

Health Human Resources Modelling: Challenging the Past, Creating the Future

Co-Principal Investigators:

**Dr. Linda O'Brien-Pallas
&**

Dr. Gail Tomblin Murphy



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Overall HHRP Program Objectives

- This program of research, comprising three separate but related projects, addresses the changing needs of nursing human resources, specifically the provision and management of human resources that are responsive to those needs.
- The goal is to expand existing demographic-focused approaches to **health human resources planning (HHRP)** by moving beyond considerations of supply and utilization by examining the broader factors that influence the health system such as the social, political, economic, and technological influences.

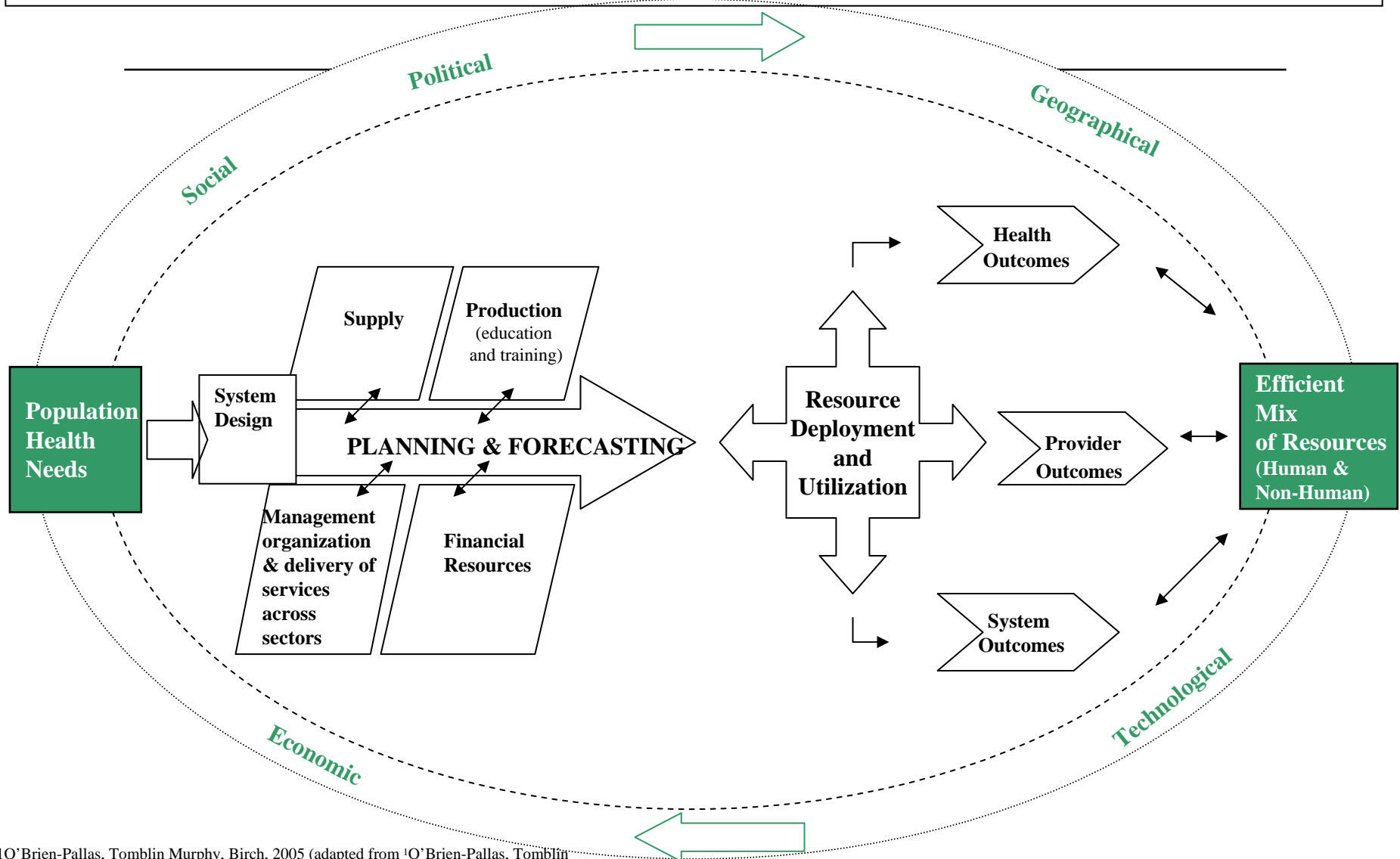
The 3 Projects:

- Project 1: **Population Health**
- Project 2: **Nursing and the Healthcare Production Function**
- Project 3: **Retention of Practicing Nurses**

Learning Objectives

- Improve understanding of the dynamic nature of the needs for, and provision and management of, nursing human resources.
- Develop a sense of how changes in **population health needs, nursing resource productivity,** and **nurse retention** can have a dramatic impact on nursing **health human resources**.

Health System and Health Human Resources Planning Conceptual Framework¹



¹O'Brien-Pallas, Tomblin Murphy, Birch, 2005 (adapted from O'Brien-Pallas, Tomblin Murphy, Birch, & Baumann, 2001, and O'Brien-Pallas & Baumann, 1997)

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Project 1 Population Health

Project Co-Investigators
Birch, Tomblin Murphy, O'Brien-
Pallas, Kephart



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Objective

- Analyze both the level & distribution of health needs within the population & how they change over time.
- Examining trends in various health needs indicators by age & sex over time
 - Overall self-assessed health
 - Mobility problems
 - Pain/discomfort
 - Chronic conditions
- Also examine trends in health behaviours by age & sex over time
 - Physical activity
 - Smoking
 - Alcohol consumption

Research Questions

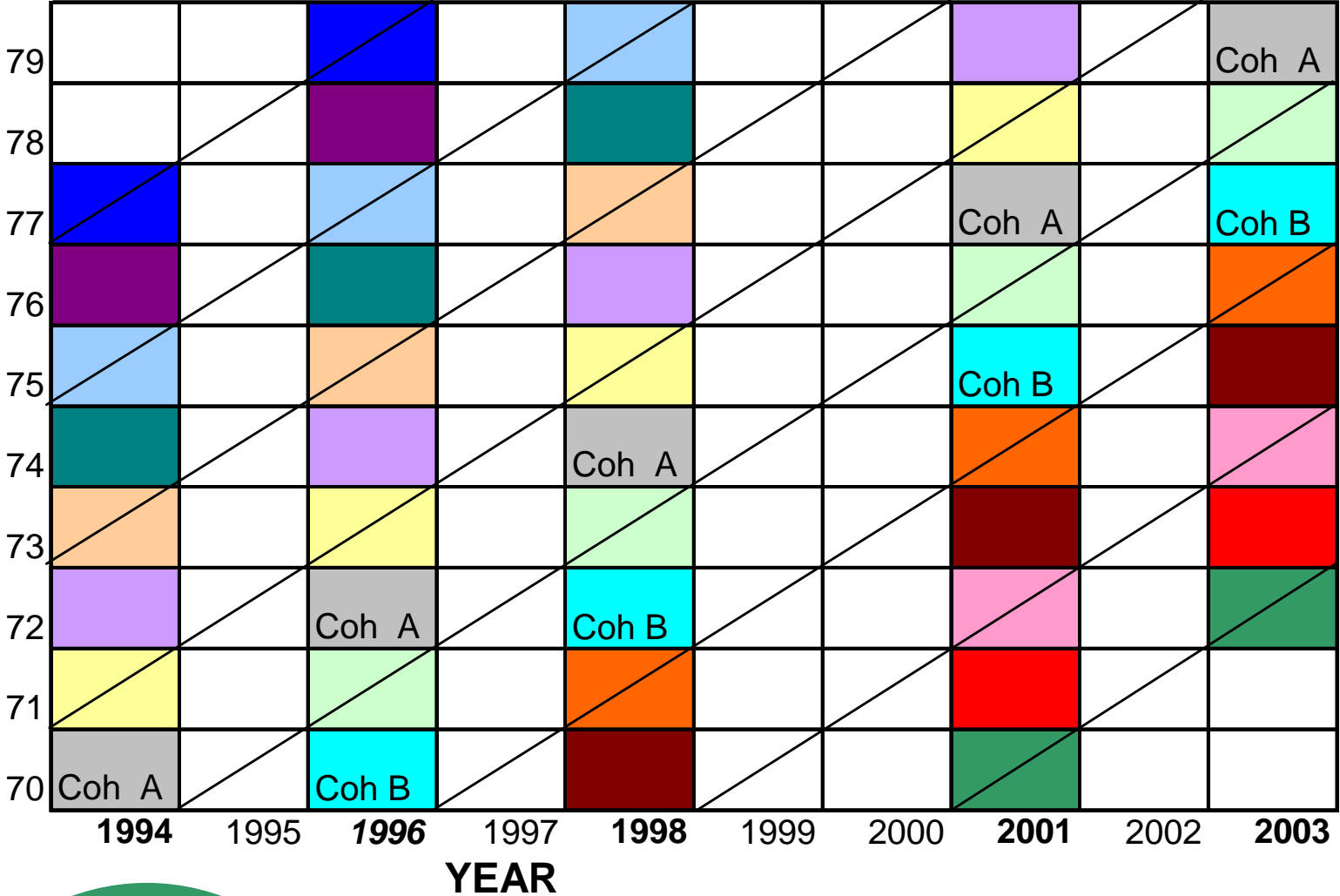
- What are the changes in levels of health by age & sex over time?
- How do these changes compare across social groups?
- What are the determinants of change that can be used to estimate changes in healthcare needs?

Methods

- Examined changes in the age patterns of health indicators over time.
 - Self-assessed health status
 - Mobility
 - Pain-discomfort
- Data from multiple surveys were used: NPHS (1994, 1996, 1998), CCHS (2001, 2003, 2005)
 - For each survey, point estimates of health indicators by single year of age and sex were estimated.
 - Standard errors for point estimates were computed by bootstrap to account for complex sample designs.
 - Point estimates were pooled into a single data set, and a cohort variable was computed (year of birth). The data thus describes health by age and year of birth.

