Aging of the Population: Why This Matters?

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Historians may well conclude that the most significant event of the 20th century was ...?

the growth of world population.
And in the 21st century, the most significant event may likely be ...

the aging of humanity.
THE DEMOGRAPHIC TRANSITION

THE DEMOGRAPHIC TRANSITION MODEL

STAGE ONE
(Pre-Modern)

STAGE TWO
(Urbanizing/Industrializing)

STAGE THREE
(Mature Industrial)

STAGE FOUR
(Post Industrial)

CBR, CDR RATE PER 1000

YEAR

TOTAL POPULATION

www.marathon.uwc.edu
WORLD POPULATION AGING

During the last decades there has been a global decline of mortality and fertility from higher to lower levels.
WORLD POPULATION

The world population is rapidly growing:

![Graph showing the increase in world population from 1950 to 2050. The population increases from 3 billion in 1950 to 9 billion in 2050.](source: U.S. Census Bureau, International Data Base, June 2010 Update.)
• World population is especially growing older:

- the share of the population aged 65+ is expected to double between 2010 and 2040, from 7.8% to 14.7%

- the number of older people will increase from 530 million in 2010, to 1.3 billion by 2040.

(U.S. Census Bureau, International Data Base)
Another aspect of world population aging is the aging of the older population; the share of the older at ages 80+ (the “oldest-old”) is growing more rapidly than the older population itself.

This growth will translate into a large increase of oldest-old within the world’s older population, from 16% in 2000 to 24% in 2040.  
(U.S. Census Bureau, International Data Base)
Gender and Aging

- NUMBERS
- MORBIDITY
- POVERTY
Trends in Global Aging

Percent of Population
Aged 65 & Over:
History and UN Projection

Source: UN (2005)
Number of Years for Percent of Population Age 65 or Older to Rise from 7% to 14%

<table>
<thead>
<tr>
<th>More developed countries</th>
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<td>France 1865-1980</td>
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<td>Speed of Population Aging in</td>
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* Dates show the span of years when percent of population age 65 or older rose (or is projected to rise) from 7 percent to 14 percent.

EPIDEMIOLOGY OF AGING: DISEASES

- The leading cause of death among elderly:
  - heart disease
  - cancer
  - stroke
  - chronic lower respiratory tract disease
  - Alzheimer’s disease

EPIDEMIOLOGY OF AGING: DISEASES

The leading Causes of Morbidity:

- Hypertension
- Osteoprosis
- Osteoarthritis
- Vision/Hearing Problems
- Falls and Fractures
  - Disease in older population is the norm
    - And many have multiple morbidities: Need more research in this area
  - Use of multiple medications
Rectangularization of the survival curve

FURTHER INCREASE IN LIFE EXPECTANCY

Squaring the survival curve

PERCENT SURVIVING

TRAUMA

IDEAL

1980

1900

AGE

0 10 20 30 40 50 60 70 80 90 100

Compression of morbidity

Fries’ paradigm based on the premise that:

• The length of human life is fixed
• Chronic disease can be postponed

• Predicted that the increase in life expectancy would plateau in the coming decades, particularly life expectancy from age 65 which excludes early life mortality
Fries potential scenarios

- Present Morbidity
- Life Extension
- Shift to the Right
- Compression of Morbidity
Evidence suggests otherwise

• Is average life expectancy approaching an upper limit to life expectancy?
  • the evidence that the average life span is 85 years is unconvincing
  • there is no evidence for further rectangularization of survival curves

• Will age at first infirmity increase?
  • there is no evidence for over-all declines in incidence of morbidity: on the contrary
  • evidence for actual “(de)compression” of morbidity is ambiguous
Historical increases of life expectancy
Oepen and Vaupel, Science 2002; C Finch adaptation

Phase 1
early urban

Phase 2
sanitation-nutrition

Phase 3?
regeneration
modern medicine
Social Policy Innovation

Life-expectancy in years

1550 1600 1650 1700 1750 1800 1850 1900

England
Norway
New Zealand
Iceland
Netherlands
Sweden
Japan

Canadian Longitudinal Study on Aging
Etude longitudinale canadienne sur le vieillissement
What happens when the epidemiologic and demographic transitions collide?
Framework for Research on Aging: Addressing the Demographic and Health Paradox

