

Prevalence and Characteristics of Multimorbidity in Ontario

Anna Koné PhD^{1,2}, Walter Wodchis PhD^{1,3}, Andrea Gruneir PhD^{1,3,4}, Susan Bronskill PhD^{1,3}, Colleen Maxwell PhD^{3,6},
Kednapa Thavorn PhD^{1,5}, Yelena Petrosyan MD, MPH¹, YuQing Bai MSc¹, Andrew Calzavara MSc³

¹ Institute of Health Policy, Management and Evaluation, University of Toronto; ² Cancer Care Ontario; ³ Institute for Clinical Evaluative Sciences;

⁴ Women’s College Research Institute; ⁵ Li Ka Shing Knowledge Institute, St. Michael’s Hospital; ⁶ School of Pharmacy, University of Waterloo

OBJECTIVES

There is a growing need to address care management, patient experience and costs, for individuals with non-communicable disease (NCD) and particularly those with multiple NCDs or multimorbidity. Multimorbidity is known to be associated with high costs and gaps in quality of care and its prevalence is expected to increase dramatically due to the aging population and improved survival. This study aims:

1. To determine the prevalence of multimorbidity in Ontario
2. To evaluate the demographic and clinical characteristics of the multimorbid population
3. To describe the trends in multimorbidity
4. To assess the feasibility of using administrative databases to measure and conduct research on multimorbidity

DATA SOURCES & STUDY POPULATION

Data sources included but were not limited to:

- CIHI Discharge Abstract Database: for inpatient hospitalization records
- Ontario Health Insurance Plan claims: for physician billings
- Registered Persons Database: for basic demographics
- ICES validated disease cohorts derived from administrative record

The **study population** included all eligible Ontario residents who met the following criteria on either April 1, 2003 or April 1, 2009:

- aged 0 to 105 years; and
- at least one of the following conditions: cardiac arrhythmia, acute myocardial infarction, hypertension, chronic coronary syndrome, congestive heart failure, stroke, asthma, chronic obstructive pulmonary disorder, diabetes, osteoporosis, rheumatoid arthritis, osteo- and other arthritis, depression, dementia, cancer, or renal failure.

- **Cohort size** in 2003: 5,263,845
- **Cohort size** in 2009: 6,639,089

MEASURES & ANALYSES

Measures

- Baseline characteristics: Age, Sex, Income Quintiles (based on the average household income value by Dissemination Area) Ethnicity Concentration (denoting the % of recent immigrants or self-identified as visible minority by geographic area), Dependency Quintiles (includes % of the population 65+, ratio of 0-14 or 65+ population to 15-64 population, and % of population 15+ not participating in labour force)
- Prevalence of each of 16 conditions and most common combinations
- Number of conditions (1, 2, 3, 4 and 5+)

Analyses

- Univariate analysis
 - Prevalence estimation
- Bivariate analysis: comparison of the prevalence of multimorbidity
 - By year of study (2003 vs. 2009)
 - By patient characteristics