Cohorts (diagonals) are compared to see if declines in health status by age are changing over time

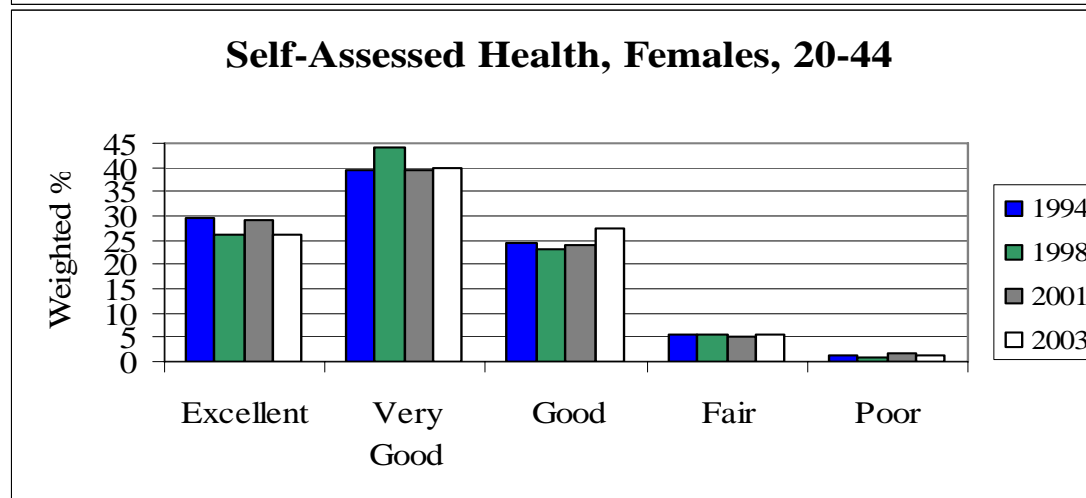
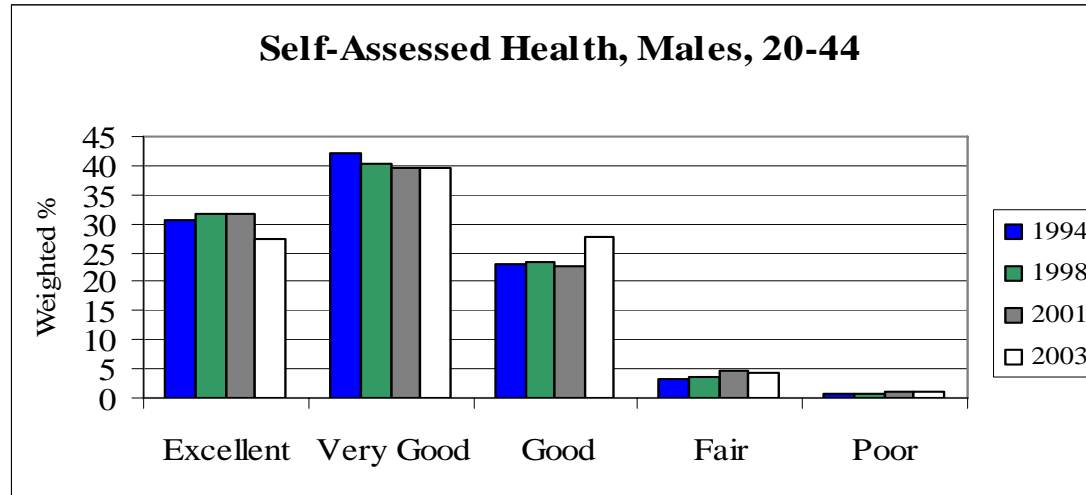
AGE



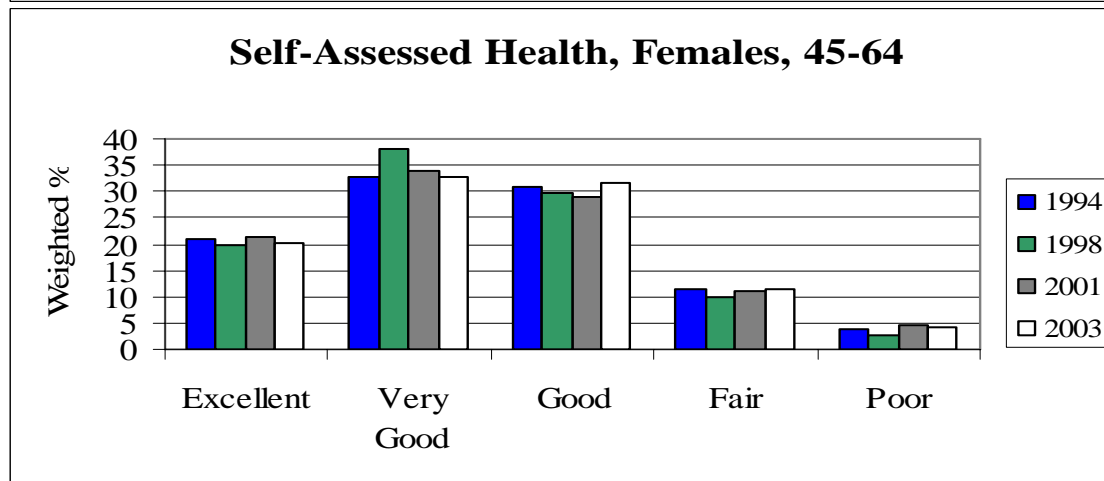
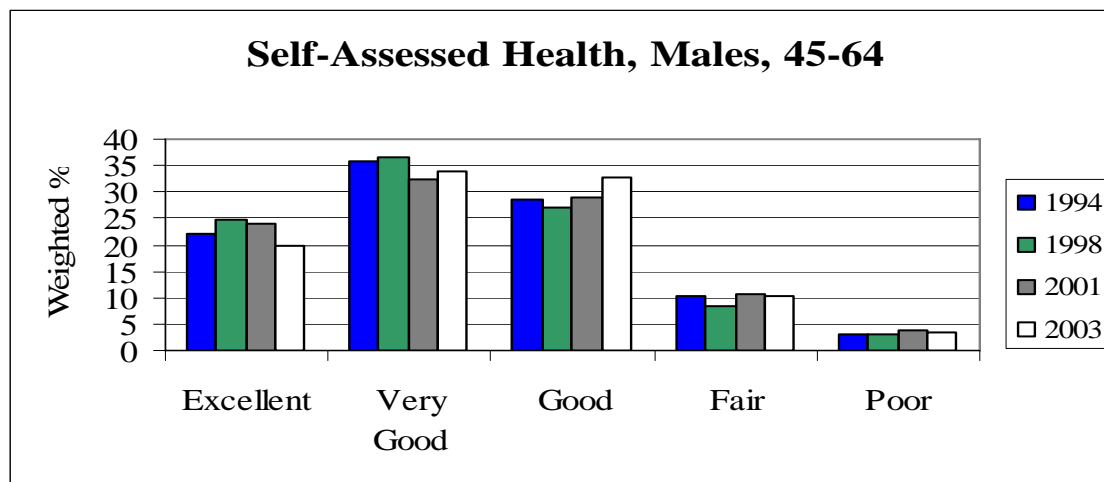
Methods (con't)

- Regression models were used to describe how the age pattern of health varies by birth cohort and sex
 - Age and cohort treated as continuous variables
 - Quadratic terms were used to describe non-linear changes in health by age and cohort
 - Analyses were stratified by sex and 10-year age groups: 55-64, 65-74, 75-84
 - Weighted OLS: Point estimates used in the regressions were weighted by the $1/\text{sdd err}$ to avoid undue influence of unstable estimates

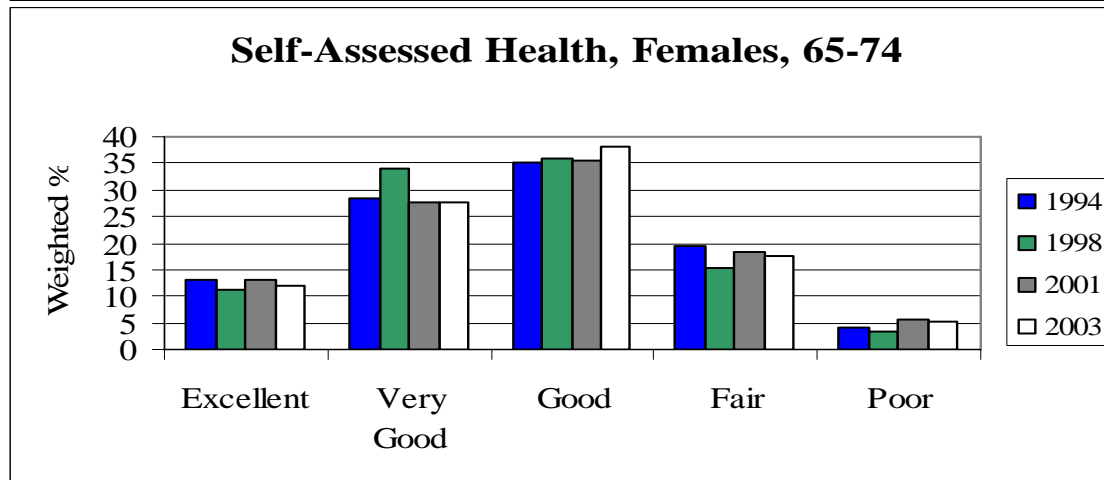
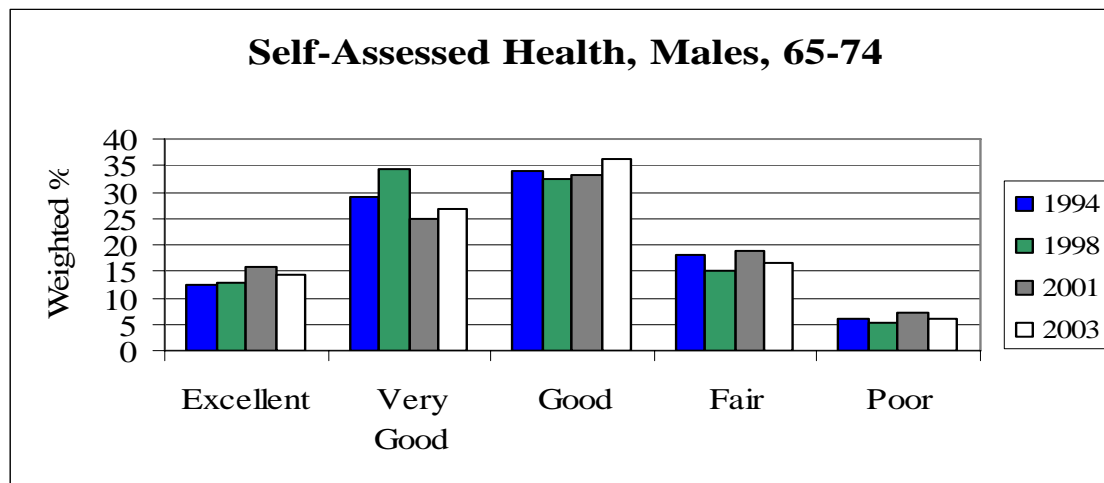
Self-Assessed Health, Ages 20-44



