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Important growth of centenarians in Canada: data evaluation, revised estimates and causes

**Applied Demography Conference
San Antonio**

January 9th, 2014

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Plan

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Context

- Centenarians are currently the fastest growing age groups in Canada.
- Census tends to overestimate these small sub-populations.
- Canadian population estimates use the census (adjusted) as a base population.
- Since 2008, STC have published estimates of centenarians (2001-2013) which has been also suffering from overestimation.
- New methods were implemented to address this situation using death records information to reconstitute and estimate these sub-population.



Objectives

1. Evaluate the accuracy of age declaration for centenarians on death certificates and in censuses.
2. Assess the accuracy of the number of centenarians reported in censuses and present new estimates.
3. Explain the rapid increase in the estimated number of centenarians in Canada.



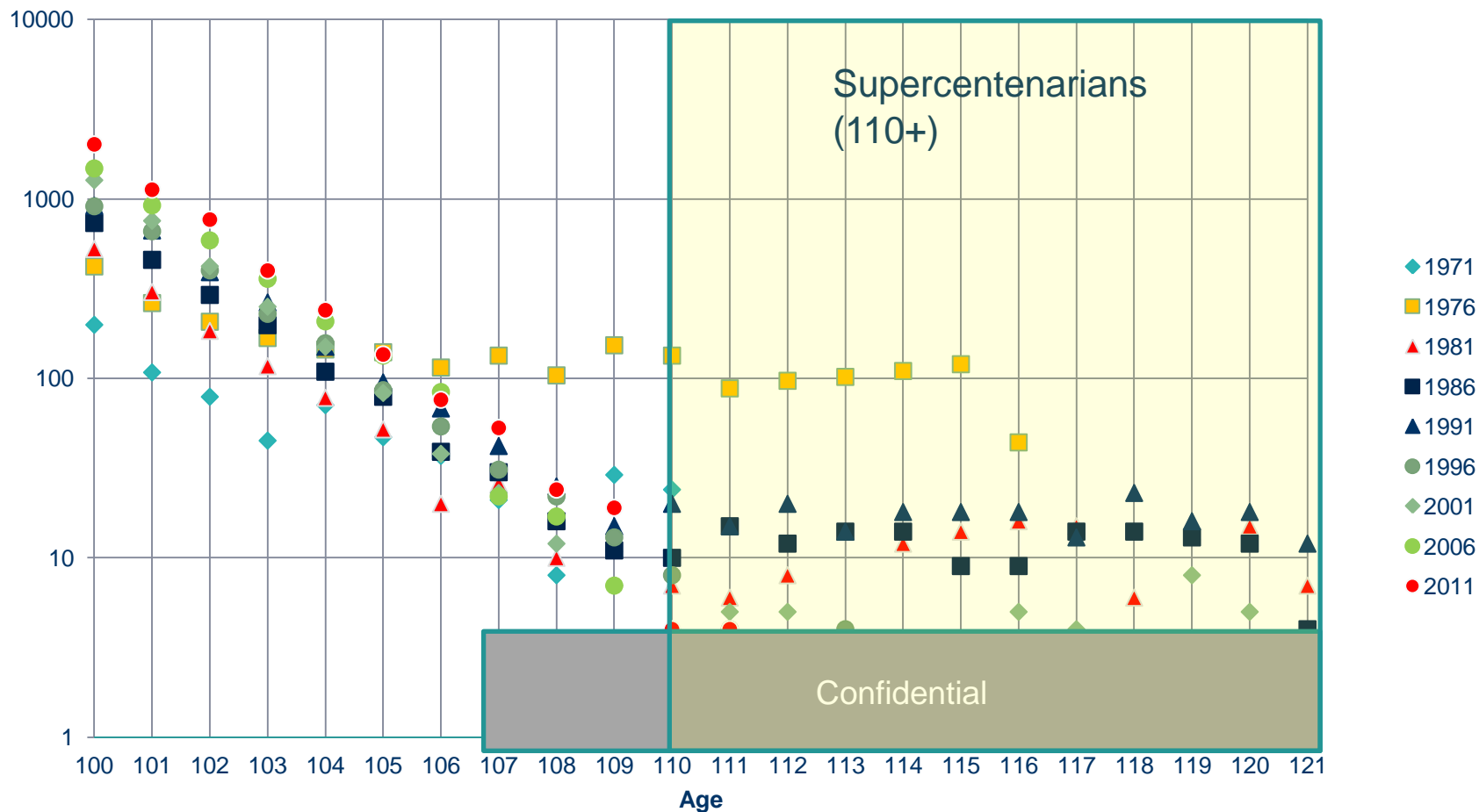
Sources

- Deaths records from vital statistics (1951-2010)
- Census special tabulation of unrounded counts for centenarian populations (1971-2011)