RESULTS

Figure 1: Prevalence of Multimorbidity in 2003 and 2009

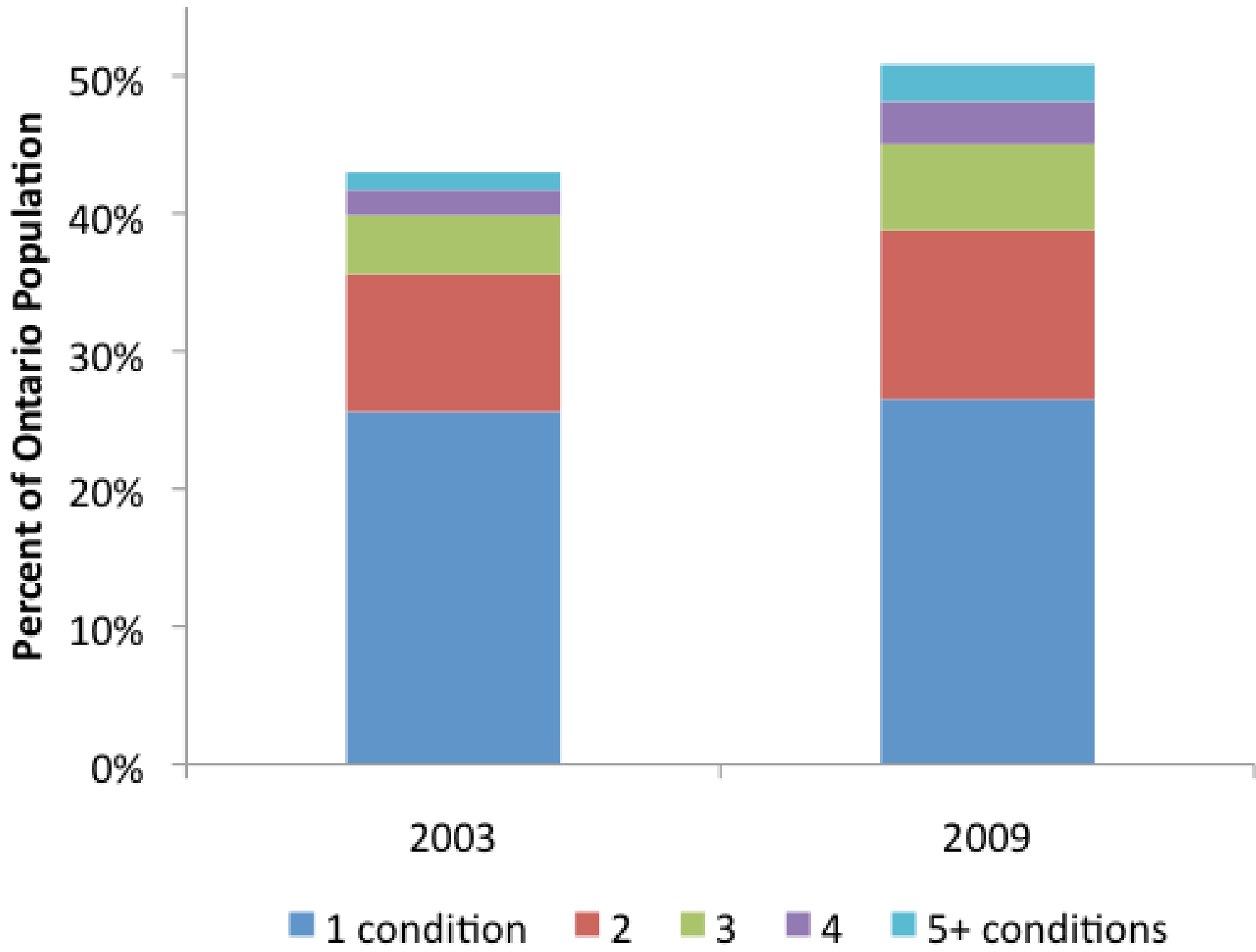


Figure 2: Association of Multimorbidity with Socio-Economic Status (Dependency, Income and Neighbourhood ethnicity concentration)