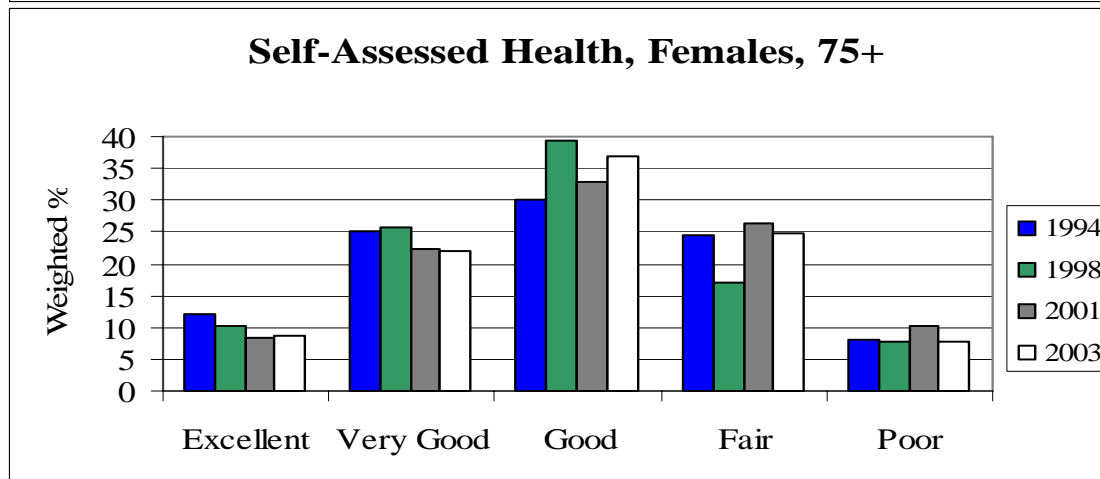
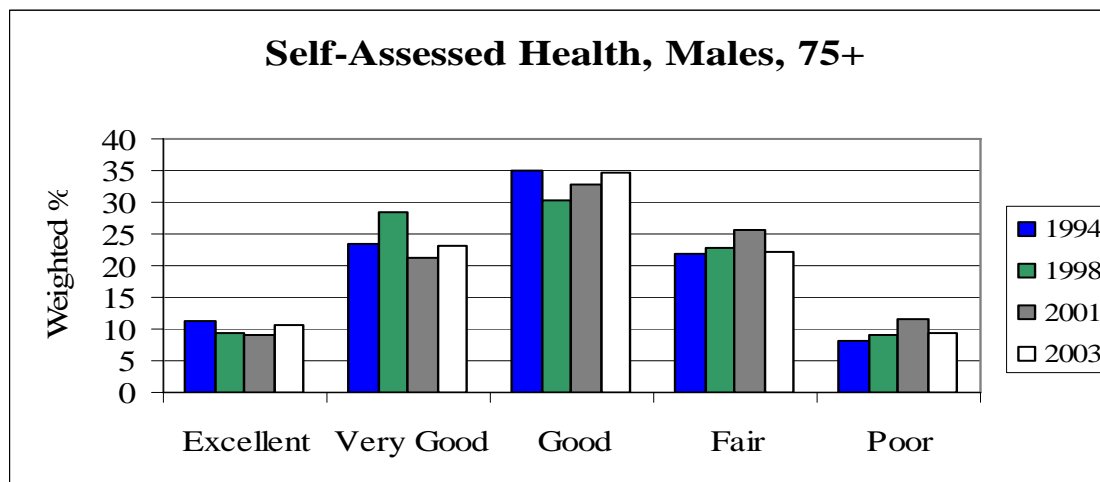
Self-Assessed Health, Ages 45-64



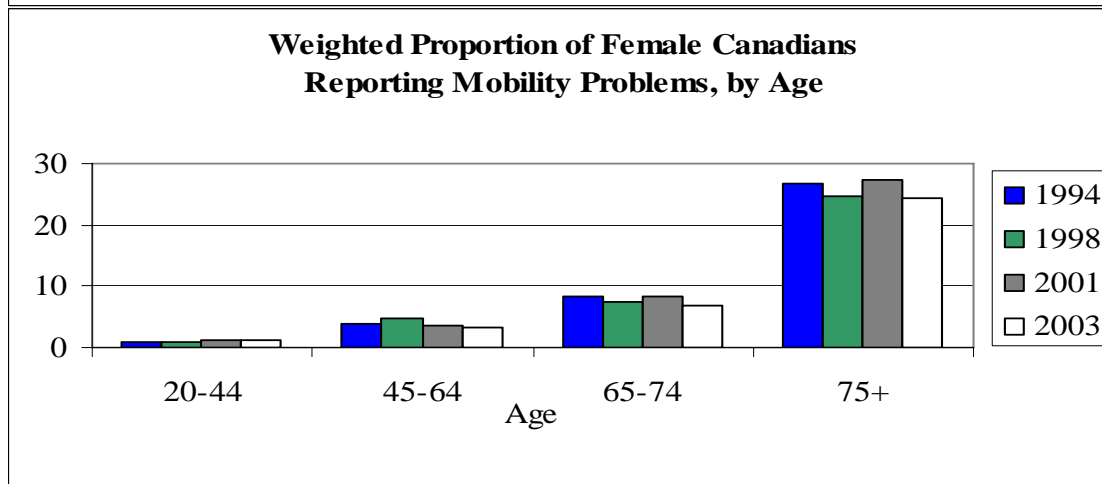
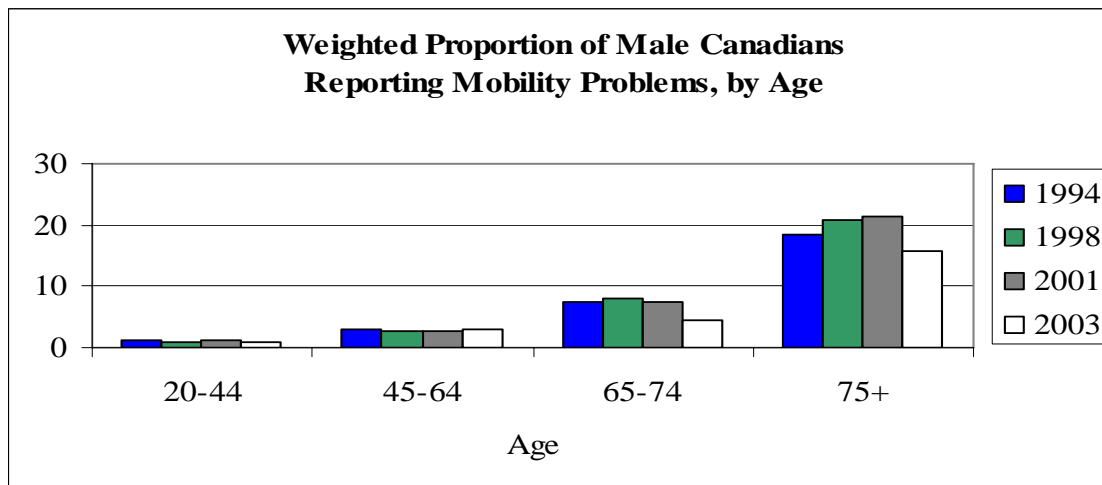
Self-Assessed Health, Ages 65-74



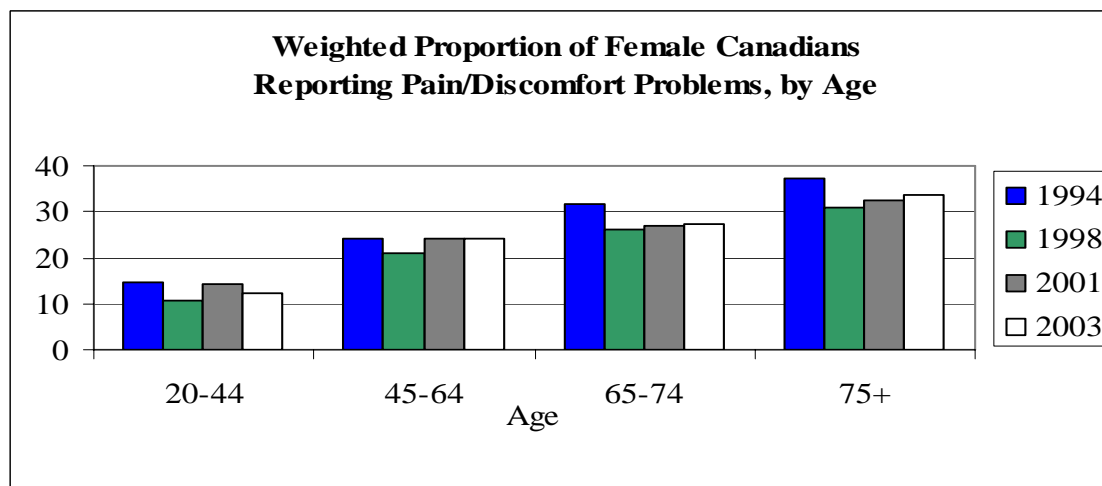
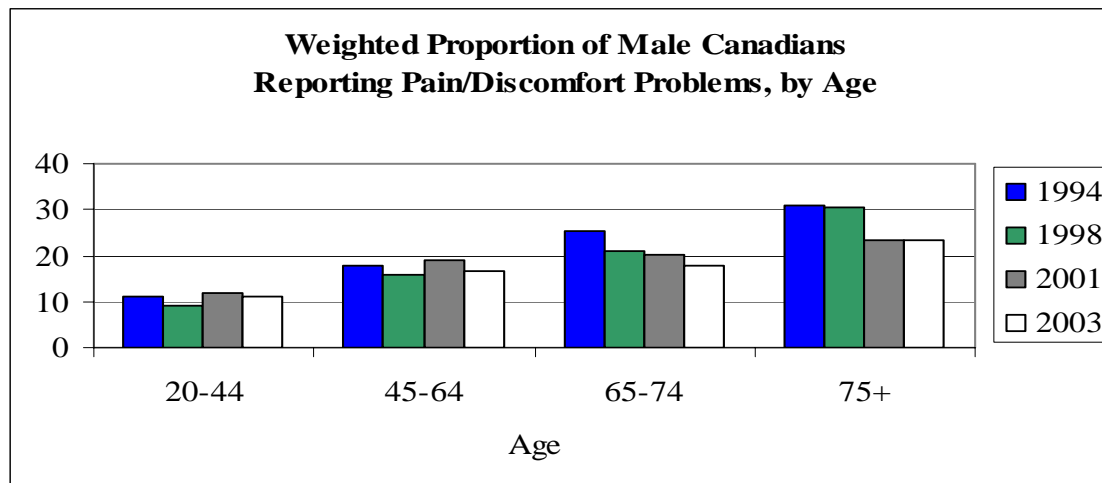
Self-Assessed Health, Ages 75+



