did not submit age-related data. By 2005, 39% of faculty members were over 50, with 7.8% over 60. If one compares these figures with the latest CIHI statistics, however, it is evident that the professoriate as a whole is aging and a significant number will be retiring over the next 10 years. This may further weaken the teaching capacity for new doctoral students, at least until the recent graduates establish themselves as productive teachers, researchers and faculty members.

From a human resources perspective there appears to be a looming crisis in terms of numbers of doctoral and postdoctoral prepared faculty to support the numbers of students enrolled in PhD programs in nursing. A targeted initiative may be required to provide financial incentives, i.e. scholarships, for those enrolled in doctoral and postdoctoral study. Another option is to fast-track graduate students who show potential for a research career.

4.2.2 Research Funding

National Initiatives

Financial support for nursing research was slow to develop in Canada. In the 1970s and 1980s, few nurse researchers were competitive at the national level in the competitions held by the research councils and by national charities such as the National Cancer Institute of Canada (NCIC). This, for the most part, was because of lack of fit between nursing research and the mandates of these organizations. The Medical Research of Council of Canada (MRC) funded basic biomedical research and clinical research primarily in the form of clinical trials, which was characteristic of the larger charities as well. Health services and nursing care research were considered less scientific and less relevant in that era. The National Health Research and Development Program (NHRDP) of Health Canada began as a program of the Department of Health and Welfare Canada and was an extramural funding program that did support nursing research and masters' and doctoral scholarships. However, the budget of NHRDP was only a fraction of the budget of MRC.

In 1989 a special joint initiative between NHRDP and MRC was launched, which provided funding to assist in the development of nursing research capacity in the faculties and schools of nursing in Canada. The total amount of this initiative was \$2,665,886, spanning from 1989 to 2000/01. The costs were shared equally by both funding agencies. Through this special initiative, nine university schools of nursing received funding, and salary support was provided to 17 nurse researchers to allow them to dedicate 80% of their time to research. Two of these researchers were subsequently successful in securing a scholar award under the NHRDP's regular health career awards program. Today all of these individuals have highly successful research careers.

Provincial Initiatives

All provincial governments supported health research, while some, such as British Columbia and Ontario, have explicit research funds dedicated to nursing. The government of Alberta in 1980 created the Alberta Heritage Foundation for Medical Research (AHFMR) with a \$300 million endowment. Its focus was on basic biomedical and medical research. After two years of lobbying, nurses in Alberta succeeded in establishing the Alberta Nursing Foundation, with a \$1 million a year budget – a small but significant gain. The ANF was eventually closed but today, AHFMR supports a broader range of health research, including nursing research and fellowships.

The Ministry of Health and Long-Term Care of Ontario also provided funds to nurse researchers throughout the 1980s and early 1990s. While the program is no longer operating, it was a major catalyst for nursing research at the time and certainly contributed to the research capacity of nursing. The Ontario government continues to provide funding for targeted research initiatives in nursing and still provides career scientist awards to nurses through the generic career scientist program. The Nursing Research Units at the University of Toronto and McMaster University are other examples of Ontario government support.

In Quebec there are several sources of funding that support nursing research and doctoral and postdoctoral students, including FRSQ (Fond de la Recherche en Santé du Québec), FQRSC (Fond Québécois de recherche sur la société et la culture), and FRESIQ (Fondation de recherche en sciences infirmières du Québec). Also included is GRISIM (groupe de recherche interuniversitaire en sciences infirmières de Montréal); this group is in the process of expanding to the larger Quebec community of university schools of nursing.

British Columbia created a British Columbia Foundation, which supported a wide variety of research projects including nursing. That foundation was replaced by the Michael Smith Foundation for Health Research (MSFHR). Nurse researchers have been very successful in the foundation's competitions. (personal communication) In 2007, the government of British Columbia gave the Michael Smith Foundation \$8 million targeted for research in the area of nursing work life.

While some of these provincial funding sources have ended or changed, they undoubtedly have had a positive effect on nursing research capacity development. As the data in this report reflect, nurse researchers now compete successfully in provincial and national research competitions along with all other health researchers.

Professional Association Initiatives

The Canadian Nurses Foundation (CNF) was established in 1962 in an attempt to provide support for nurses who wished to continue their graduate studies. CNF in the early years was, for the most part, the only source of funding for nurses. In addition to scholarships, the CNF began to provide small grants for research in nursing. However, the CNF struggled to maintain a funding base sufficient to support research. Much of its funding has been donations from nurses, and many of these have been bequests for named awards. While the CNF has not historically played a major role in the funding of research, it has made a significant contribution to nursing scholarship. More recent CNF initiatives are discussed later in this report.

A number of significant developments related to funding for nursing research occurred at the national level in the 1990s. Under the leadership of Dr. Henry Friesen, then president of the Medical Research Council (MRC), the MRC began a transformation of its mandate to move

from an emphasis on biomedical research to include all health research. By 2000, the MRC was changed to the Canadian Institutes of Health Research (CIHR) with a much larger annual budget in order to meet its new mandate. The NHRDP ceased to exist, as some of its work was now included in the funding of CIHR. Nursing research has benefited greatly by this change in federal support for health research.

In 1997, the federal government also established the Canadian Health Services Research Foundation (CHSRF). The mandate of this new funding agency was to support applied health services and policy research. By 1999, the CHSRF had an endowment of \$126.5 million. CHSRF received an initial endowment of \$66.5 million from the federal government, and then in 1999, CHSRF received \$35 million to support the Capacity for Applied and Developmental Research and Evaluation in Health Services and Nursing (CADRE) program and was designated as the steward of a \$25 million Nursing Research Fund to support nursing research over a 10-year period. These significant federal investments in nursing research were largely as a result of successful lobby efforts by the CNA.

Another federal funding agency, the Social Sciences and Humanities Research Council (SSHRC), has also funded nursing research related to the history of nursing, women's studies, and some psychosocial research. However, as noted earlier, it is difficult to identify nursing studies from other studies in its database, as the SSHRC does not have a discipline-specific category for nursing.

4.2.3 Nursing research funding in Canada: 1990 – 2006/07

Despite missing data and incomplete data sets, it is possible to say there has been an impressive increase in the funding of nursing research in Canada over the past 10-15 years. According to O'Connor and Bouchard ⁽¹⁹⁾, based on data collected by CASN, formerly Canadian Association of University Schools of Nursing (CAUSN) from 1971 to 2002, during the 1980s, nurse researchers received a total of \$4,491,000 in the academic year 1988-89. By 1998, this amount had increased to \$8,584,611 ⁽²⁾. In 1999, a CAUSN database, collecting self-reported data completed on line by individual researchers, was developed to capture the research productivity of university nurse researchers. The data for 1999 showed a significant increase in funding over 1998 with \$14,390,303 reported for 1999 and \$19,323,971 in 2000. By 2001, the total was \$27,528,277. Unfortunately, the database has not been maintained by the community of researchers. At the present time, it is necessary to estimate the amount of funding by a search of multiple data bases of funding agencies and/or collect primary data from Schools of Nursing.

In examining the Canadian Institutes of Health Research (CIHR) databases, it can be ascertained that from 2000-2007, the number of operating grants to nurses as principal investigators increased from 38 grants in 2000/01 to 130 grants in 2005/06. In 2006/07, the number decreased slightly to 119, but data for 2007 may have been incomplete (Figure 9). Funding for new grants had reached a plateau because a large percentage of funds had already been committed. Funding for operating grants increased from just over \$2 million in 2000/01 to almost \$11 million in 2006/07 (Figure10). The number of awards for clinical trials increased from two in 2001/02 to 10 in 2006/07 (Figure 11). CIHR salary support/career awards for nurses increased from seven awards in 2000/01 to 37 awards in 2006/07 (Figure12). The dollar value of these awards ranged from \$2-2.5 million from 2004/05 to 2006/07 (Figure 13).