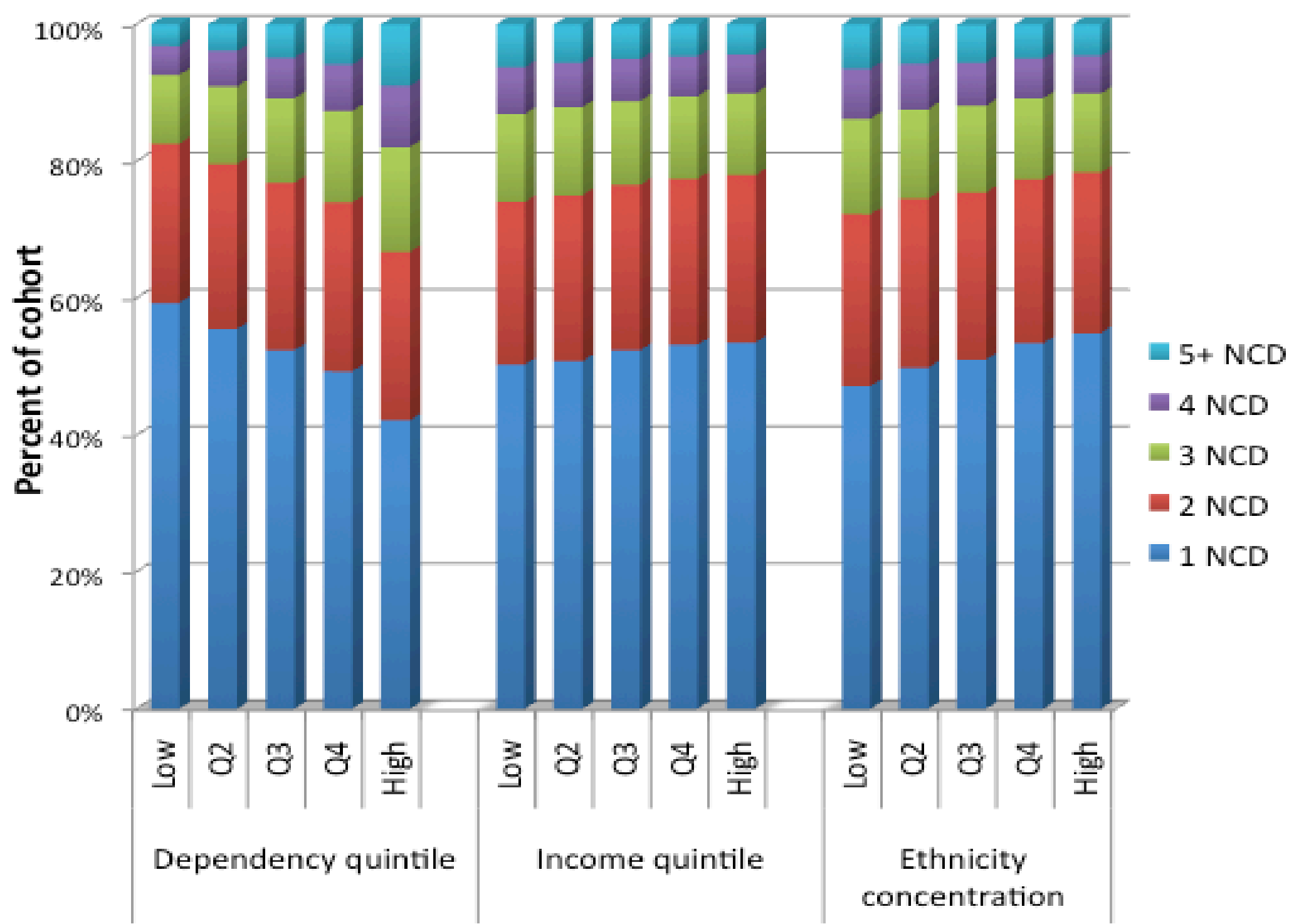


Figure 3: Distribution of Multimorbidity by Age – 2003 and 2009

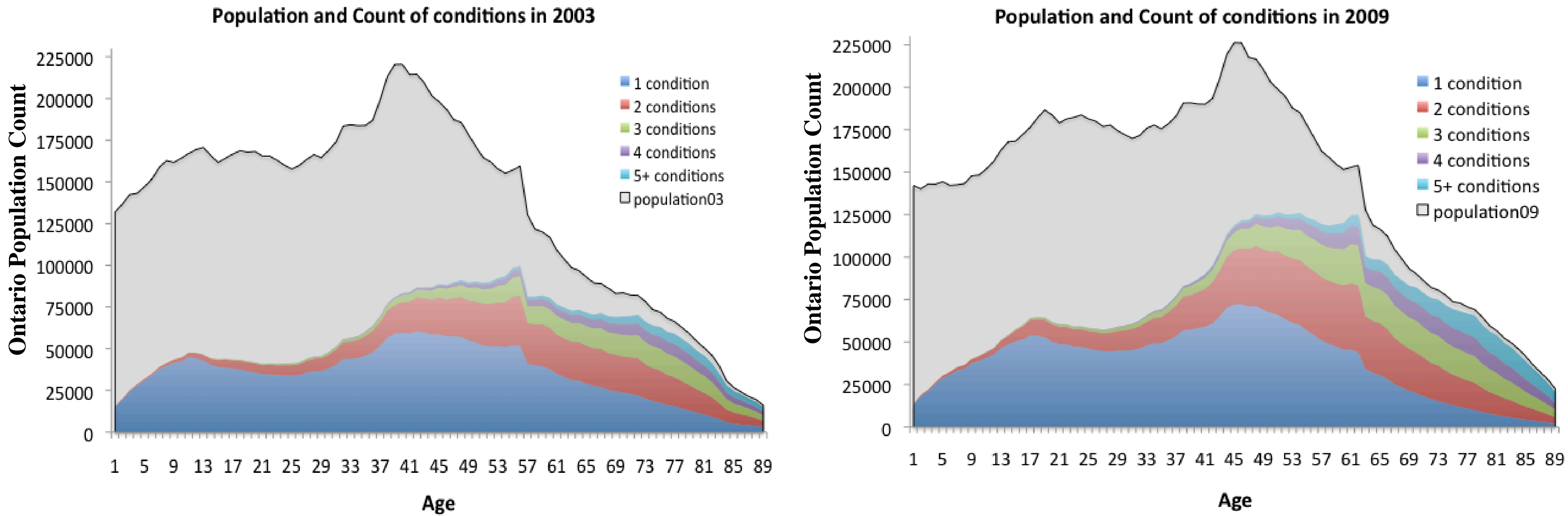


Table 1: Five Most Prevalent Conditions and Clusters in 2009

Cohort	Top conditions or clusters	Proportion of cohort with top conditions or clusters	Number of conditions or clusters accounting for:	
			50% of cohort	80% of cohort
1 condition	Asthma (29.2%); Arthritis (24.2%); Hypertension (16.7%); Depression (14.7%); Cancer (6.2%)	91.0%	2	4
2 conditions	Hypertension & Arthritis (17.5%); Depression & Arthritis (10.0%); Diabetes & Hypertension (9.0%); Asthma & Arthritis (8.8%); Asthma & Depression (6.6%)	52.0%	5	14
3 conditions	Diabetes & Hypertension & Arthritis (10.9%); Depression & Hypertension & Arthritis (6.8%); Cancer & Hypertension & Arthritis (5.8%); Coronary Syn. & Hypertension & Arthritis (5.0%); Asthma & Hypertension & Arthritis (4.9%)	33.4%	11	45
4 conditions	Coronary Syndrome & Diabetes & Hypertension & Arthritis (5.6%); Depression & Diabetes & Hypertension & Arthritis (4.0%); Asthma & Diabetes & Hypertension & Arthritis (3.8%); Cancer & Diabetes & Hypertension & Arthritis (3.6%); Asthma & Depression & Hypertension & Arthritis (3.2%)	20.1%	30	127
5 conditions	Asthma & Depression & Diabetes & Hypertension & Arthritis (1.4%); Cancer & Coronary S & Diabetes & Hypertension & Arthritis (1.3%); Coronary S & Depression & Diabetes & Hypertension & Arthritis (1.2%); CHF & Coronary S & Diabetes & Hypertension & Arthritis (1.1%); Asthma & Coronary S & Diabetes & Hypertension & Arthritis (1.0%)	6.0%	243	2744

KEY FINDINGS

Multimorbidity is highly prevalent in Ontario

- 1 in 4 Ontarians have at least 2 of 16 conditions and the prevalence of multimorbidity increases to 75% in people aged 75 years or older.
- Higher neighbourhood income level is associated with less multimorbidity but higher dependency level is associated with more multimorbidity

While disease prevalence has increased slightly, multi morbidity has increased significantly between 2003 and 2009