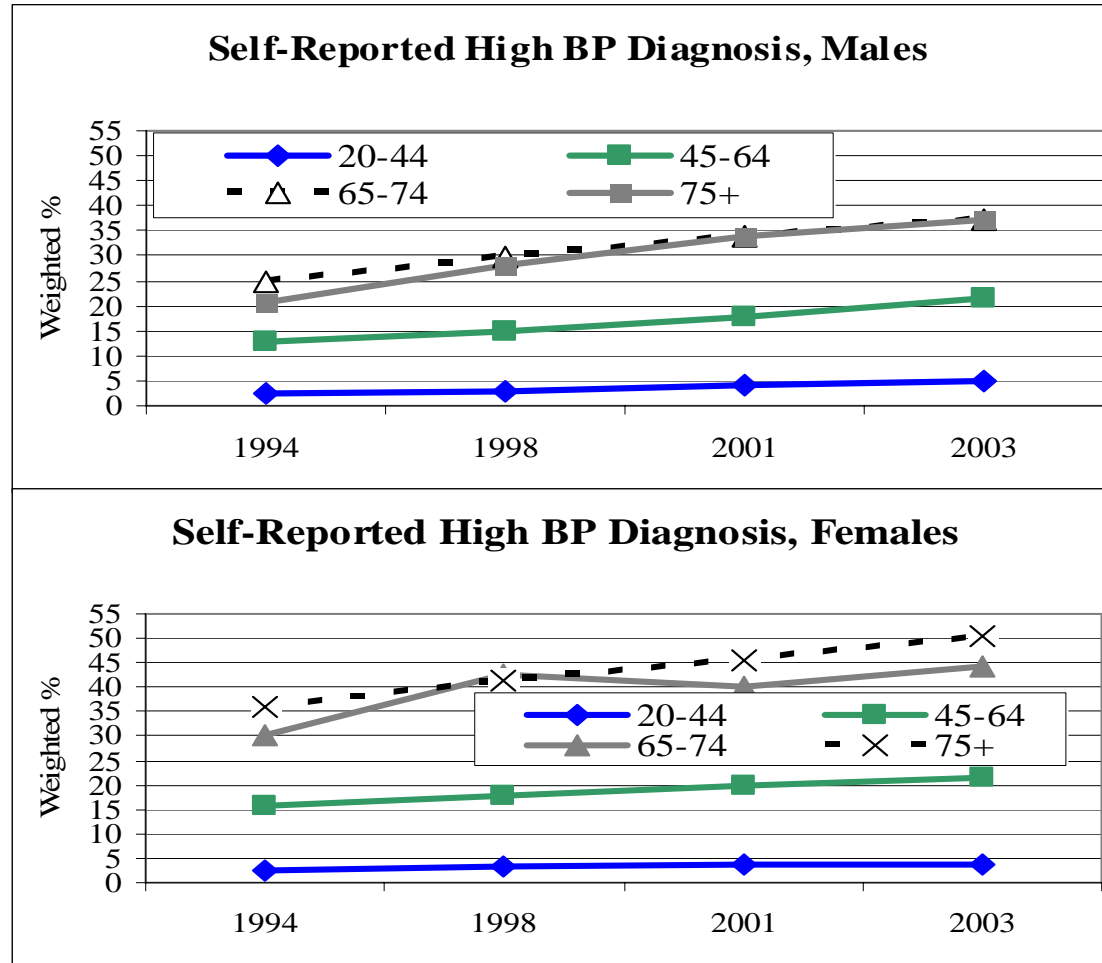
Mobility Problems



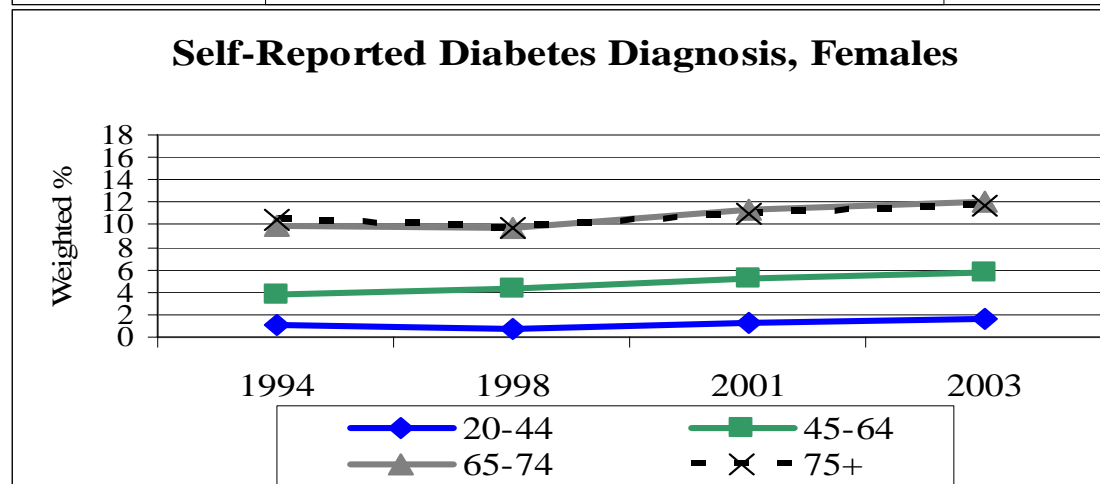
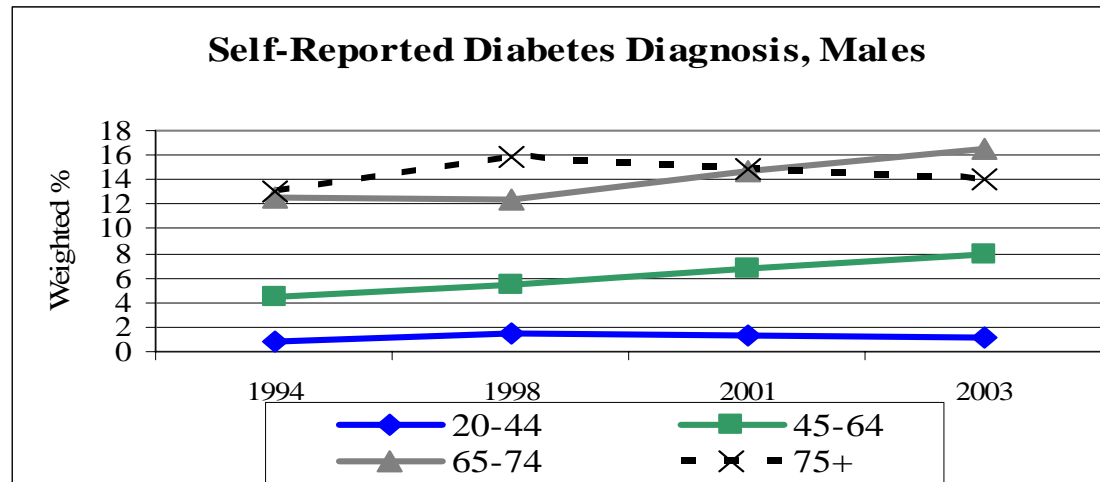
Pain/Discomfort



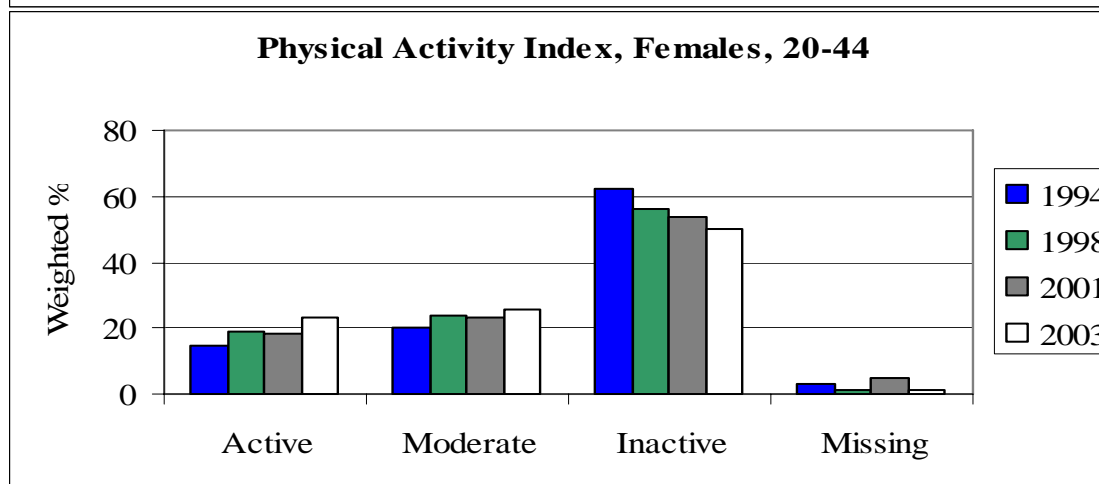
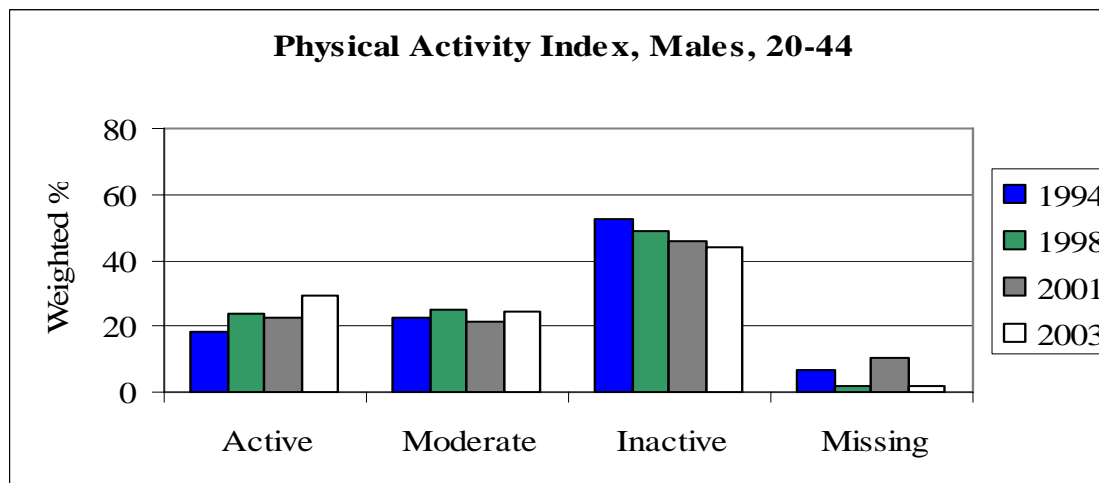
Hypertension/High Blood Pressure