Understanding biological medical, psychological and lifestyle mechanisms of aging

Interventions

Life expectancy ↑

(110 to 120 yr)

Depletion of or inadequate financial resources

Delayed retirement

Competition for jobs with younger people

Quality of life/disability

Out of pocket expenses↑

Health costs ↑↑

Greater demands on pension funds

Inadequate workers to sustain social security

Poverty in over 65

Adversarial relations with younger age generation

Informal Care giving

Population increase

Environment

Refugee ↑

Poverty ↑

Malnutrition ↑

Emerging Health Problems

Causes of increased urbanization

Increased urbanization

Poverty

Malnutrition

Out of pocket expenses↑

Greater demands on pension funds

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Inadequate workers to sustain social security

Poverty in over 65
Health Care and Aging: Why Should this Matter?
Why should this Matter?

- According to ICES (2012) in Ontario amongst the 65+
  - The most complex 10% of older adults account for 60% of our collective health care funding
  - The least complex 50% of older adults account for 6% of our collective health care spending
Aging and Hospitalization in the 70+

- No Hospital Episodes ~42.6%
- Consistently Low Users ~24.6%
- Inconsistently High Users ~6.8%
- Consistently High Users ~4.8%

- Only a small proportion of older adults are consistently extensive users of hospital services
What Defines our Highest Users?

- Multimorbidity
- Functional Dependence
- Social Frailty
- Psychological Frailty
What are our options?

- One day in Hospital costs~$1000
- One day in Long term care~$130
- One day in Supportive Housing or Home and community care costs~$55

- Senior’s Strategy For Ontario, 2013
Few Key Strategic Areas Identified in Senior’s Strategy for Ontario

- Development of elder friendly communities
- Promoting health and wellness
- Strengthening Primary care for older adults
- Improving Community care
- Improving Acute care
- Enhancing LTC environments
- Caring for caregivers
Harder-working Americans
Annual number of hours worked per person in employment, ‘000

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Source: OECD

*1995  †1997
Workers have heavy caregiving loads

- 25% of employees have cared for an elderly relative in the last year
- More dual-earning couples
- 20% of working parents are also providing elder care
- ~50% of workers are caring for someone

Bond, Galinsky, Swanberg. 1998. Families and Work Institute
Global Distribution of Incident Dementia (7.7 million new cases per year)

Asia 47%
Africa 7%
North America 11%
Latin America 5%
Europe 30%

One new case every 4 seconds!

WHO Report 2012 – Dementia a Public Health Priority
Family & Friends are the cornerstone of care, but their need for support is often overlooked.

- What are the consequences of caregiving?
- Negative versus positive consequences
hours spent on informal care is expected to more than triple

Now 231 million hours
Within a Generation 756 million hours

The time Canadians will be providing in informal care
Annual Economic Burden
Within one generation $15 \text{ billion to } $153 \text{ billion}

Monetary economic burden to reach approximately $97 \text{ billion}
Opportunity costs of informal caregivers add a further $56 \text{ billion}
Symptomatic Domains of AD Over Time

Mood
Cognitive Function
Functional Autonomy
Motricity (Motor Function)
Behaviour Problems

Deterioration

Time

Adapted from Gauthier et al. *Clinical Diagnosis and Management of Alzheimer's Disease*, 1999.
The Caregiving Career

Aneshensel et al., 1995
Chronic Stress Trajectory in Caregiving

Schulz, 2010
Who are the caregivers of people with dementia?
Profile of Canadian Caregivers  
(Baseline Data from CSHA-1)

- 75% of caregivers were women; 70% were married
- 29% were also employed
- 23% of caregivers were the person’s wife
- 12% were the husband
- 37% were children: 28% daughters, 9% sons
- 23% were other friends or relatives
- 5% were paid caregivers.

Community Support Services

- 40% of caregivers used a homemaker service
- 20% used a home nurse
- 9% meals on wheels
- 8% day centre
  - However, people with dementia received fewer services than non-demented people with the same level of disability

We recorded comments made by the participants and the interviewers...

“This subject has Alzheimer’s. For the last four years has not been able to speak or recognize anyone. Can’t do any ADLs; is just in bed.”