- 4% increase in the prevalence of single condition
- 40% increase in the prevalence of multimorbidity

Multimorbid patients with 3 conditions or more don't have predominant combinations of conditions

- Because of the high crude prevalence, Hypertension & Osteoarthritis are present in most clusters
- However we found up to 243 possible clusters representing 50% of those with 3 conditions or more, compared to 5 conditions for those with 2 conditions

Clinical administrative databases are useful for measuring and monitoring multimorbidity in Ontario despite some limitations in case ascertainment and possible impact of false-positives

- Cases based on validated definitions and using a similar approach for non validated conditions
- Prevalence and characteristics comparable to other studies

IMPLICATIONS

Policymakers need to develop and support patient-centred (rather than disease focused) care management of multimorbid population. Because this population is increasing exponentially, they will continuously represent a burden for the health system and they will be insufficiently supported by disease-specific management programs

This study confirms that multimorbidity is predominantly found in the older population. However it also becomes a prevalent and growing issue among young adults that are often overlooked from previous studies.

Given the high and growing prevalence, future studies are required to evaluate the impact of multimorbidity on health outcomes, health care costs and quality of care.

ACKNOWLEDGEMENTS

This research was supported by a research grant from the Ontario Ministry of Health and Long Term Care (MOHLTC) to the Health System Performance Research Network (HSPRN). The opinions, results and conclusions reported in this paper are those of the authors and are independent from the funding sources. No endorsement by the MOHLTC is intended or should be inferred.

Additional information:
anna.josette.kone@umontreal.ca