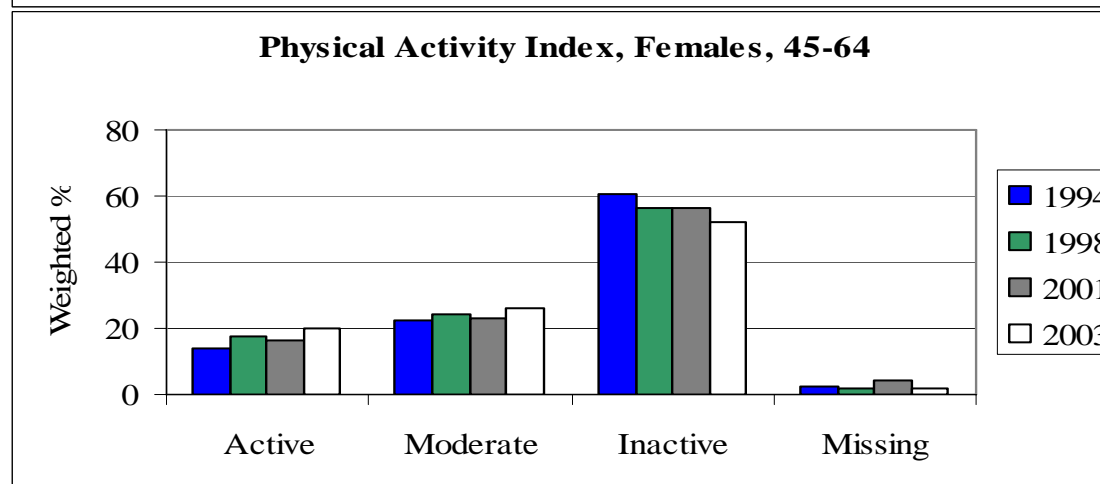
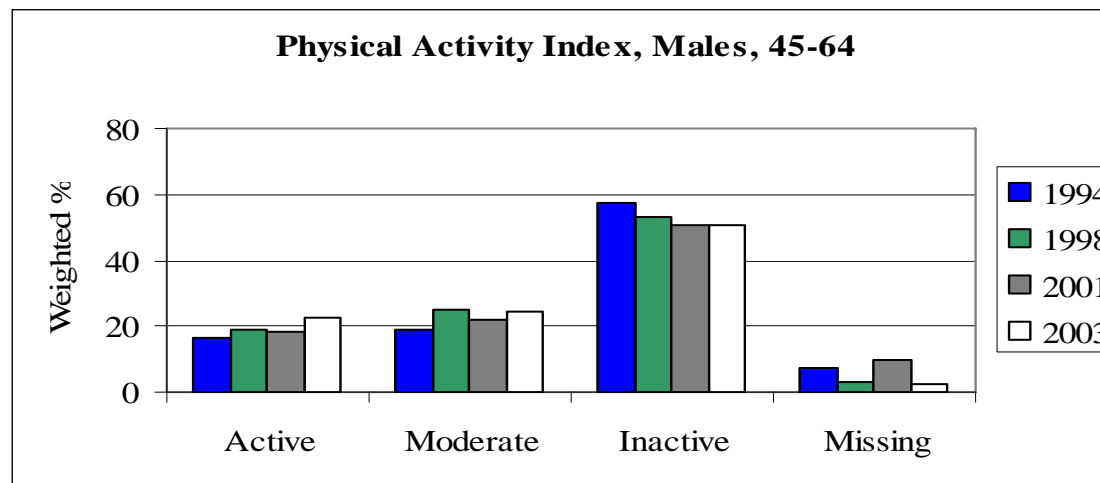
Diabetes



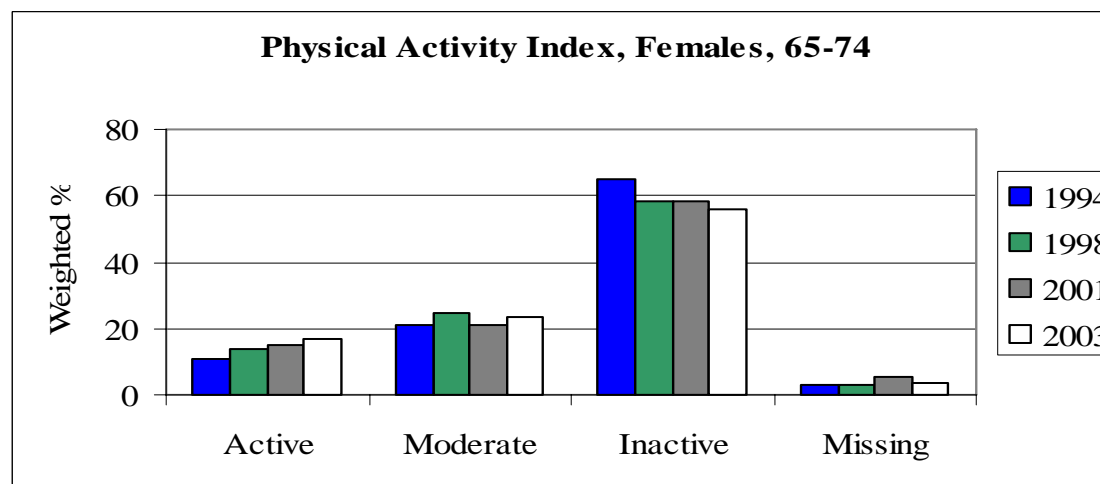
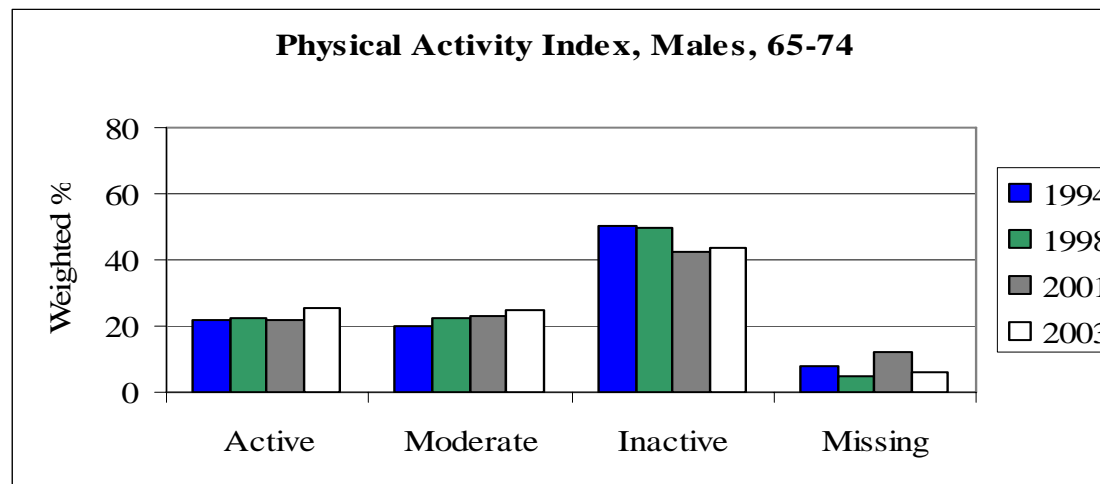
Physical Activity Level, Ages 20-44



