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The increasing ethnocultural diversity among the Canadian-born population: results from DemoSim, a population projection model using micro-simulation

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In recent decades, the ethnocultural diversity of the Canadian population has increased under the effect of sustained immigration levels from non-European countries. The proportion of persons belonging to visible minority groups[1], of non-Christian religions or of mother tongue neither English nor French has risen, especially in large urban centres such as Toronto, Montreal and Vancouver. Ethnocultural diversity first increased rapidly among the foreign-born population of Canada and it is now increasing rapidly among the second generation of Canadians, that is persons born in Canada with at least one parent born outside the country, as well as in the third (or more) generation, that is people born in Canada with both parents born in Canada. Based upon projections using a unique micro-simulation model, this paper focuses on these changes, distinguishing different generations of Canadians and showing the complex ethno cultural mosaic of the Canadian population by 2031. The paper will be divided in two parts. The first part will give a general overview of Statistics Canada's population projection micro-simulation model. The second part will consist of a detailed analysis of the ethnocultural diversity among the Canadian-born population.

The rapid changes in the ethnocultural diversity of the Canadian population have various public policy implications. In 2004, Statistics Canada was originally commissioned by a federal department responsible for multiculturalism policies to project the evolution of visible minority groups, major linguistic groups, immigrants and religious denomination groups up to 2017. In order to do so, Statistics Canada developed a population projection micro-simulation model (DemoSim) that allowed the ethnocultural diversity of the entire population of Canada to be projected according to a geographic structure that includes Canada's largest urban centres. This led to the publication of an analytical report[2] in 2005 that received broad media coverage and has since been widely used, especially by various federal departments and academics. According to this publication, about one Canadian in five (between 19% and 23%) is expected to be from a visible minority group by 2017 compared to 13% in 2001. Also, immigrants in Canada would account, according to the reference scenario, for 22.2% of Canada's population in 2017, which is equivalent to the highest level observed in the twentieth century.

The publication of the results of the 2006 Census, combined with the timeliness of immigration-related issues and the changes occurring in Canada's population, called for an update of the results published in 2005. A new agreement was reached between Statistics Canada and various federal departments not only to update these projections, extending the

[1] The *Employment Equity Act* defines visible minorities as 'persons, other than Aboriginal peoples, who are non-Caucasian in race or non-white in colour'

[2]. Alain Bélanger and Éric Caron Malenfant, *Population Projections of Visible Minority Groups, Canada, Provinces and Regions*, 2001-2017, Statistics Canada, Catalogue no. 91-541, 2005.

time horizon to 2031, but also to review methods and to expand the content of the model (new variables are included and new events are modeled).

This new micro-simulation model is using the 2006 Canadian Census of the population micro-data file (20% sample), adjusted for net under-coverage, as its base population. This file is composed of approximately six million individuals including all their characteristics such as age, gender, place of residence, religious denomination, visible minority group, immigrant status, generation status[3], continent/region of birth, mother tongue and highest level of schooling. Like any population projection model, DemoSim makes the initial population change over time by adding births and immigrants and subtracting deaths and emigrants. However, in this model estimates of the future population of Canada are obtained by simulating *one at a time* each individual. These individuals are therefore likely to "experience," in the course of projection, a number of events, mainly birthday, birth of a child, death, migration from one part of Canada to another, emigration, change of education level and change of marital status. Using a Monte Carlo procedure and the probabilities associated with each event, the model calculates for each person, based on his or her particular characteristics, the probabilities that he or she will experience these events as well as the time that will elapse before they occur. The model advances all individuals to the end of the projection period, unless they die or emigrate in the meantime. New individuals are also added over time through birth and immigration, after which they are subject, like the rest of the population, to the probabilities of experiencing the events simulated by DemoSim. Please refer to Table 1 for a general overview of methods, data sources and variables used for parameters estimates for DemoSim.

Table 1 : Methods, data sources and variables used for parameters estimates for DemoSim

Module	Methods	Data sources	Variables
Fertility	1 – Base risks : projected fertility rates 2 – Relative risks : log-log regressions	Census 2006 and own-chlidren method, vital statistics data (for adjustments to 2006 Census data)	Age, parity, aboriginal identity, registrered Indians status, time since immigration, generation status, visible minority group, religion, place of birth, education, marital status
Intergenerational transfers	1 – Transition matrixes of mother tongue, visible minority group, aboriginal identity and registrered Indians status from mother to the child 2 – Deterministic and probabilistic imputations of the child characteristics	Census 2006 (with own-children method for calculation of transition matrixes)	Immigrant status, registrered Indians status, visible minority group, aboriginal identity, mother tongue, mixed unions, place of residence of the mother
Mortality	1 – Base risks : projected mortality rates using a variant of the Lee-Carter method 2 – Relative risks: Cox proportional hazards	Vital statistics and 1991 Census mortality follow-up file	Age, sex, place of residence, time since immigration, education, visible minority group, aboriginal identity
Immigration	Annual number of immigrants set up and imputation by donors of characteristics of immigrants	Census 2006 and Citizenship and Immigration Canada data	All characteristics assigned to each new immigrants
Emigration	1 – Base risks : emigration probabilities 2 – Relative risks : Cox proportional hazards	Statistics Canada population estimates and Longitudinal Administrative Database	Age, sex, place of residence, time since immigration
Internal migrations	1 – Out-migration rates: log-log regressions specific to each region 2 – Choice of a destination: origin-destination matrixes	Censuses 1996, 2001 and 2006	Age, marital status, presence of children at home and age of the youngest child, education, place of birth, time since immigration, visible minority group, aboriginal identity, place of residence
Highest level of schooling	1 – Graduation probabilities : discrete time event history analysis 2 – Probabilities are projected to 2006 3 – Probabilities are adjusted to match the 2006 Census distribution	General Social Survey 2001 and 2006 Census	Birth cohorts, age, sex, place of birth, visible minority group, aboriginal identity
Marital status	Multiple logistic regressions "embedded"	Census 2001 and 2006	Age, sex, presence of children at home and age of the youngest child, visible minority group, mother tongue, religion
Departure of children from parental home	Cox proportional hazards	General Social Survey 2006	Age and sex of the youngest child, visible minority group, place of residence

[3]. Class of respondents depending on whether they are born abroad (first generation), born in Canada of at least one foreign-born parent (second generation) or born in Canada of two parents who were also born in Canada (third generation or higher).

The South Asians (4.0%) became Canada's largest visible minority group in 2006, surpassing Chinese (3.9%) for the first time. The populations of both groups were well over 1 million. The proportion of those identifying themselves as Black, the third largest visible minority group in Canada, reached 2.5% in 2006. The 2006 Census enumerated over 6 million individuals who were born outside Canada and these people are referred to as first generation Canadians (about one citizen out of five). According to the 2006 Census, three-quarters of recent immigrants (who arrived between 2001 and 2006) belonged to a visible minority group. The second generation refers to those who are Canadian-born and have at least one parent born outside Canada while the third generation or more are people who are Canadian-born and whose parents were both born in Canada. In 2006, visible minorities represented 14% of second generation Canadians compared to half of first generation Canadians. Among Canadians of third generation or above, this proportion remained below 1%.

Due to differential demographic behaviours, (mixed marriages, immigration composition, fertility and mortality) and intergenerational transfers of characteristics, visible minority groups are expected not only to represent a larger part of the foreign born Canadians but also of second and third generations Canadians. This paper will focus on differences in the ethnocultural diversity of first, second and third (or more) generations of Canadians, and thus will show how the face of Canadian population is likely to change over the next decades, according to projections results to be published in early 2010.