The provincial distribution of CIHR operating grants continues to show regional disparity, with the largest number of grants going to Ontario, followed by Quebec, British Columbia and Alberta. This distribution covers 2000 to 2007 (Table 16). The same pattern does not hold true for fellowships and salary awards. In both of these categories, Quebec falls to fifth place, with Ontario leading by twice as much funding as Alberta and British Columbia.

Taken together, overall funding for nursing in all categories of awards by CIHR increased from just over \$3 million in 2000/01 to slightly over \$16 million in 2005/06 (Figure 15). The data for 2006/07 reveal a slight decline, but this may be due to incomplete 2007 data at the time of this study. The total amount of funding for all grants and awards from CIHR in 2006-07 was \$810 million (CIHR annual report, 2007). A percentage would be helpful for comparison.

As noted earlier, in 1999 CHSRF was granted \$25 million over 10 years to support capacity development in nursing research. The investment was called the Nursing Research Fund (NRF). The primary objectives of the Nursing Research Fund were to: 1) create high-quality knowledge of use to health system decision and policy makers; 2) increase the number and natures of applied health services and nursing researchers; 3) move research into the hands of decision makers; and 4) help decision makers routinely appraise, adapt and apply relevant research in their work.

Generally, CHSRF provides funding for four categories of awards: training awards; research funding; network, synthesis and dissemination; and nursing chairs. As part of the Nursing Research Fund agreement, \$500,000 per year, increased in 2003 to \$535,000 per year, was distributed to nurse researchers in partnership with the Canadian Nurses Federation (CNF) to specifically support clinical nursing research, equating to more than \$5 million. This Nursing Care Partnership (NCP), which requires 2:1 matched funds, has attracted several funding partners from national and provincial charities (see below the section on the Canadian Nurses Foundation for additional information). Building partnerships is integral to capacity building^(1, 12, 14, 18). The remaining \$20 million has supported nursing-focused Chairs, Regional Training Centres, Postdoctoral Awards, Career Reorientation Awards (through the CADRE program), projects and programs through CIHR's Partnership for Health System Improvement and the CHSRF's Research, Exchange and Impact for System Support (REISS) grant competition, commissioned research projects, such as CHSRF's Decision Support Synthesis, and knowledge networks and dissemination activities.

Between 1999 and 2006, the Nursing Research Fund provided funding for a significant number of activities. Highlights include:

- 40 Open Grants Competition projects and programs
- 2 Research, Exchange and Impact for System Support (REISS) Programs
- 5 nursing-specific CHSRF-CIHR Chairs and 3 nursing-related Chairs (of the 12 awards)
- 18 Postdoctoral Fellows
- 3 CHSRF-CIHR Regional Training Centres (of the five awards)
- 3 Career Reorientation Awards
- Research funded by Nursing Care Partnership
- Co-sponsorship for 4 nursing theme projects funded under the CIHR Partnerships for Health System Improvement (PHSI) competition
- More than 24 special project grants or awards

The annual NRF spending for research and personnel awards ranged from just over \$400,000 in 1999 to almost \$1.2 million in 2003. In 2004, the project portion of the CHSRF's Open Grants Competition was transferred from CHSRF to CIHR. The following year, CIHR launched the new Partnerships for Health System Improvement competition, which provided health services and nursing project funding with an expanded number of eligible themes. The CHSRF also launched its new Research Exchange and Impact for System Support Competition, which provided expanded funding for programs of research under its four priority theme areas – one of which was Nursing Leadership, Organization and Policy. When these two new competitions were put in place, the \$500,000 per year that was set aside to provide successful nursing

theme applications under the Open Grants Competition (OGC) with the matching funding that the OGC required was divided between REISS (\$300,000) and PHSI (\$200,000) to provide some of the matching funding requirements. These amounts for nursing theme programs and projects were in addition to the amounts requested and provided by CHSRF and CIHR.

Funding to support the five CHSRF/CIHR Chairs in nursing and three nursing-related Chairs ranged from just over \$200,000 in 2000 (the year that the chair awards were granted) to slightly over \$800,000 in 2006⁽²⁰⁾. The increase in funding from 2000-2006 for the Chair awards is largely as a result of administrative issues related to invoicing and reporting. The Chair awards are each worth \$125,000 per year in salary funds (the same amount annually reinvested by the host university into the chair program), as well as \$50,000 program funding per year. In 2005, following a mid-term review, one of the nursing chairs was not renewed for the second five years of the award and this, along with the sabbatical of another chair and other administrative issues, contributed to a decreased amount of funds flowed during that year (Figure 17). While there has been some variability in the annual amounts flowed to the nursing and nursing-related chairs, the overall total funding will average out over the 10-year course of the awards.

Overall, the Nursing Research Fund appears to have injected a significant amount of support for nursing research and the development of research capacity. An annual report is prepared for nursing research and the development of research capacity. An annual report is prepared to capture the activity supported through the NRF. In 2007 an external independent evaluation of the NRF was commissioned, the results of which were made publicly available in November 2008. The need for renewal of the NRF will be discussed in the conclusion and recommendations of this report.

Charitable Organizations (Disease related): Several national and provincial charities also support research in nursing. While not all charities were included in the analysis, a few of the larger ones are identified in order to search for any existing trends of nursing research.

- The Heart and Stroke Foundation of Canada (H&SFC): For several years, this foundation has supported nursing research in the area of cardiovascular care and in 1999 provided \$100,000 in support of nursing research. This increased to almost \$160,000 in 2003 (Figures 18 and 19). The amount of funding appears to have decreased in 2004 and 2005 and the data from 2005 onward are not available. However, according to Heather Arthur (McMaster), the H&SFC has provided special initiatives to promote research capacity-building in cardiovascular nursing. These included the establishment of a Chair in Cardiac Nursing in 2004 and in 2004/05, the funding of strategic training programs for a value of \$1.8 million (2002-2003 Visiting Scientist Award; 2004 Chair in Cardiac nursing; and 2004-2005 Strategic Training Program Grant).
- National Cancer Institute of Canada (NCIC): Table 2 shows the total amount of NCIC funding for nursing research from 1999 to 2007. Figure 20 shows the annual breakdown of funding, demonstrating a reasonably steady increase over the seven-year period.
- Alzheimer Society of Canada: From 2000 to 2007, the Alzheimer Society of Canada supported research in nursing through research grants. Similar to findings of other funding agencies noted above, the trend is, for the most part, one of increased funding over the years. (Figure 21). In 2000, the Society funded research grants for a total of \$50,000. By 2005, the amount had increased to over \$600,000.
- The Kidney Foundation of Canada: Three nurses have been the recipients of doctoral awards from this foundation since 2000. Prior to 2000, the discipline of recipients was not identified. Since 1998, a total of 15 research grants in nursing have been awarded.

Charitable Organizations (Non-disease related):

- Canadian Nurses Foundation: Following the establishment of the Nursing Research Fund (NRF), administered by CHSRF, the CNF partnered with CHSRF to manage that part of the NRF dedicated to clinical research, since clinical research was not the mandate of CHSRF. In January 2001, CHSRF provided the CNF with \$50,000 to develop the Nursing Care Partnership Program. In January 2003, all conditions for funding were met and CHSRF granted CNF a five-year award of \$2.59 million to support the Nursing Care Partnership Program (NCP). The program required CNF to find matching funds for the funds that they provided to support clinical nursing research projects, and stipulated that the funded projects be approved through an established peer review process. In October 2007, CNF conducted an evaluation of the NCP as part of its proposal to CHSRF for continuing the NCP for a further five-year period, from 2008 to 2012. The results were impressive: (personal communication, Hélène Sabourin, Executive Director, CNF). From 2003 to 2008, 33 partnership agreements were formed and 149 projects were funded. Over the five years, CNF contributed \$2,222,057 to research and leveraged a further \$4,649,443 from partners. The total investment in clinical research was \$6,869,509 (Table 8). In late 2007 the NCP was renewed for an additional two years, representing an additional investment of \$1.07 million. This extension will take the NCP's timeframe to March 31, 2009, which coincides with the end date of the NRF.