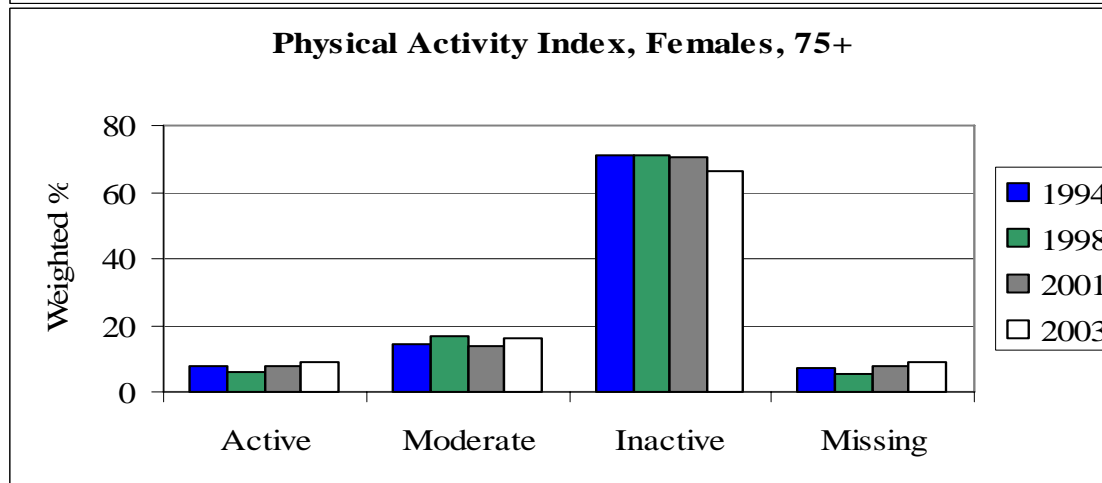
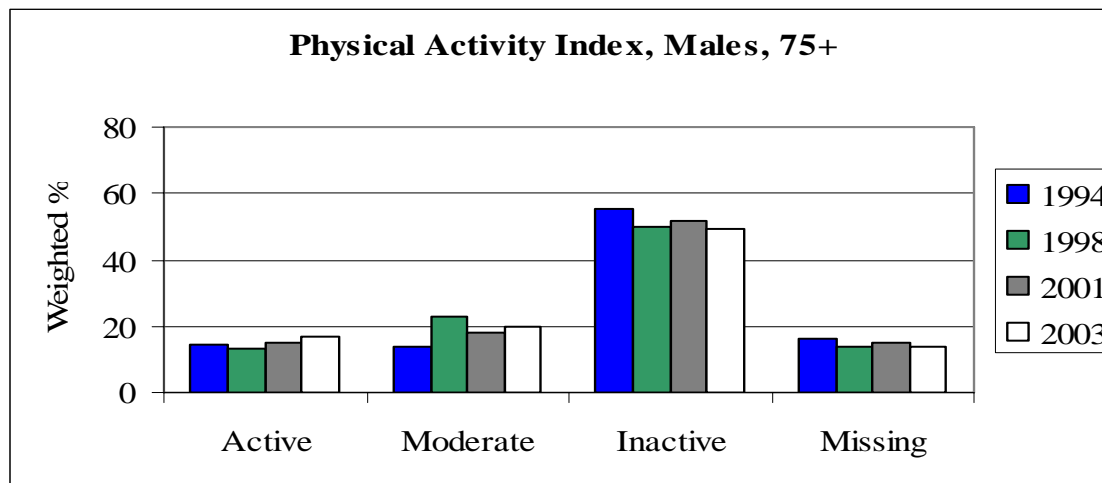
Physical Activity Level, Ages 45-64



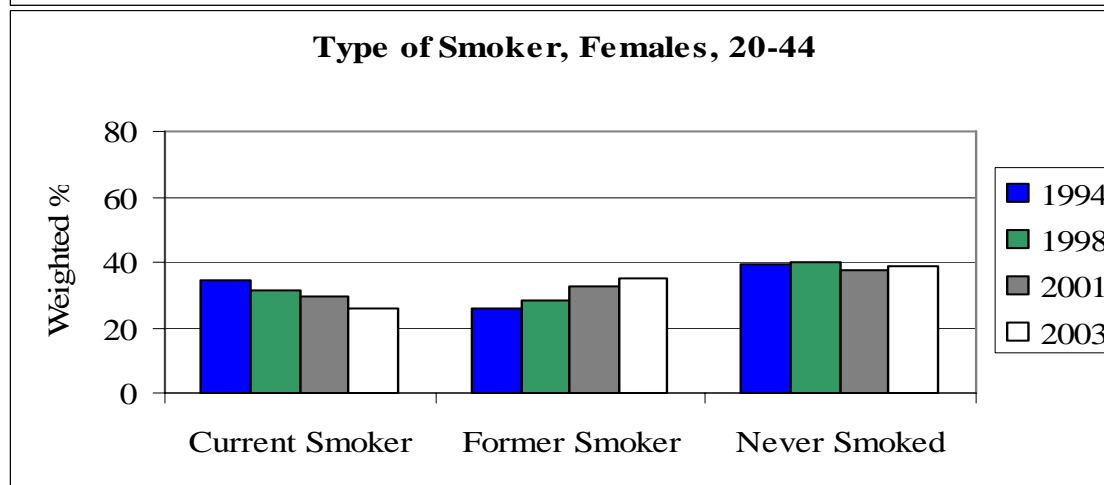
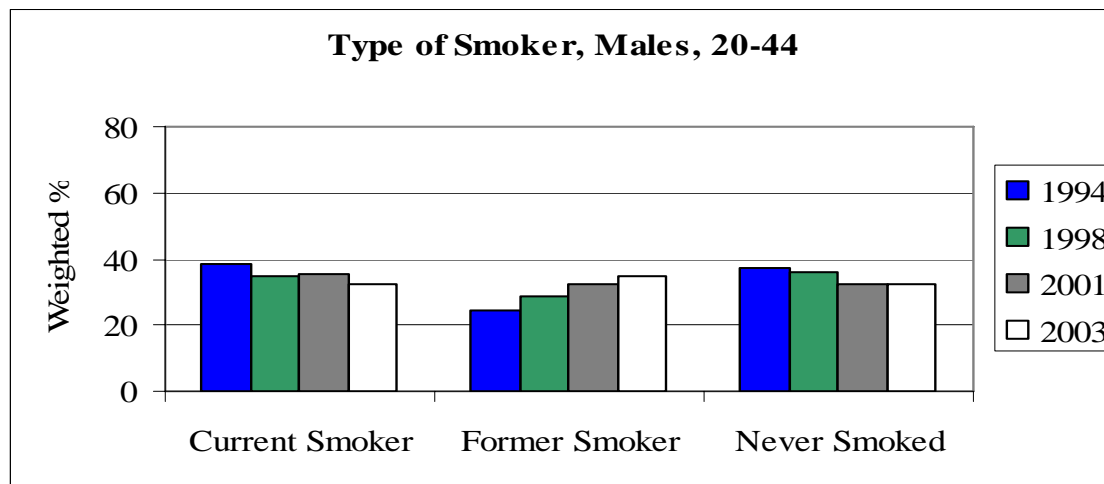
Physical Activity Level, Ages 65-74



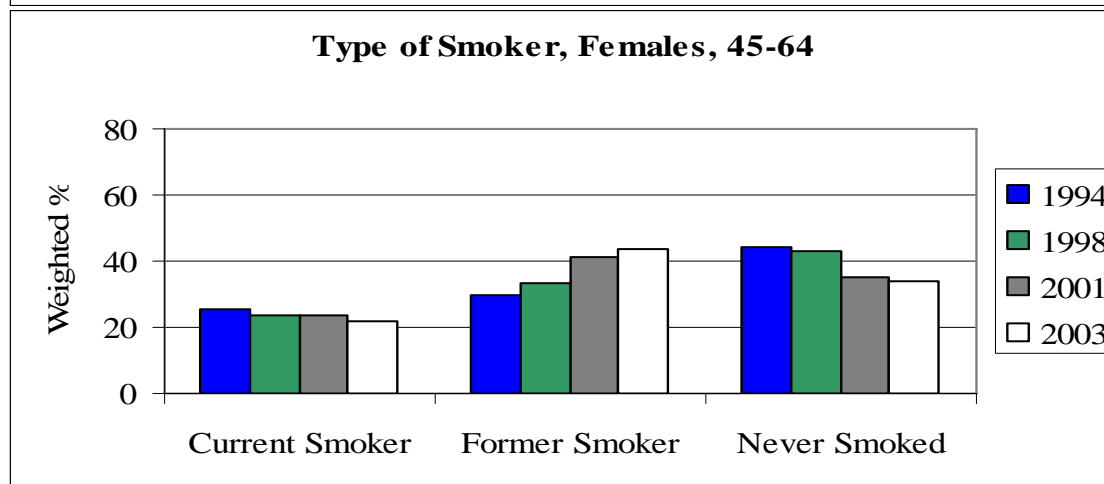
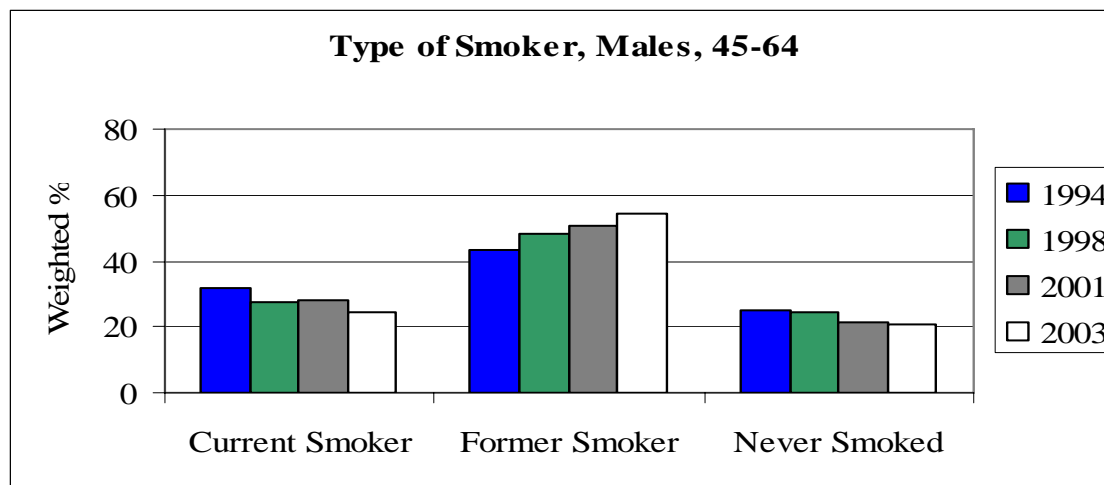
Physical Activity Level, Ages 75+