- Births estimates (1872-1901)
 - Derived from work of Keyfitz(1950): "The Growth of Canadian Population"
- Population estimates at all ages (1921-2011)

Evaluation of age declaration in censuses

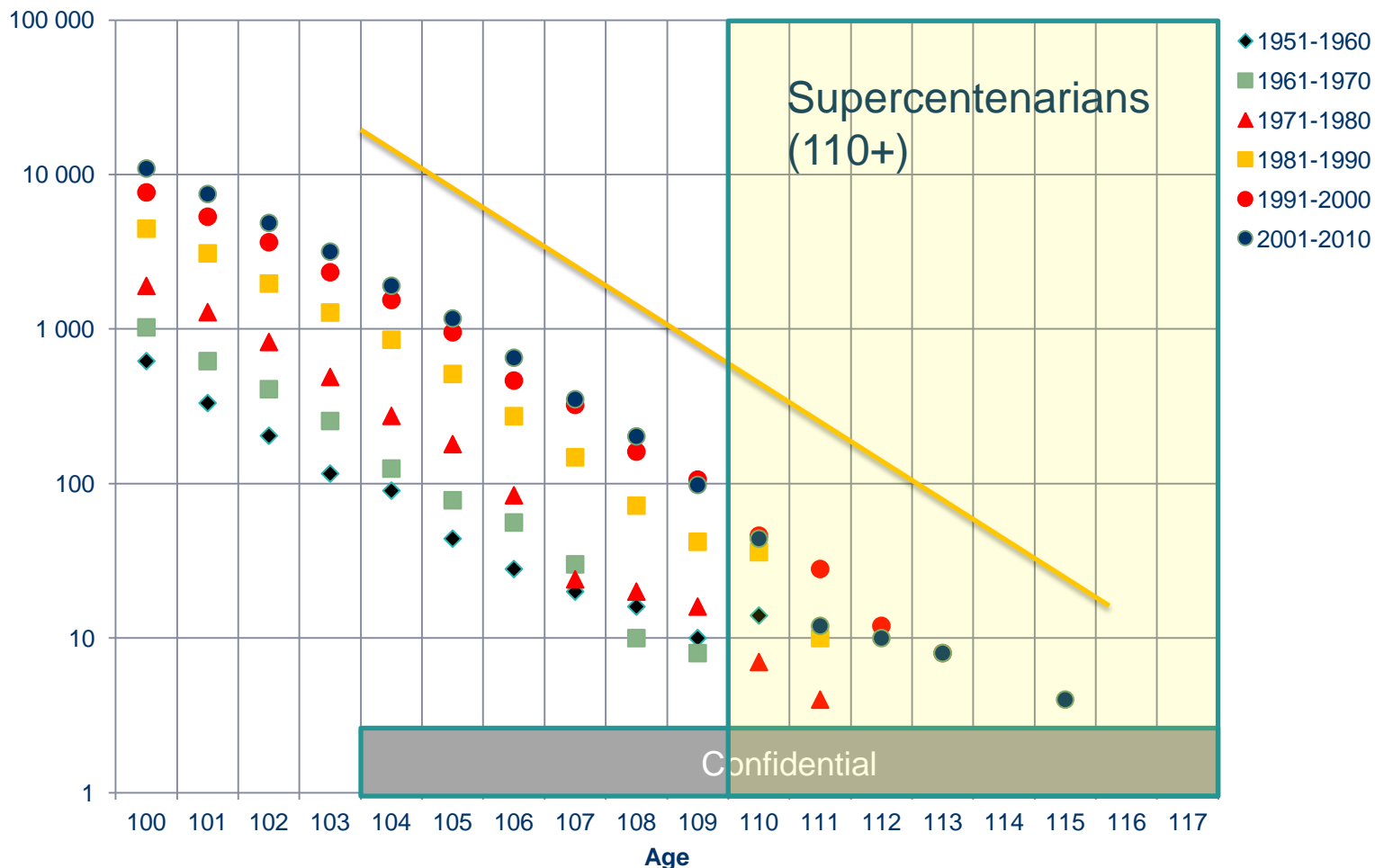
Number of female centenarians declared in censuses (1971-2011) by age, Canada