4.2.4 Research Teams: From solo researchers to communities

Until the mid-1990s, nurse researchers typically worked on individual research projects in solo fashion. This may be a typical step in the development of research capacity. Nevertheless, the development of research networks and the building of partnerships and collaboration are integral to capacity-building^(12, 18, 21). In Canada, over time, successful researchers began to collaborate with one another on similar research themes. For example, nurse researchers working in the field of pain began to apply as a team for research grants and began to publish together in relevant journals (Jeans, manuscript in preparation). These teams often involved graduate students and researchers from within and outside the same academic institution. Some faculties/schools of nursing became known for particular areas of expertise such as health human resources, pain, and perinatal care. What followed in the next eight to 10 years was the proliferation of teams to include nurses and other disciplines.

4.2.5 Survey of Faculties/Schools of Nursing

To gain a further understanding of research productivity at the level of the faculty/school, a brief survey was sent to CASN member university programs. This survey sought to determine the current level of capacity development as it relates to postdoctoral training, established chairs, and research centres/institutes. Surveys were distributed to 48 academic nursing programs and 28 were completed, for a response rate of 58%. With almost half of the programs not responding, it is likely that the data reported here are underestimated.

Eleven of the 28 responding school/faculties indicated that they are engaged in postdoctoral training, with numbers ranging from one postdoctoral fellow to nine fellows per unit. As of September 2008, the University of Alberta had seven nurse postdoctoral fellows, two of whom are international, and two non-nursing post-doctoral fellows.

Of the 28 respondent schools, 10 reported the establishment of research chairs. A total of 27 chairs were cited. One faculty reported eight chairs, with the majority reporting one or

two. Most of the chairs were endowed. The CHSRF/CIHR CADRE nursing chairs (N=5) were not endowed but were funded for a 10-year period, which will be ending between 2010 and 2012. Some of the chairs as reported by faculties are shared with teaching hospitals, while some are university-specific. At the time of writing, two chairs were unfilled and one was launched in 2008.

Eleven schools/faculties reported the existence of Nursing Research Centres. The number of centres per unit ranged from one to five. Twenty schools/faculties have established research centres in partnership with other departments/institutions. Some of these centres are nursing-focused, but several are multidisciplinary and focus on a particular area of study; for example, pain research and education.

While the data are incomplete, there is some indication that research training centers in nursing have been established across the country. Three of the five CHSRF/CIHR CADRE regional training centers that began funding 2001 had a nursing focus. The purpose of the regional training centres is to increase the number of qualified applied health services and nursing researchers at the master's and PhD levels. The three nursing-focused centres are:

- FERASI – Quebec-based center involving a partnership with Faculties of Nursing at the University of Montreal, Laval, McGill and Sherbrooke Universities. The focus of this Center is on nursing leadership and administration;
- The Ontario Training Centre - Ontario-based centre involving six universities with nursing programs (McMaster, York, Laurentian, Lakehead, University of Ottawa and University of Toronto). The focus of research is on health services and policy; and
- The Centre for Knowledge Transfer – Alberta-based but was designed to be national in scope with partners from the Universities of Laval, Manitoba, Saskatchewan and Alberta. The focus of this training center was knowledge transfer. In 2006, following a mid-term review of the regional training centres, funding for the Centre for Knowledge Transfer second five-year term was not renewed.

All of the CHSRF/CIHR regional training centres were established based on four fundamental program requirements. Each centre (1) is multiple site; (2) provides a curriculum that includes training in knowledge transfer; (3) offers mandatory student residency with decision-makers; and (4) uses an interdisciplinary approach in both student and faculty composition⁽²⁷⁾. The Ontario Training Centre and Centre for Knowledge Transfer are referred to as “nursing related,” in that the Centre strives to attract and accept interdisciplinary students. The only “nursing-specific” centre of the three is FERASI in Quebec. As noted earlier, other initiatives, such as that of the Heart and Stroke Foundation, provided funding for strategic training programs.

Overall, the growth in research capacity in nursing over the past 10-15 years as related to research productivity has been remarkable. Although nursing does not have its own institute within CIHR, nor one institute that clearly embraces a nursing perspective, nurse researchers have been very successful in competing for CIHR funding in the categories of operating grants, scholarships, and salary support. CIHR is the largest federal source of funding for nursing research, followed by CHSRF. Other funding organizations have also increased their support of nursing research as noted above. The formation of Chairs and Research Centres/Institutes is another powerful indicator of research productivity.

While no data were available related to the status of infrastructure (human, technical and physical) to support research productivity, the reality is that for nursing faculty carrying heavy classroom and clinical teaching loads, committing time for research and/or securing adequate space for research presents a major challenge. Difficulty with access to statistical, design, and substantive consultation is another area that is still a barrier for research capacity development for some faculties/schools of nursing. Many of these problems affect the development of a robust nursing research program(s) in academic teaching hospitals as well.

4.3 RESEARCH OUTPUT

This domain of the framework is another measure of research capacity development. ⁽¹⁾ Some support for networks, synthesis and dissemination was provided by CHSRF through the Nursing Research Fund, beginning in 1999 with almost \$170,000 and dropping to less than \$10,000 in 2006. This decrease reflected the increase in research funding provided by CHSRF between 1999 and 2006 as fewer funds were available for this type of activity.

In academic institutions the usual criteria for assessing the results of research, and hence the research productivity and output of faculty, include the number of publications, conference presentations, invited talks, and awards and honors ^(21,22). Hanney et al. ⁽²³⁾ suggest that publications outside the research community, i.e. lay publications, directed to those who potentially may be affected by the research, also be included as output criteria for research.

Data from faculty members related to the criteria of research output were not possible to collect. However, in key informant interviews, researchers and deans agreed that the number of publications and presentations has increased significantly, as has the scope of the journals in which nurses publish including non-nursing scientific journals. The number of presentations at national and international conferences (professional as well as interprofessional) was also increased.

A significant indicator of development in this aspect of nursing research capacity-building can be found in the history of nursing research publications. In Canada, the first peer-reviewed nursing research publication was founded at McGill University in 1969 by Dr. Moyra Allen. *Nursing Papers* (as it was first called) was published quarterly and accepted manuscripts in both English and French. There were few contributors and few people able and willing to take on the peer review of manuscripts. There was also little funding available, and for several years much of the work was carried out by the Editor and the McGill School of Nursing faculty.

In 1988 the journal was renamed the *Canadian Journal of Nursing Research (CJNR)*. The name change was in part an attempt to attract funding for the journal. After two attempts, the journal was successful in receiving a publication grant from SSHRC, which continues to this day. The journal also received a grant from MRC for two years, which helped get it back on financial track. Scholarly journals in Canada almost always struggle for financial security, as small population makes circulation numbers low. Today the journal has a very healthy publication schedule and its format is much improved compared to the early years. Dr. Laurie Gottlieb is the current editor, and she has enlisted several guest editors who have played an important role in the continuing development of the journal. In 2009, the journal will celebrate its 40th anniversary with a special issue looking back at its history and milestones.

Another scholarly nursing journal was founded in Canada in 2003. *The Canadian Journal of Nursing Leadership (CJNL)* evolved from a previous journal of nursing administration. The CJNL is the official journal of the Academy of Canadian Executive Nurses (ACEN) and is published by Longwoods. The current editor is Dr. Dorothy Pringle. The journal is peer-reviewed and publishes research articles as well as non-research-based manuscripts. It is published quarterly and has a large international circulation. As well, there are a variety of peer-reviewed clinical specialty journals such as the *Canadian Journal of Cardiovascular Nursing*. The *Canadian Nurse Journal* from the Canadian Nurses Association also includes in its publications some peer-reviewed research articles.