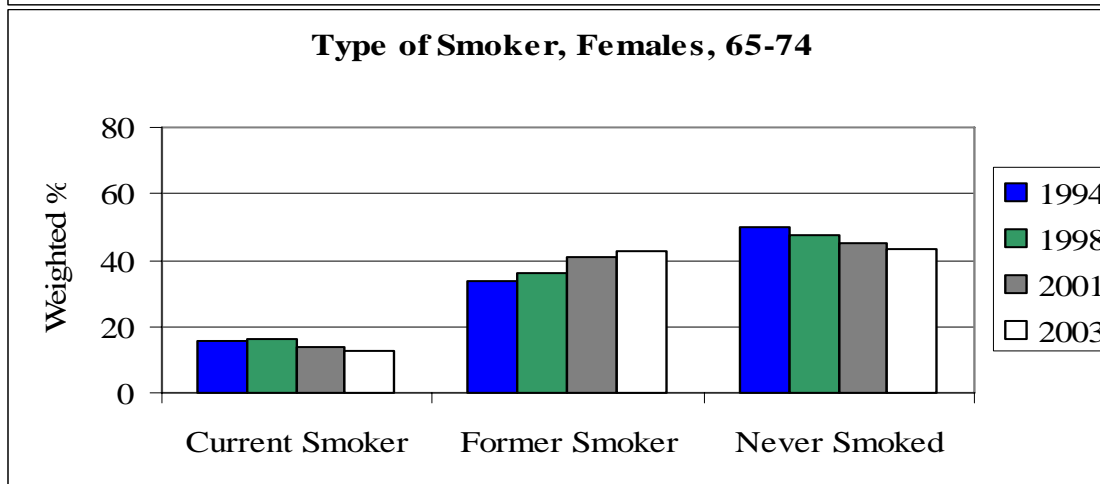
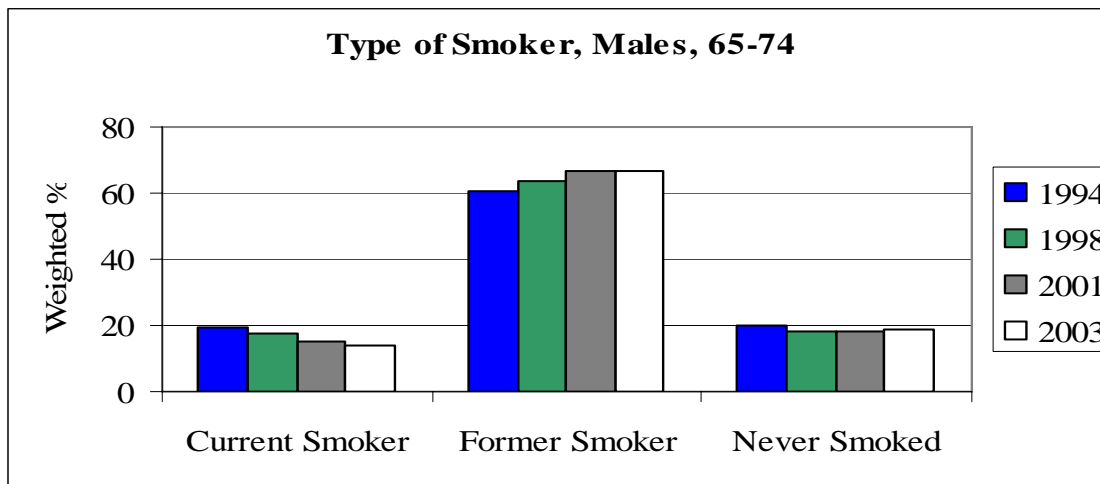
Smoking Behaviours, Ages 20-44



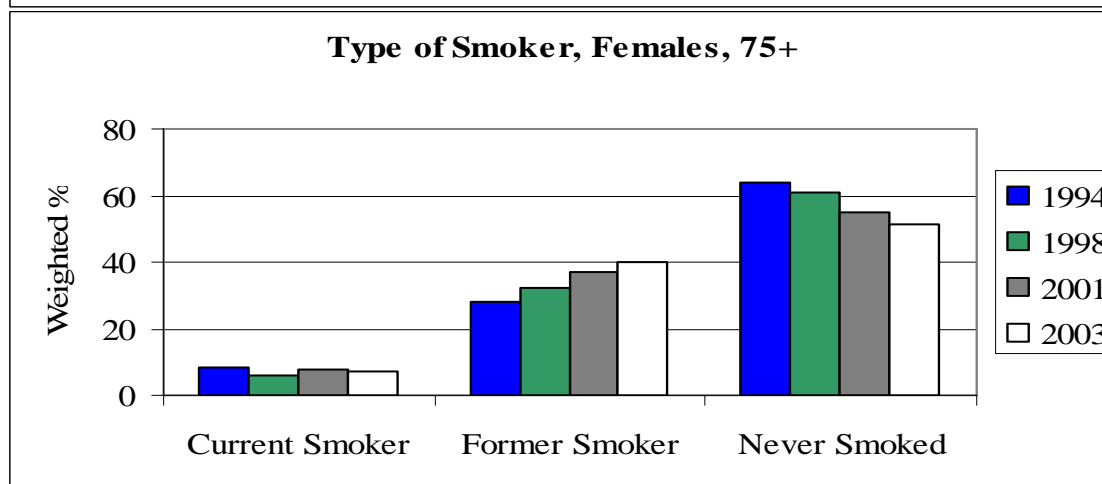
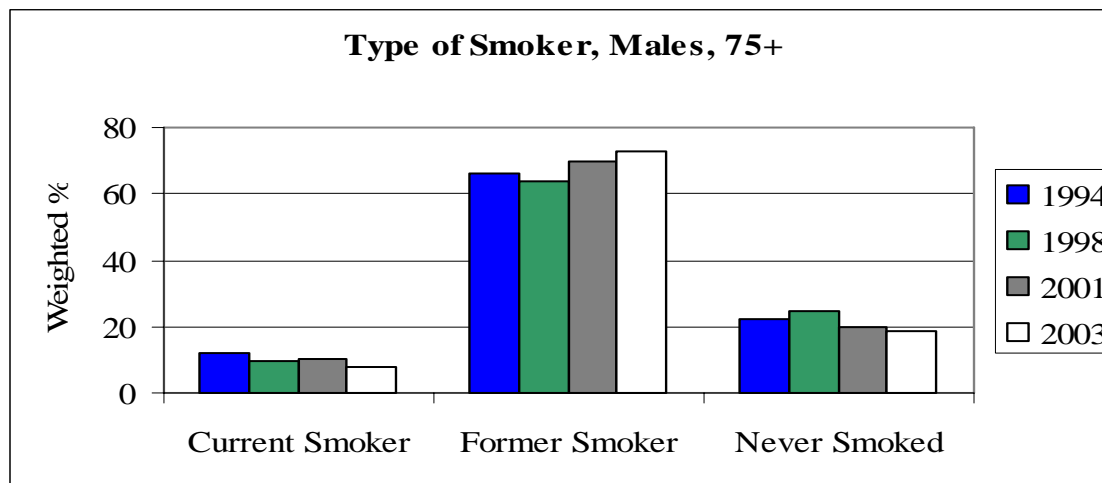
Smoking Behaviours, Ages 45-64



Smoking Behaviours, Ages 65-74



Smoking Behaviours, Ages 75+



Health Human Resources Modelling: Challenging the Past, Creating the Future

Co-Principal Investigators: Dr. Linda O'Brien-Pallas & Dr. Gail Tomblin Murphy

Project 2: Nursing and the Healthcare Production Function

Project Co-Investigators:
Birch, Tomblin Murphy, O'Brien-Pallas



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The Health Care Production Function

- Nursing human resources = one of several inputs into production of health care services
- Requirement for nurses for any given output of services depends on the availability of other inputs (e.g. hospital beds, patient severity etc.)

Objective

- To consider how the level of nursing inputs have changed over time
- To compare the change in nursing inputs with the change in the output of services and other inputs
- To analyze the change in the relative level of nursing inputs over a period of change in fiscal climate

Data

- **1994-1999 Data:**
 - Period of reduced health care expenditure - bed reductions
 - Data for acute care hospitals in Ontario
 - Source: Ontario Ministry of Health and Long Term Care

- **1998-2001 Data:**
 - Period of increased health expenditure – bed numbers steady
 - Data for acute care hospitals in PEI and NB (other provinces still to be analyzed)
 - Source: Jurisdictional Data

Methods

STEP 1: Production of Health Care

→What happened to hospital resources (input)- hospital services (output) relationship?

- Compare rate of change in services with rate of change in inputs

STEP 2: Needs for Health Care

→What happened to needs per patient?

- Adjust hospital services for age-specific severity of patients (RIWs)

Hospital-based Services Ontario 1998-2001

	1998	2001	Change (%)
Population (000s)	11,367	11,898	4.7%
Inpatient episodes (000s)	1163	1144	-1.6%
Registered Nurse (RN) FTEs	39,640	45,687	15.3%
Sum Rated Bed Capacity	26,837	27,377	2.0%
Inpatient episodes per 100 pop.	10.23	9.61	-6.1%
Inpatient episodes per RN	29.34	25.04	-14.5%
Inpatient episodes per bed	43.34	41.79	-3.6%
Adjusted inpatient episodes per RN	37.88	35.31	-6.8%
Adjusted inpatient episodes per bed	55.95	58.91	5.3%

Results for Ontario 1998-2001

STEP 1:

- Inpatient episodes per nurse fell by 1.6%
- On average, each inpatient episode consumes more nursing
- Inpatient episodes per bed decreased by 3.6%

STEP 2:

- Average severity of cases increased as less severe cases not admitted
- Adjusted episodes per nurse decreased by 6.8%
- On average, each inpatient episode consumes more nursing
- Adjusted episodes per bed increased by 5%

CONCLUSION:

- **To meet needs of 1.6% fewer patients using 2% more beds, hospitals employed 17% more nurses per inpatient**
- **Additional nursing inputs per episode employed to support technological innovations required to reduce hospital admission (substitution between inputs)**

Hospital-based Services PEI and NB 1998-2001

	Prince Edward Island			New Brunswick		
	1998	2001	Change (%)	1998	2001	Change (%)
Population	135819	136672	0.63	750551	749890	-0.09
Inpatient episodes	19721	17544	-11.04	117520	107916	-8.17
Registered Nurse (RN) FTEs	480.1	497.5	3.62	2865.3	2958.1	3.24
Beds	494	469	-5.06	3794	3794	0.00
Inpatient episodes per 100 pop.	14.52	12.84	-11.59	15.66	14.39	-8.09
Inpatient episodes per RN FTE	41.08	35.26	-14.15	41.01	36.48	-11.05
Inpatient episodes per bed	39.92	37.41	-6.30	30.98	28.44	-8.17
Adjusted inpatient episodes per 100 pop.	17.30	16.60	-4.05	18.73	18.72	-0.05
Adjusted inpatient episodes per RN FTE	48.9	45.61	-6.79	49.09	47.46	-3.32
Adjusted inpatient episodes per bed	47.55	48.38	1.75	37.07	37.01	-0.16