Source: Canadian Censuses for 1971 to 2011

Evaluation of age declaration in deaths records

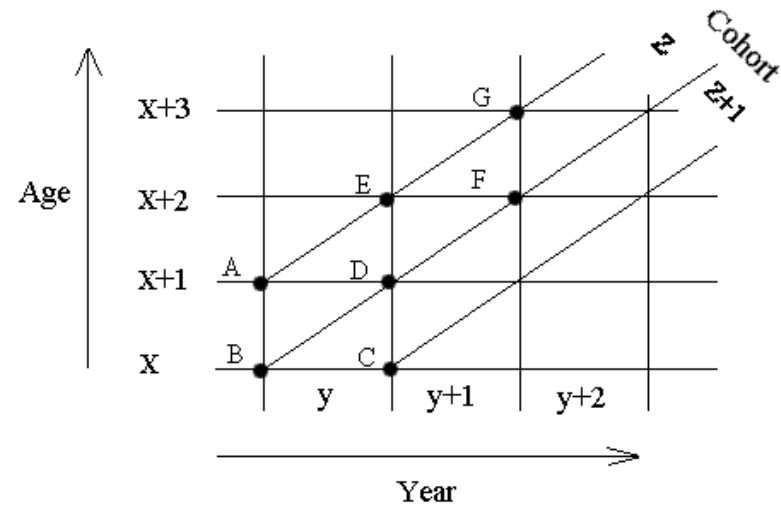
Number of female centenarians deaths by decade, Canada



Source: Canadian Vital Statistics from 1951 to 2010.

Estimation Methods

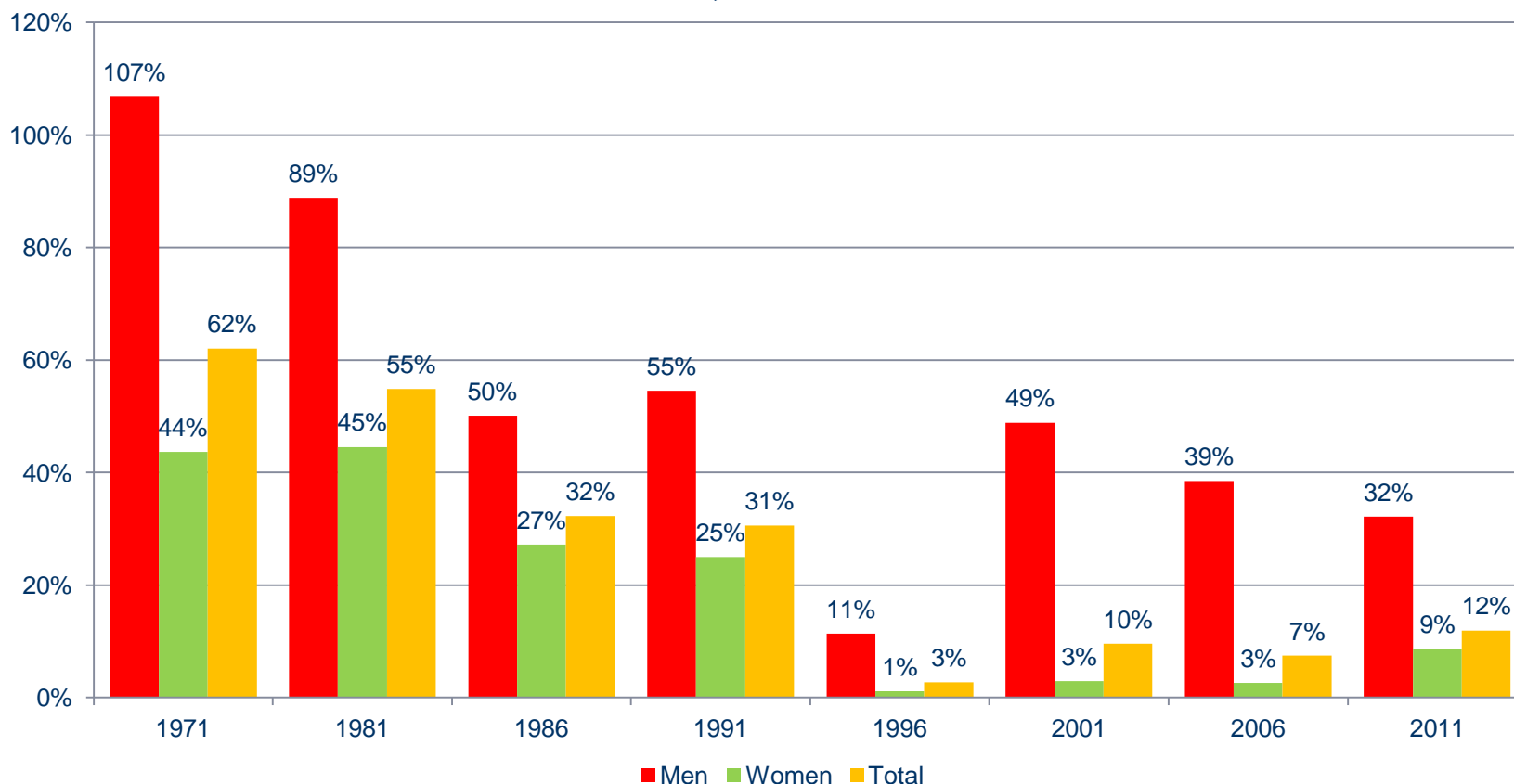
- Extinct cohort method (Vincent, 1951) is used to compensate for the diminishing quality of age declaration in Census as age increases (over 90+).
- In close population (w/o migration), the number of individuals from a single cohort reaching age x , within a year, is equal to the number of deaths up until there is no survivor.