4.4 RESEARCH IMPACT

Identifying the impact of research constitutes the final category of the research capacity framework. The ultimate goal of research capacity-building is one of health improvement; it should generate research that is useful for practice – new knowledge to improve the health of individuals and families (2, 24, 25, 26). The availability of documentation to populate this category related to the actual impact of nursing research is at present extremely limited. For the most part, the data are restricted to personal communication made by or provided to the author of this report. The directions taken within the last decade are topics relevant to the health of individuals and families. Three major categories of studies emerged from the analysis of funded nursing research. These were studies dealing with selected health issues, those addressing the topic of health services organization, and those with a focus on health promotion. Health issues constituted the largest of these categories. This category included studies dealing with chronic illness, reproductive health, pain, and end-of- life/palliative care. Chronic illness emerged as the dominant focus in this group of studies. Health services/ organization formed the second largest category of studies, followed by health promotion. The populations studied within these respective areas were also identified.

1.2.1 Health Issues/Problems

Within this category of research, a number of subcategories were identified, with chronic illness emerging as the most prominent focus.

Chronic Illness: Studies addressing the issue of chronic illness focused primarily on patients and their families dealing with various forms of cancer, mental health problems, and cardio-vascular disease. Studies that examined the problems associated with cancer included exploratory studies of the experience of living with and coping with cancer, and studies that described/ tested interventions aimed at providing supportive care to patients and their families. Issues of increasing accessibility to quality cancer care and eliminating the disparities to receiving care were addressed in many of the studies in this category. In addition, fostering healthier lifestyles for those with cancer and supporting the decision-making role of patients regarding treatment options were key elements in much of the research.

Mental illness formed the second major sub-category within the category of chronic illness. The mental health of women emerged as a dominant theme, particularly as related to the issue of abuse. Access to mental health services, continuity of care, and the needs of groups, such as those living in rural areas, were prominent themes in the studies in this sub-category.

The third sub-category of chronic illness to be targeted was cardiovascular disease. The influence of psychosocial factors, selected support measures, new service approaches such as health lines, the role of the patient in the decision-making process, and the client's adaptation/adjustment to the illness were explored in these studies. The question of gender differences, both in terms of help- seeking and quality of life outcomes for patients with a cardiovascular insult, were examined in several of these studies.

The populations studied in the above group of studies spanned all age groups from infants to the elderly. Over one-third of the studies focused on women and 12% targeted minority/ disadvantaged populations.

1.2.2 Health Services/Organization

The second largest category of studies overall identified in this qualitative analysis was that of health services/organization. Studies within this category focused on issues related to the delivery and structure of health care. Reducing disparities in health care and improving access to quality health care figured prominently. Many of the studies were evaluation studies, involving testing of a variety of models of care, and evaluation of selected delivery care models such as tele-nursing. Effects of hospital restructuring on patient outcomes, length of stay in hospital and its relationship to various patient variables, costing of nursing services and models for costing such services, and evidence-based practice were all topics included under the theme of health services /organization. Given the major thrust of studies in this category – reducing disparities and improving access – it is perhaps not surprising that minority/disadvantaged groups and the elderly were the populations targeted.

1.2.3 Health Promotion/Disease Prevention

The third-largest category of studies had as its central theme health promotion/disease prevention. Specific issues targeted in these studies were tobacco use, Aids/HIV, abuse, and obesity. A number of these studies examined the role played by communities, or which communities could play, in the promotion of health. Exploratory studies, as well as studies that subjected a particular health promotion intervention to testing, constituted the studies in this category. Of the populations identified in this group of studies, children, adolescents, and women, followed by minority groups, were the main populations targeted.

These studies were examined further within the context of other reports/documents dealing with nursing research as related to health care priorities. In the document, *Global Health Research Priorities: Implications for Nurse Researchers* ⁽¹⁾ released in 2005 by the International Network for Doctoral Education in Nursing, the “urgent need for nursing research” particularly as related to health promotion, disease prevention, and chronic disease was stressed. Similarly, the National Institute of Nursing Research in the United States in its *Strategic Plan 2006*, ⁽²⁾ identified health promotion/illness prevention and eliminating health disparities as priorities for nursing research. Findings from the present study are consistent with these proposed directions of other national and international bodies.

Examining the results of the current analysis of Canadian nursing research within the context of Canadian health care also reveals a number of encouraging signs. The Health Council of Canada’s first report ⁽³⁾ released in 2005 reviewed the progress made in implementing the 2003 Health Accord. The Health Accord identified health disparities as the number one health problem in Canada, and the improvement of services to aboriginals was of high priority. As noted in the above analysis of nursing studies, and where populations were identified in the study title, 24% were directed toward services for the aboriginal population or other disadvantaged groups such as immigrants/refugees. The Accord called for particular attention to the problem of obesity, considered then and in 2008 to be a problem of epidemic proportions both within the adult as well as the paediatric populations. This area of research in the studies reviewed received little attention.

A second area of concern relative to Canadian health care identified in the Accord was that of access to health services. The Health Council report of 2005 stressed the need for accelerated development of new models of health service delivery and the need for expansion of home care services to improve access to health care. Access to services was a dominant and recurrent theme in the studies analyzed in this review.

The third area perceived by the Health Council as demanding further attention was the establishment of the infrastructure required to achieve access to health care services/ programs. As part of this infrastructure, the need for a “team focus” was stressed. This was also a theme that emerged in the studies reviewed.

The predominance of chronic illness in the nursing studies reviewed, and the relevance of this focus of study to the health of Canadians, is underscored in a number of recent reports issued by the Health Council of Canada.

In 2007, the Health Council issued two reports on chronic illness care in Canada: *Why Health Care Renewal Matters: Learning from Canadians with Chronic Health Conditions* ⁽⁴⁾ and *Canadian’s Experiences with Chronic Illness Care in 2007* ⁽⁵⁾. In these reports, the Council points out that more than 9 million Canadians, or one-third of youth and adults in Canada, suffer from one or more chronic health conditions, representing a significant and growing health care and economic burden for Canada. They note that serious gaps in accessibility and quality of care exist and that “team care,” which can make a difference in the health of people with chronic conditions, is far from the norm for Canadians. Of relevance to nursing is the observation by the Council that referrals to services that can help those with chronic illnesses adopt a healthier life style remain uncommon, despite the fact that life style behaviours can delay or prevent the onset of health conditions and related complications. The Council stresses that governments must invest in proven (research-based) strategies to improve quality of care and assist those with chronic illnesses to become engaged in the management of their own chronic health condition. Furthermore, “we need continued research to identify how health care providers can be most effective in improving health outcomes”.

The present analysis of nursing studies funded by CIHR between the years of 2000 and 2007 would appear to indicate that nursing research in Canada is attempting to address the priorities identified by Canadians as well as those identified by other national and international groups concerned with the health of their nations.

The availability of documentation to populate this category is at present extremely limited and is, for the most part, restricted to personal communication and observations made by or offered to the author of this report.

How has the research enterprise in nursing influenced the practice of nursing, nursing education, health policy and services, and patient care? While there are no definitive answers to these questions, there are major trends that indicate a great change in research uptake. Research utilization, evidence-based practice, and best practice guidelines are becoming common initiatives in nursing and other health disciplines. Research is central to the development of “best practice”. Because the volume of evidence upon which to base practice was very low in the 80s and early 90s, it was not possible to base practice on a well-established body of evidence. Even now, in certain areas of nursing, such evidence is scant. However, a few examples demonstrate the powerful impact research can have on practice, such as Ducharme’s online resources for aging Canadians and their caregivers, Johnston’s studies on infant pain, and Paterson’s new standards of care for diabetes.