“She is very happy that her father is alive and that she can share and enjoy things with him. He is very independent and very loving--often an emotional support for her and the grandchildren.”

“Mom had Alzheimer’s. Dad couldn’t cope, so he gave up... He was incontinent and depressed.

I had 2 “babies” to look after... I just couldn’t cope.”
Help given by caregivers

• In the Community

**People with dementia:**
- The primary caregiver helps with an average of 4.2 activities of daily living
- Other informal caregivers on average help with 1.9 activities
- Paid caregivers help with 2.3 activities of daily living

**People without dementia:**
- The primary caregiver helps with 1 activity of daily living
- Other informal caregivers help with 0.3
- Formal caregivers help with 0.6 activity

• In Institutions
- Demented: 45% of primary caregivers help with daily activities
- Nondemented: 25% of primary caregivers help with daily activities
Understanding the Influence of the Complex Relationships among Informal and Formal Supports on the Well-Being of Caregivers of Persons with Dementia

Parminder Raina,\textsuperscript{1,2} Chris McIntyre,\textsuperscript{6} Bin Zhu,\textsuperscript{1} Ian McDowell,\textsuperscript{3} Lina Santaguida,\textsuperscript{1} Betsy Kristjansson,\textsuperscript{5} Alexandra Hendricks,\textsuperscript{4} Helen Massfeller,\textsuperscript{1} and Larry W. Chambers\textsuperscript{3,4}

Published by Cambridge University Press
DOI: 10.1353/cja.2005.0041
Consequences of Caregiving

- Caregiver stress rises with behavioral and other acute problems of the care recipient (aimlessness, aggression, etc.)
- Caregiver burden increases with more disturbing behavior, combined with lower social support or family functioning
- Caregiver and patient characteristics predict conflicts among family members
- The hopelessness theory of depression applied to caregivers
Implications for Caring for Caregivers

• Interventions need to consider the complex influences on the health of the caregivers

• Different stages of the CG career require different support systems

• Caring for elderly also requires caring for family caregivers
Research on Aging and Hamilton: What are we doing to support your work?
RESEARCH ON AGING

- The demographic causes of aging of the population, in terms of fertility rates and mortality rates, are generally predictable. A variety of population projections are available, prepared by UN, EU and National Statistic Institutes.

- What is less predictable is the interaction of these forces with social context, health status, economic changes, cultural influences and hence international migrations.
Risk factors for Disease, Disability and longevity

- Risk factors
  - Many factors contribute
  - Gender difference remains unexplained
  - Loss of prediction
  - Paradoxes in prediction

- New opportunities
  - Larger number of very old people
  - Longer term follow-up
  - Longitudinal data – identify optimal trajectory
  - Common risk factors
Exceptional survival – Understanding physiologic reserve

• Do systems decline together?
• Is there a common underlying "rate" of aging across organ systems?
RESEARCH ON AGING

• For this reason further research on biodemography, dynamic of health, epidemiology, economics, psychology, social sciences and aging are needed.
• Longitudinal data are essential in order to sort causal relationships among demographic, biological, psychosocial and economic factors, and health.
• Cross-national comparison are important, considering variability across societies, in terms of status and well-being of older persons, experiences of health and mortality, family and social support.
The Canadian Longitudinal Study on Aging (CLSA)

A key strategic initiative of CIHR

The Canadian Longitudinal Study on Aging

More than 160 researchers - 26 institutions

Multidisciplinary - biology, genetics, medicine, psychology, sociology, demography, economics, epidemiology, nursing, nutrition, health services, biostatistics, population health
Canadian Longitudinal Study on Aging (CLSA)

A research platform – infrastructure to enable state-of-the-art, interdisciplinary population-based research and evidenced-based decision-making that will lead to better health and quality of life for Canadians.
Participants (50,000)

Enrolled

Questionnaire Data (50,000)

Physical Exam and Biological Specimen (30,000)

Active Follow-up (F) Every 3 years
- Questionnaire
- Physical exam
- Biological samples

Maintaining Contact Interview (MC) mid-wave
- Update contact information
- Short Questionnaire

Passive Follow-up Every 3 years
- Health care utilization
- Disease registries
- Mortality databases

Data and Biological Sample Repositories

Researchers
Our Mission
Transforming everyday life into extraordinary ideas

The Canadian Longitudinal Study on Aging (CLSA) is a large, national, long-term study that will follow approximately 50,000 men and women between the ages of 45 and 85 for at least 20 years. The study will collect information on the changing biological, medical, psychological, social, lifestyle and economic aspects of people's lives. These factors will be studied in order to understand how, individually and in combination, they have an impact on both maintaining health and in the development of disease and disability as people age. The CLSA will be one of the most comprehensive studies of its kind undertaken to date, not only in Canada but around the world.