Results for PEI and NB 1998-2001

STEP 1:

- Inpatient episodes per nurse fell by 14% (11%)
- On average, each inpatient episode consumes more nursing
- Inpatient episodes per bed decreased by 6% (8%)

STEP 2:

- Average severity of cases increased as less severe cases not admitted
- Adjusted episodes per nurse decreased by 6% (3%)
- On average, each inpatient episode consumes more nursing
- Adjusted episodes per bed increased by 2% (decreased by 0.1%)

CONCLUSION:

- **To meet needs of 11% (8%) fewer patients using 5% less beds (same beds), hospitals employed 16% (12%) more nurses per inpatient**
- **More nursing input per episode even after adjusting for increased severity of patients**
- **This may reflect an easing of tight fiscal pressure and burnout among nurses**

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Project 3: Retention of Practicing Nurses

Project Co-Investigators:
O'Brien-Pallas, Meyer, Tomblin Murphy,
Duffield, Kephart, Birch & Eisler



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Objective

- To understand ***nurses' decisions to leave or remain*** in the nursing workforce in order to aid in the identification of ***efficient & effective strategies for nursing retention***

Approach

- The study used a cross-sectional survey design, which sampled three different groups at one point in time:
 - i. Former nurses who have left nursing & do not maintain registration
 - ii. RNs (& LPNs in Ontario) who maintain registration but are unemployed or do not work in nursing; and
 - iii. RNs (& LPNs in Ontario) who remain in practice, with special attention to over sampling nurses in the under 35 age cohort

Overall Sample (RN/LPN combined)

- Mailed surveys: PEI, NS, NFLD, NB, ON, SK
- Response rate: 41.6%
- N = 6453
- 96.7% female
- Average age: 43.8 (SD = 12.7)
- Marital status:
 - 11.8%: single
 - 78.6%: married/common-law/partnered
 - 9.6%: widowed/separated/divorced

Overall Sample (cont'd)

- # of children at home:
 - 47%: none
 - 20%: 1
 - 24%: 2
 - 10%: 3+
- # of children at college or university (not living with you):
 - 86%: none
 - 10%: 1
 - 3%: 2+
- # of other dependents living with you (e.g., elderly parents)
 - 92%: none
 - 5%: 1
 - 3%: 2+

Household income:	
\$0 - \$39,999:	7.6%
\$40,000 - \$49,999:	9.2%
\$50,000 - \$59,999:	15%
\$60,000 - \$79,999:	23%
\$80,000 - \$99,999:	22%
\$100,000+:	23%

Paths – Defined

< 35	Nurses under 35 yrs of age
Intend to Leave	Nurses who intend to leave nursing as a career within the next year (all ages)
Intend to Retire Early	Nurses over age 50 who intend on taking early retirement – i.e. before age 60
Leavers	Nurses who have left nursing as a career & who would either consider coming back or are undecided

What is the main reason that you still maintain registration?

- **Among leavers**

	RNs	LPNs
I may want to return to nursing	59.3%	65.3%
I want to keep my professional status	30.2%	20.7%
*Other	8%	9.1%

How long did it take to actually leave your last nursing position?

- **Among leavers**

	RNs	LPNs
3 months or less	63.5%	61.4%
4 – 12 months	25.6%	27.0%
13+ months	10.9%	11.6%

How do you feel about your decision to leave nursing?

- Among leavers

	RNs	LPNs
No regrets	35.2%	29.5%
Some regrets	51.8%	59.8%
Many regrets	13.1%	10.7%

Would you consider coming back to work in nursing?

• Among leavers

	RNs	LPNs
Undecided	25.4%	30.7%
Yes	34.1%	43.4%
No	37.6%	23.3%

RNs Satisfaction with ...

	<35	INTEND TO LEAVE	INTEND TO RETIRE EARLY	LEAVER
Overall nursing career in hindsight				77.3%
Overall nursing career currently or at time left	83.2%	50.7%	89.9%	63.1%
Current/last nursing job	76.1%	40.4%	81.6%	46.3%
Current/last nursing employer	65.5%	33.8%	70.6%	49.2%

LPNs Satisfaction with ...

	<35	INTEND TO LEAVE	INTEND TO RETIRE EARLY	LEAVER
Overall nursing career in hindsight				77.0%
Overall nursing career at time left or currently	76.9%	38.5%	80.5%	60.5%
Last/current nursing job	72.5%	30.8%	75.6%	51.2%
Last/current nursing employer	63.2%	27.5%	63.6%	47.6%

Factors that greatly influenced decision to leave nursing as a career

	RNs		LPNs
Opportunities for preferred lifestyle or worklife balance in other fields	73.5%	Opportunities for preferred lifestyle or worklife balance in other fields	63.4%
Difficult to manage the shift work	52.6%	Difficult to manage the weekend shifts	44.3%
Difficult to manage the weekend shifts	45.9%	Difficult to manage the shift work	43.1%
Opportunities for more financial rewards in other fields	42.6%	Concerned about the quality of care & patient safety	39.8%
Better opportunities for promotions in other fields	41.8%	Dissatisfied with nursing	33.1%
Dissatisfied with nursing	41.3%	Difficult to manage workload or patient assignments	29.5%

Among those aged 50+, factors influencing plan to retire early*

	RNs		LPNs
Having financial ability to retire	91.8%	Having financial ability to retire	92.2%
Being eligible for retirement	78.8%	Being eligible for retirement	76.5%
Spouse/partner is/will be retired	48.8%	Difficult to manage the heavy physical labour	62.7%
Concerned about the quality of care & patient safety	47.6%	Concerned about the quality of care & patient safety	62.0%
Difficult to manage the heavy physical labour	34.4%	Difficult to manage the workload or patient assignments	54.9%
Difficult to manage the workload or patient assignments	34.0%	Dissatisfied with nursing	51%

*before age 60

Factors influencing intent to leave the profession

	RNs		LPNs
Opportunities for preferred lifestyle or worklife balance in other fields	65.9%	Concerned about the quality of care & patient safety	54.3%
Dissatisfied with nursing	55.2%	Opportunities for preferred lifestyle or worklife balance in other fields	52.9%
Prefer not to work shift work	55.2%	Prefer not to work shift work	48.6%
Difficult to manage the shift work	54.6%	Opportunities for more financial rewards in other fields	47.1%
Concerned about the quality of care & patient safety	54.1%	Difficult to find my preferred nursing position	46.9%
Difficult to find my preferred nursing position	55.2%	Dissatisfied with nursing	45.7%

The Policy Initiatives Most Frequently Chosen **BY ALL** as One of their Top 5...

- RN & LPN < 35
- RN & LPN who intend to leave
- RN & LPN who intend to retire early
- RN & LPN leavers

Appropriate Workload
Better Salary
Improved or Safe Work Environment

The Policy Initiatives Most Frequently Chosen **BY SOME** as One of their Top 5...

Benefits Package

Fulltime Employment

Availability of Type of Position Wanted

Shorter Work Week with Full Pension Contribution

Preferred Shift

Policy: Fulltime Employment Nurses <35

Fulltime Employment was *more likely* to be perceived as 'very important' to creating attractive nursing work opportunities:

- by LPNs < age 35 than by RNs < age 35
- by the younger nurses in this < 35 age group
- by those < age 35 who were unmarried or had no children under age 5 than by married nurses < age 35 with at least one child under age 5

Policy: Better Salary

Nurses < 35

Better Salary was *more likely* to be perceived as 'very important' to creating attractive nursing work opportunities:

- by fulltime nurses < age 35 than by those < age 35 working casual hours
- by nurses < age 35 who felt they had invested a lot in nursing (i.e. time, education)

Policy: Appropriate Workload Nurses Who Intend to Leave

Appropriate Workload was *more likely* to be perceived as 'very important' to creating attractive nursing work opportunities:

- by RNs who intend to leave than by LPNs who intend to leave

Policy: Improved Work Environment Nurses Who Intend to Leave

Improved Work Environment was *more likely* to be perceived as 'very important' to creating attractive nursing work opportunities:

- As the annual incomes' (of nurses who intend to leave) increased

Policy : Appropriate Workload Nurses Who Intend to Retire Early

Appropriate Workload was *more likely* to be perceived as 'very important' to creating attractive nursing work opportunities:

- by staff nurses than by non-staff nurses who intend on retiring early

Policy: Shorter Work Week with Full Pension Nurses Who Intend to Retire Early

Shorter Work Week with Full Pension
was *more likely* to be perceived as 'very important'
to creating attractive nursing work opportunities:

- by those who felt they had invested a lot in nursing (i.e. time, education)

Policy Initiative: Fulltime Employment Leavers

Fulltime Employment was *more likely* to be perceived as 'very important' to creating attractive nursing work opportunities:

- by leavers in full or part-time non-nursing positions than by those working casual hours
- by leavers who were not satisfied overall with nursing
- by former LPNs than by former RNs
- by leavers with annual incomes under 50K than by those with incomes of 50K-80K or >80K

Policy: Improved Work Environment

Leavers

Improved Work Environment was *more likely* to be perceived as 'very important' to creating attractive nursing work opportunities:

- by leavers who had worked as nurses in urban areas as compared to rural areas
- by leavers who perceived more job/career alternatives *outside* of nursing
- by leavers who worked in the hospital sector

Scope of Career Paths Outside of Nursing– RNs vs. LPNs

	RNs		LPNs
Health Care & Social Assistance	31.8%	Health Care & Social Assistance	48.6%
Educational Services	11.5%	Retail Trade	9.2%
Other Services (e.g. childcare-related positions appeared frequently)	10.0%	Other Services (e.g. childcare-related positions appeared frequently)	6.9%
Scientific Research & Development Services	5.1%	Manufacturing	5.2%
Retail Trade	3.9%	Educational Services	5.2%
Finance & Insurance	3.0%	Accounting, Tax Prep, Bookkeeping, Payroll	4.0%

Education Level Required for Positions Outside of Nursing – RNs vs. LPNs

	RNs	LPNs
On the Job Training	37.1%	47.7%
University Education	34.8%	3.3%
College Education	21.9%	42.4%
Secondary School	5.0%	5.3%
Apprenticeship	1.2%	1.3%

Concluding Remarks

- Additional analysis will assist us to determine the probability of more or less successful return or retention scenarios for different age cohorts & groups