Although considerable progress has been made, there continue to be gaps between what is known through research and the application of that knowledge to patient care. In part, this is a major culture change, from nurses relying on textbook knowledge (usually out of date) and one another as a source of practice guidelines, to nurses seeking out new evidence to use in patient care. In this respect, the science of research utilization is now a growing area of study for all health professions. Nurses are no exception and in some cases are leading in this field ⁽²⁶⁾.

The influence on education has been far more evident. The production of nurses with research preparation at the doctoral level has changed the nature of nursing curricula and teaching methods. Research is used in teaching materials and classroom lectures. Research-intensive faculties and schools have many opportunities to expose undergraduates to the value of evidence and to a career in nursing research. The presence of graduate students in the school also serves to stimulate undergraduates to consider graduate studies.

The ability to assess the impact of nursing research on health care services and health policy is also limited by lack of documentation. However, there are some examples of research contributing to health services changes, including Doran and McGillis Hall's work on nursing staffing ratios and skill mix on patient outcomes ⁽²⁾; O'Brien-Pallas' research program on the size and nature of the nursing workforce and management of the health care system; Browne's study of the link between costs and outcomes; DiCenso's integration of nurse practitioners into primary health care; and Edwards' study on the prevention of falls and changes in building codes. Personal communications would indicate that there are more examples of how nursing research has contributed to improved health and health system functioning. It is important that researchers ensure that those research findings that have a potential to improve the system and/or the health of patients/clients be conveyed to those who can use it, such as clinicians, administrators and policy makers.

5.0 RECOMMENDATIONS

1. Serious effort should be made to improve databases to support future research evaluation.
 - 1.1 The CASN database should be modified and made user-friendly, and incentives put in place to ensure regular input of data.
 - 1.2 Major research funding organizations (starting with SSHRC) should be requested to add a nursing discipline code to their databases and, where possible, harmonize data coding and reporting with CIHR to facilitate comparison of data. National and provincial research funding organizations should also be requested to add the nursing discipline code and harmonize reporting.*
2. Immediate strategies should be put in place to address the significant shortage of research-prepared faculty available to supervise doctoral students.
 - 2.1 A strategic funding initiative is needed to provide greater support for postdoctoral fellows. The requirement by all funders that they not hold a faculty position should be waived until such time as there are adequate numbers of faculty with established research careers.
 - 2.2 Funding should be made available to repatriate retired successful nurse researchers on a part-time basis to assist with doctoral student supervision.
3. Strategies need to be developed to strengthen the documentation of the impact of nursing research on policy, practice, and patient outcomes.
 - 3.1 Consideration should be given to periodic surveys of CASN members for data on the impact of their research.
 - 3.2 Funding should be sought to hold a conference every two-to-three years showcasing the significant impact of nursing research on practice, education, health services organization, and policy. Proceedings could be published to begin to accumulate meaningful documentation.
4. Increase studies designed to demonstrate the impact of selected nursing interventions
5. Strategic funding should be made available by governments through their research funding organizations for increased support of research related to chronic disease management, health promotion, and health services.

6. Renewal of the Nurse Research Fund (NRF) for 10 years at a more significant level of funding should be requested of government, and should include a strategic postdoctoral initiative.
7. Nursing leaders should be encouraged to work collaboratively to establish research priorities for nursing every five years in order to give direction to capacity-building.
8. An evaluation of research capacity needs to be conducted every three-to-five years in order to continue to document capacity development and make recommendations to educators, nurse leaders, and governments for any required action.

** Improved databases will benefit all disciplines, not just nursing*

6.0 CONCLUSION

A framework for assessing research capacity in nursing has been proposed and the components of the framework have, to the extent possible, been populated with data. Originally, the framework was to be used to assess the past 10 years of research capacity development in nursing. However, a number of limitations were identified in terms of data availability and quality, resulting in some instances of less than 10 years of data. In such cases it was necessary to use secondary sources of data. The findings suggest that nursing must develop methods to accurately and efficiently assess research capacity in nursing if strategic initiatives are to be developed in response to strengthen areas of knowledge development. The CASN research database was an important development and one which should be revisited. Incentives may be needed to keep the database current; for example, making compliance with data reporting as one of the criteria for program accreditation. Further work may also be required to make data reporting as user-friendly as possible and, where feasible, similar to other data collection instruments that faculty are required to use. An approach similar to the common curriculum vitae might be considered.

The findings also suggest the value of discipline-specific codes in databases. The Consortium for Nursing Research and Innovation may consider approaching the federal/provincial research funding organizations to include a nursing discipline-specific code in their databases. This approach would be more inclusive, enable a much better quality of analysis of these databases, provide the potential to compare and contrast across organizations, and benefit all disciplines wishing to assess their own research productivity. Funding could be sought to bring together some of these organizations to look at harmonization of data coding and reporting.

Despite the incompleteness of data, the growth and development of research capacity in nursing over the past seven to 10 years has been remarkable. The number of doctoral programs has increased, as has enrolment of doctoral students and to a lesser extent, postdoctoral fellows. The number of faculty prepared at the doctoral and postdoctoral level has increased as well, but is still not adequate to meet the human resource needs now or in the near future. Consideration may be given to establishing a strategic initiative to support new PhD graduates in postdoctoral programs to fast-track their development as independent researchers and faculty members.

Based on information in the CNA / CASN 2005 database, of the 408 nurses holding a doctorate in nursing, only 129 cited academia as their place of employment, with another 35 reporting they were engaged in research (Table 9). It is not clear exactly what these statistics mean, but if there are active researchers in health care organizations who are not associated with an academic program, every effort should be made to include these people as part of the faculty complement. This model is key to increasing the number of research-

prepared faculty and is used successfully in a number of faculties/schools of nursing. At present, the ratio of PhD-prepared faculty to doctoral students is low, and this is without considering that not all PhD-prepared faculty are productive researchers. There may also be a small cohort of nurse researchers who have taken early or planned retirement. Such individuals could be hired on a part-time basis to assist in student teaching and research.

Research productivity in nursing has increased dramatically over the past 15 years, particularly in the past seven years. Funding for nursing research has grown to an impressive level. From the perspective of national funding organizations, CIHR is the largest source of support for grants and scholar awards, although all funding organizations showed increased amounts of money for nursing. CHSRF has also made an important contribution to capacity development in nursing research, with the NRF. The support of Chairs and regional training centres in nursing, along with support of postdoctoral candidates, has contributed to increased research productivity. The additional focus on knowledge translation has been an important strategy for the development of evidence-based nursing care and the establishment of clinical guidelines. Because capacity development takes place over many years, there is a strong argument to be made to renew and increase the NRF for at least another decade. Endowed chairs in nursing and the establishment of centres and institutes all provide evidence of growth and success.

Research outputs have also increased in terms of publications and the number of peer-reviewed journals in nursing in Canada. Nurse researchers also publish in a wide variety of non-nursing scientific journals related to their substantive field of study. While it was not possible to collect statistical information on publications and presentations, a database such as the CASN database could capture data related to this area of capacity development. The impact of research is less well-documented, and the gap between evidence and evidence-based practice far from closed.

In conclusion, it is clear that relatively modest investments in developing research capacity in nursing over the past several years have had a significant impact. Several initiatives have contributed significantly to the growth of research capacity in nursing. These include: founding of CNF; the MRC/NHRDP nursing program; development of PhD programs in nursing; establishment of the NRF administered by CHSRF; evolution of MRC to the CIHR; and targeted provincial and charitable organization funding for nursing research.

Finally, it would be remiss not to mention the incredible determination of nursing leaders in academia, health services and professional associations who have worked relentlessly to improve the research capacity of the profession. Research capacity is not built in one generation, but takes many decades of adequate support to become a robust industry that will have positive results for the health of Canadians and their health care.