Dr. Hamidreza Minaei (McMaster University, Hamilton) is the lead principal investigator of the CLSA. Dr. Christine Wolfson (McGill University, Montreal) and Dr. Susan Kirkland (Dalhousie University, Halifax) are co-principal investigators of the CLSA. Drs. Raina, Wolfson and Kirkland, along with a team of more than 160 investigators and collaborators from several Canadian universities, have participated in the development of this innovative, interdisciplinary study.

For more information, please contact us at info@clsae-lcv.ca.

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News

Mar 13th

The new science of everyday living for aging well
The Canadian Longitudinal Study on Aging (CLSA) will be the focus of an upcoming Café Scientifique hosted by the University of Victoria Centre on Aging.

Mar 12th

CLSA hosts MP Joy Smith
The Canadian Longitudinal Study on Aging (CLSA) welcomed Joy Smith, Member of Parliament for Kildonan – St. Paul, for a tour of the Winnipeg Data Collection Site in March.

Mar 12th

I'm not afraid of aging: But let's talk
The Montreal site of the Canadian Longitudinal Study on Aging (CLSA) hosted a Café Scientifique at Le Café des Beaux-Arts on March 12, 2013.

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Provincial & Institutional Partners

Funders

Supported by the Government of Canada through the Canadian Institutes of Health Research and the Canada Foundation for Innovation.
Teams Advancing Patient Experience: Strengthening Quality (TAPESTRY)

• to help older adults stay healthy at home using an interprofessional primary health care team delivery approach that integrates community trained primary healthcare volunteer volunteers, system navigation, community engagement, and use of technology; and

• to adopt this team approach as a scalable and sustainable model for care across jurisdictions and illnesses.
McMaster Optimal Aging Portal

The McMaster Optimal Aging Portal is a website that will provide a unique, trusted information source with a variety of tools and information to address questions about healthy aging from citizens, health care providers, researchers and policy makers. The site will become Canada’s authoritative voice on optimal aging, and will offer free, up-to-date, evidence-based and bilingual information.

The portal will consist of a "knowledge refinery," which will search for and review the best available research evidence related to health aging; the "information rater" will then assess the information by subject experts and evaluate it for value; finally, a system navigator will link the user to related resources. The portal project will also include strategies to engage the key audiences through public talks, forums and the use of media outreach.

Please check back here soon for a link to our new portal.

Knowledge Translation Enterprise

The KT Enterprise will consist of the following:

- **Citizen panels** — to give elderly citizens, caregivers and those interested in optimal aging a voice in how optimal aging is supported in Canada.
- **Public talks** with include high-profile speakers to discuss and debate on important issues related to optimal aging.
- **Debates** with high-profile national and global researchers to discuss these important issues with scientists and to learn how we can address the needs of the aging population.
- **Student-led conversations** to discuss current issues in optimal aging, to expose students to relevant information and to learn from the students about how they think optimal aging is or should be supported in Canada.
Strategic Initiative on Aging at McMaster

Institute of Aging

- Clinical & Population Aging
- Psychology & Aging
- Technology & Aging
- Geography, Social, Economic, Culture & Aging
- Biology & Aging

SUPPORTING INFRASTRUCTURE
- Technology Development and Testing Laboratory
- Data Collection & Processing Laboratory
- Social Sciences Quantitative & Qualitative Laboratory
- Data Repository Laboratory
- Sensory and Neurocognitive Laboratory
- Biospecimen & Biomarker Laboratory
- Aging Animal Model Laboratory
- Optimal Aging Portal for Knowledge Transfer
praina@mcmaster.ca

CLSA funded by the Government of Canada through CIHR and CFI, and provincial governments and universities

www.clsa-elcv.ca