REFERENCES

1. Cooke, J. (2005). A framework to evaluate research capacity building in health care. BMC Family Practice, 6, (44).
2. Pringle, D. (2004). The realities of Canadian nursing research. In M. McIntyre, E. Thomlinson, C. MacDonald (Eds). Realities of Canadian Nursing: Professional, Practice and Power Issues. Philadelphia: Lippincott, Williams & Wilkins (2nd ed), pp. 262-268.
3. Kerr, J (1996). The financing of Nursing Research in Canada. In J. Kerr and J. MacPhail, Canadian Nursing Issues and Perspectives. Toronto: Mosby.
4. Kerr, J. & MacPhail, J. (1996). Canadian Nursing Issues and Perspectives. Toronto: Mosby
5. Stinson, S., Lamb, M.A. and Thibaudeau, M.F. (1990). Nursing Research: the Canadian scene. International Journal of Nursing Studies, 27(2), 105-122.
6. Burns, N. & Grove, S. (1987) The Practice of Nursing Research: Conduct, Critique and Utilization. Toronto: WB Saunders
7. Thurston, N., Tenove, S. & Church, J. et al. (1989) Nursing Research in Canadian Hospitals. CJNA, Mar/Apr, 8-10
8. Marks, I. & Godfrey, M. (2000). Developing research capacity within the NHS: A summary of the evidence. Leeds, Nuffield Portfolio Programme Report.
9. Farmer, E. & Weston, K. (2002). A conceptual model for capacity building in Australian primary care research. Australian Family Physician, 31, 1139-1142.
10. Lansang, M.A. & Dennis, R. (2004). Building capacity in health research in the developing world. WHO Bulletin, Oct. 2004, 82 (10).
11. Horton, D. et al. (2003). Evaluating capacity development: Experiences from research and development organizations around the world.
12. North American Primary Care Research Group (2002). What does it mean to build research capacity? Family Medicine, 34, 678-684.
13. Moody L., Wilson, M. Smyth, K. et al. (1988). Analysis of a decade of nursing practice research: 1977-1986. Nursing Research, 37(6), 374-379.
14. Shield, K. (2006). Invited commentary. Physical Therapy, 86(2). 299-300.
15. Raghunath, A.S. & Innes, A. (2004). The case of multidisciplinary research in primary care. Primary Care Research and Development, 5, 265-273.
16. CNA and CASN (2007). Nursing Education in Canada Statistics.
17. Trostle, J. (1992). Research capacity building and international health: Definitions, evaluations and strategies for success. Social Science and Medicine 35, 1321-1324.
18. Crisp, B., Swertissen, H. & Duckett, S. (2000). Four approaches to capacity building in health: Consequences for measurement and accountability. Health Promotion International, 15, 99-107.
19. O'Connor, A. & Bouchard, J. (1991). Research activities in Canadian University Schools and Faculties of Nursing for 1988-89. CJNR, 23, (1).
20. CHSRF (2006). Annual Report, 1999-2006.
21. Griffiths, F., Wild, A., Harvey, J. & Fenton, E. (2000). The productivity of primary care research networks. British Journal of General Practice, 50, 913-915.
22. Sarre, G. (2002). Capacity and activity in research project (CARP); supporting R&D in primary care trusts.

23. Hanney, S., Grant, J., Wooding, S., Burton, M. (2004). Proposed methods for reviewing the outcomes of health research: the impact of funding by the U.K.'s Arthritis Research Campaign. Health Research Policy and Systems, 2004, (4).
24. Albert, E., & Mickan, S., (2002). Closing the gap and widening the scope. New directions for research capacity building in primary health care. Australian Family Physician, 31, 1038-1041.
25. Smith, R. (2001). Measuring the social impact of research. BMJ, 323, 528.
26. Estabrooks, C., (1998). Will evidence-based nursing practice make practice perfect? CJNR, 30 (1), 15-36.
27. Conrad, P. (2008). To Boldly Go: A Partnership Enterprise to Produce Applied Health and Nursing Services Researchers in Canada. Healthcare Policy, 3(Sp) 2008: 13-30.
28. International Network for Doctoral Education in Nursing (2005). Global Health Research Priorities: Implications for Nurse Researchers.
29. National Institute of Nursing Research, U.S. Department of Health (2006). NINR Strategic Plan
30. Health Council of Canada (2005). Health Care Renewal in Canada.
31. Health Council of Canada (2007). Why Health Care Renewal Matters: Learning from Canadians with Chronic Health Conditions.
32. Health Council of Canada (2007). Canadian's Experiences with Chronic Illness Care in 2007

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Table 1: National Cancer Institute of Canada (NCIC) - Total Funding for Nurses (1999-2007)

Research Grants - \$3, 516,826 (N=37)
 Regional Development - \$525,000 (N=2)
 Studentships* - \$306,459 (N=6)
 Strategic training - \$900,000 (N=1)
 Research scientists - \$952, 607 (N=4)

*Research studentships are limited and are designed for those who are engaged in full-time study in a Ph.D. program in a Canadian institution. The applicant must have completed at least two years of research training at the graduate level.

Source: *NCIC*

Table 2: Highest Academic Credential Reported by Nursing Faculty, 2002-2005, Canadian Schools of Nursing

	2002	2003	2004	2005
Credentials				
Postdoctoral in Nursing	21	44	32	38
Postdoctoral in other Discipline	15	44	20	19
Doctoral in Nursing	221	272	259	258
Doctoral in other Discipline	251	290	311	276
Other	2741	3010	3148	3481
Not stated	111	160	128	133
Total	3360	3820	3898	4205

Note: Some missing data

Source: *Canadian Nurses Association, Canadian Association of Schools of Nursing, Nov. 2007, Nursing Education in Canada Statistics*

Table 6: Contributions of Canadian Nurses Foundation to Research and Scholarships: 1999-2008

<u>Research:</u>	<u>Scholarships:</u>
1999: \$27, 619	1999: \$255, 300
2000: \$0	2000: \$270, 850
2001: \$181, 401	2001: \$242, 032
2002: \$51, 525	2002: \$226, 950
2003: \$329, 994	2003: \$244, 510
2004: \$387, 284	2004: \$149, 782
2005: \$473, 166	2005: \$145, 000
2006: \$474, 911	2006: \$134, 000
2007: \$457, 989	2007: \$140, 000
2008: \$95, 181	

Source: *Canadian Nurses Foundation*

Table 7: Place of Employment in Canada of those Holding a Doctorate in Nursing (2005)

Direct Patient Care: 85
Administration: 28
Education: 129
Research: 35
Other: 96
Not stated: 35
Total: 408
Source: <i>CNA 2005</i>

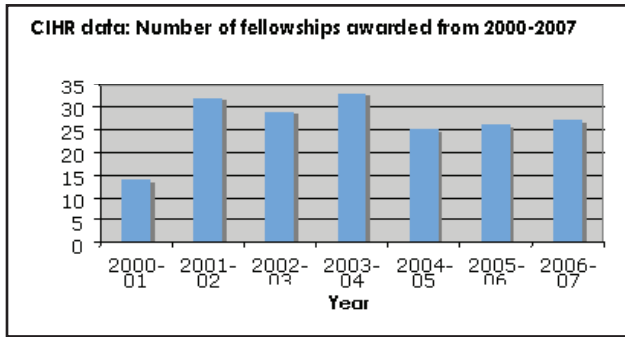
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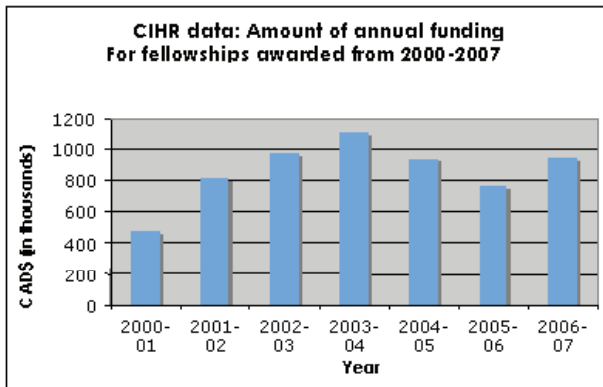
18. Heart and Stroke Foundation: Amount of funding for Grants in Aid, Nursing:
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(1999-2007)
21. Alzheimer Society of Canada- Research Grants/Nursing: Amount awarded per year
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Figure 2: Canadian Institutes of Health Research: Number of Fellowships* awarded: Nursing (2000-2007)



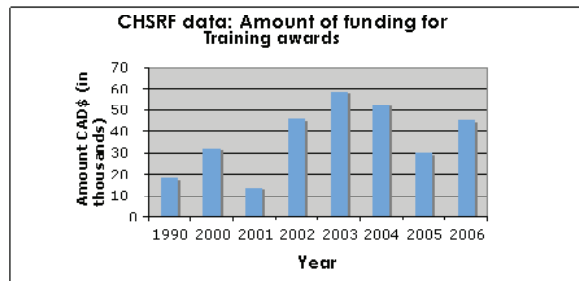
* Fellowships includes both doctoral and postdoctoral

Figure 3: Canadian Institutes of Health Research: Amount of funding for Fellowships*: Nursing (2000-2007)



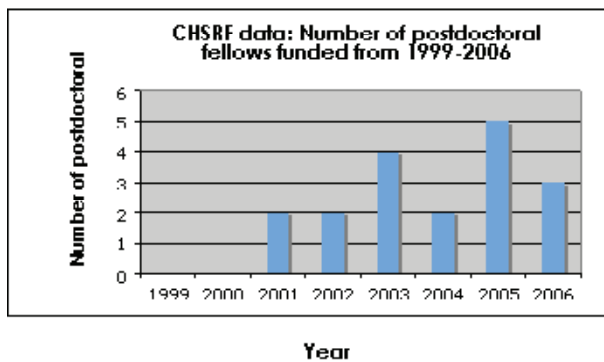
* Fellowships includes both doctoral and postdoctoral

Figure 4: Canadian Health Services Research Foundation: Nursing Research Fund: Amount of funding for Training awards* (1999-2006)



* Includes post doctoral awards

Figure 5: Canadian Health Services Research Foundation: Nursing Research Fund: Number of postdoctoral fellows funded (1999-2006)

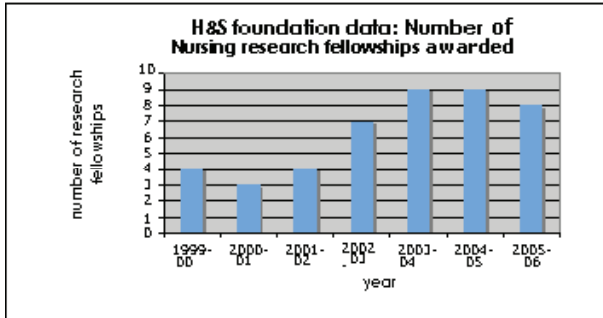


Total: 18

Note: Postdoctoral fellows receive \$50,000/year for 2 years

Source: CHSRF - 2006 Annual report, Nursing Research Fund

Figure 6: Heart and Stroke Foundation: Number of Nursing Research Fellowships* awarded (1999-2006)



* Nursing research fellowships for Ph.D. preparation

Note: In 2000-2001, one postdoctoral research fellowship was awarded for \$44,000.

Source: Annual reports - Heart and Stroke Foundation research programs, www.hsf.ca/research

Figure 7: Heart and Stroke Foundation: Nursing Research Fellowships: Amount awarded (1999-2006)

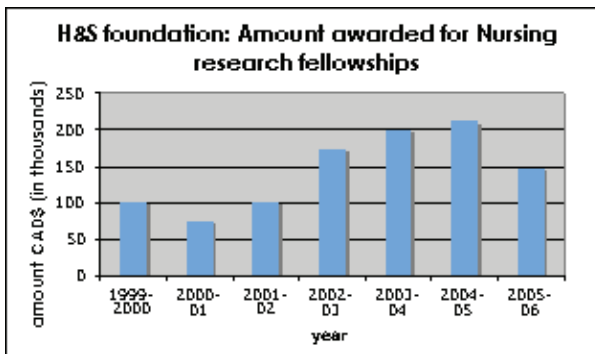


Figure 8: Alzheimer Society of Canada - Doctoral awards to nurses (2000-2006): amount awarded per year

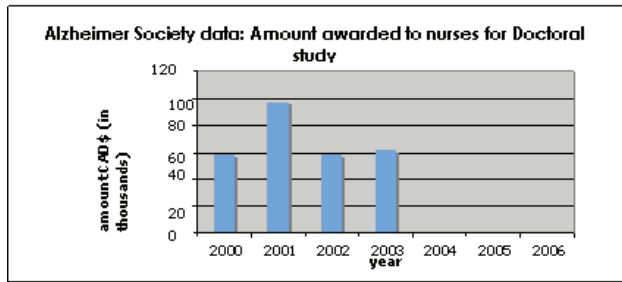


Figure 9: Canadian Institutes of Health Research: Number of Operating Grants awarded: Nursing (2000-2007)

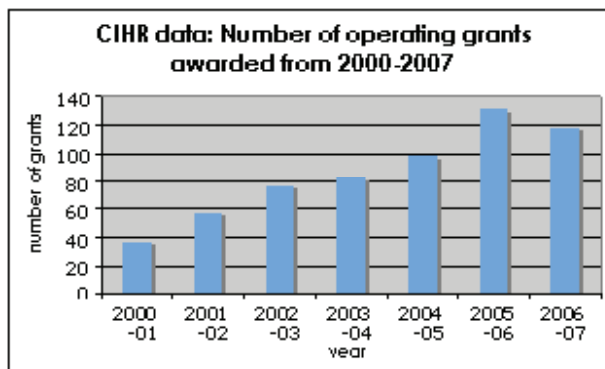


Figure 10: Canadian Institutes of Health Research: Amount of funding for Operating grants: Nursing (2000-2007)

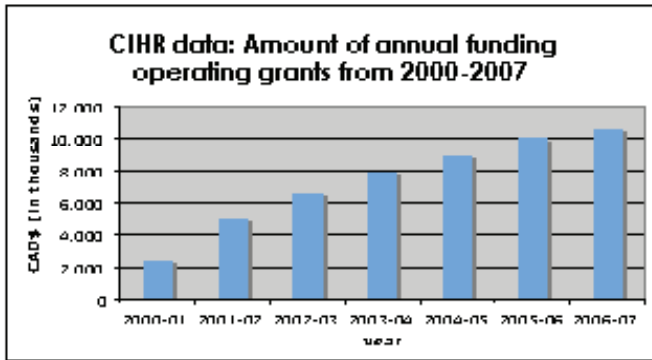


Figure 11: Canadian Institutes of Health Research: Number of awards, Clinical trials: Nursing (2000-2007)

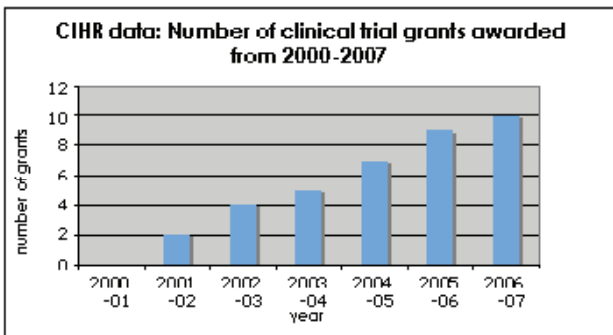


Figure 12: Canadian Institutes of Health Research: Number of Salary awards: Nursing (2000-2007)

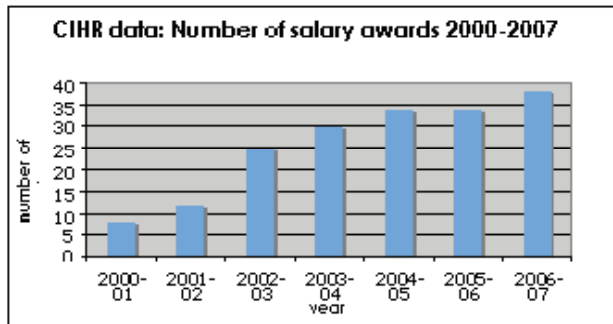
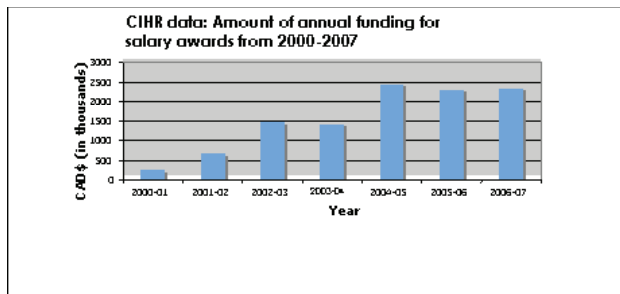


Figure 13: Canadian Institutes of Health Research: Amount of funding for Salary awards*: Nursing (2000-2007)



* Salary awards include:

- Senior investigator
- New investigator
- Chairs
- Senior research Fellowship
- Regional Partnership Program Investigator

Figure 14: Canadian Institutes of Health Research: Number of operating grants awarded, nursing, per province (2000-2007)

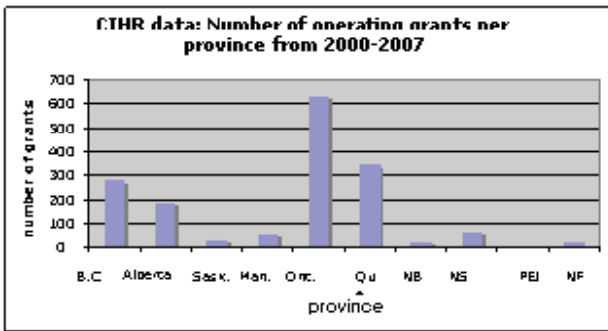


Figure 15: Canadian Institutes of Health Research: Amount of funding, all awards and grants: Nursing (2000-2007)

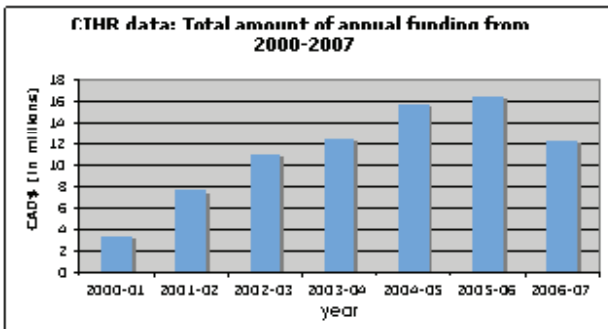
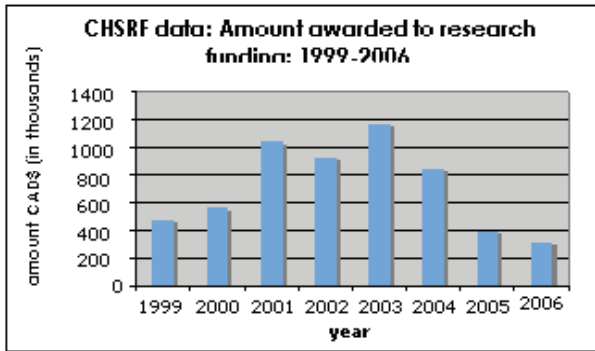


Figure 16: Canadian Health Services Research Foundation: Nursing Research Fund: Amount awarded to research funding (1999-2006)



Note: In 2004, most open grant competition projects transferred to CIHR. In 2005, project portion of open grant competition transferred to CIHR for 2005 competition. Source: CHSRF

Figure 17: Canadian Health Services Research Foundation: Nursing Research Fund: Amount of funding to Chairs (1999-2006)

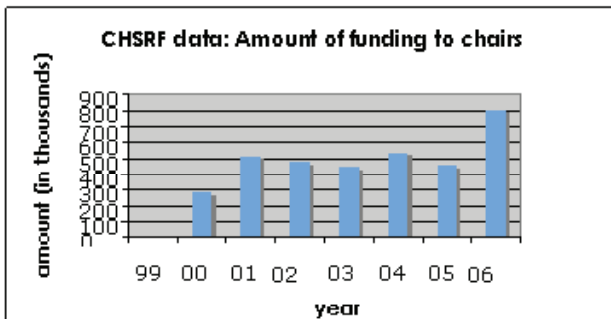
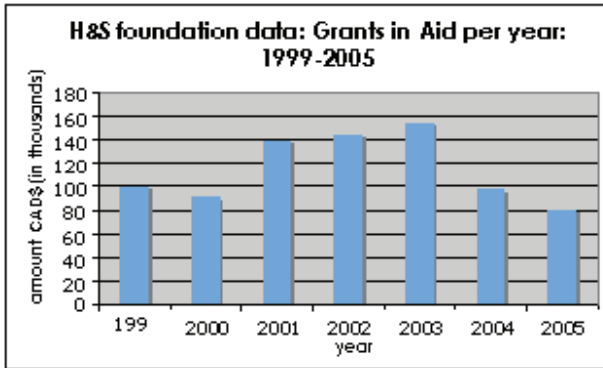
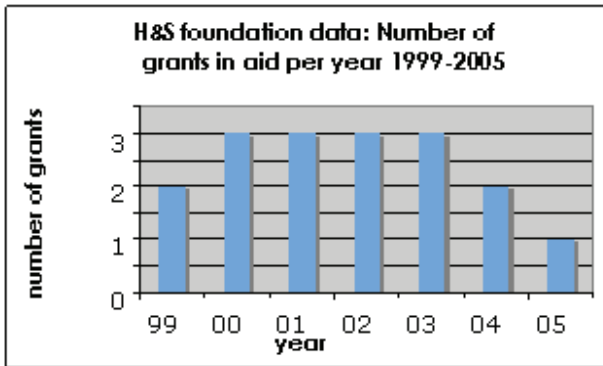


Figure 18: Heart and Stroke Foundation: Amount of funding for Grants in Aid, nursing (1999-2005)



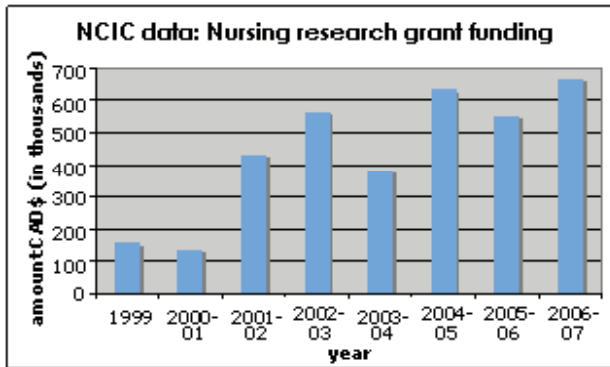
Source: Annual reports - Heart and Stroke Foundation research programs, www.hsf.ca/research

Figure 19: Heart and Stroke Foundation: Number of Grants in Aid, nursing (1999-2005)



Source: Annual reports - Heart and Stroke Foundation research programs, www.hsf.ca/research

Figure 20: National Cancer Institute of Canada (NCIC): Nursing Research Grant funding (1999-2007)*



* Amounts (in thousands) include research grants, research scientist awards, planning grants, idea grants and feasibility studies

Note: Only those who were confirmed as nurse researchers were included in the calculations

Source: NCIC

Figure 21: Alzheimer Society of Canada - Research Grants/nursing, amount awarded per year (2000-2007)