- Survival Ratio method uses the estimates of the population for the non-extinct cohort (Thatcher, 1992).

Census overestimation of centenarians

Census counts vs. estimates of centenarians by gender, Canada, 1971 to 2011

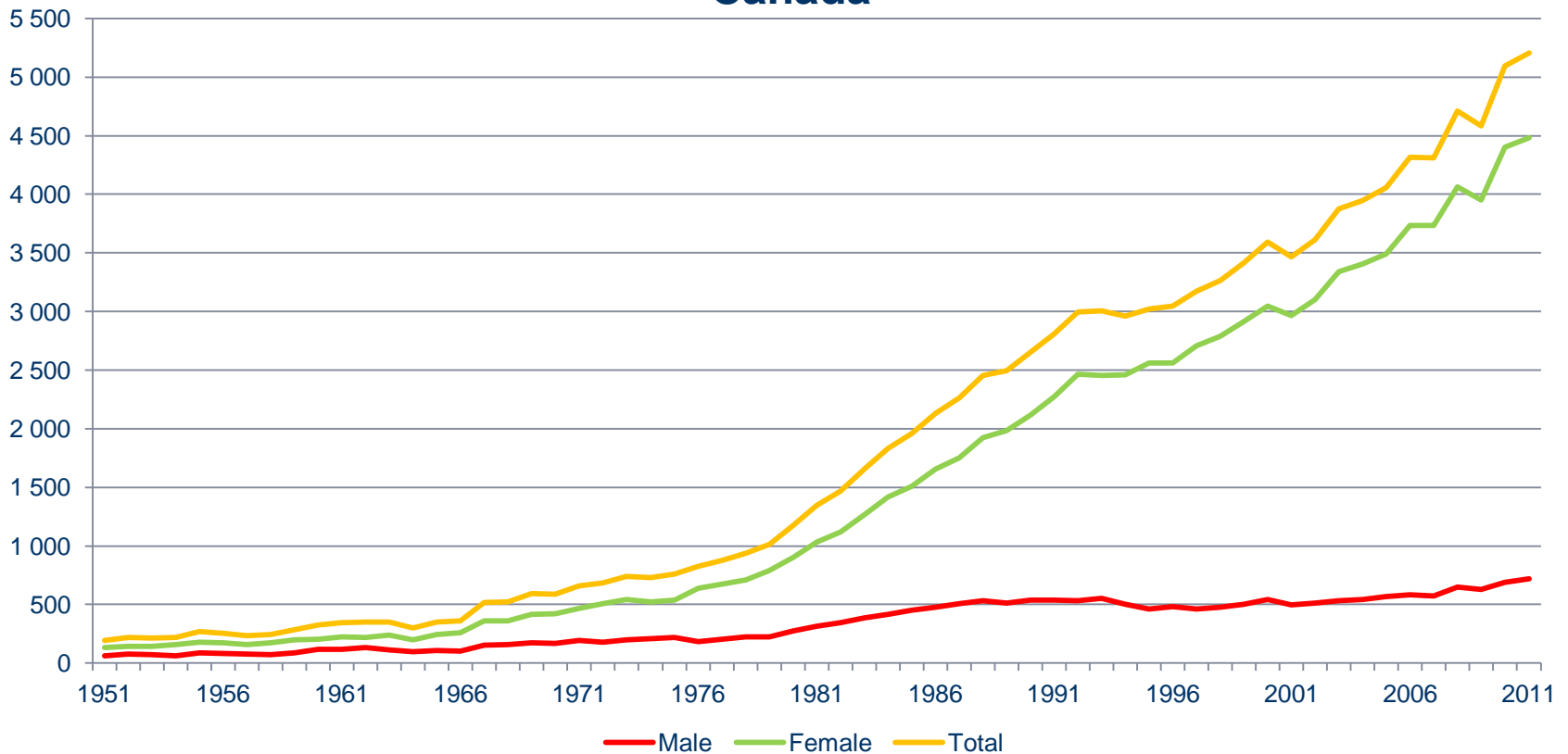


Source: Canadian Censuses for 1971 to 2011 and Preliminary Population Estimates on Census Day for 2001 to 2011 and unpublished estimates for the 1971-1996 period.



Rapid growth of centenarians in Canada

Centenarians population estimates by gender, 1951-2011, Canada

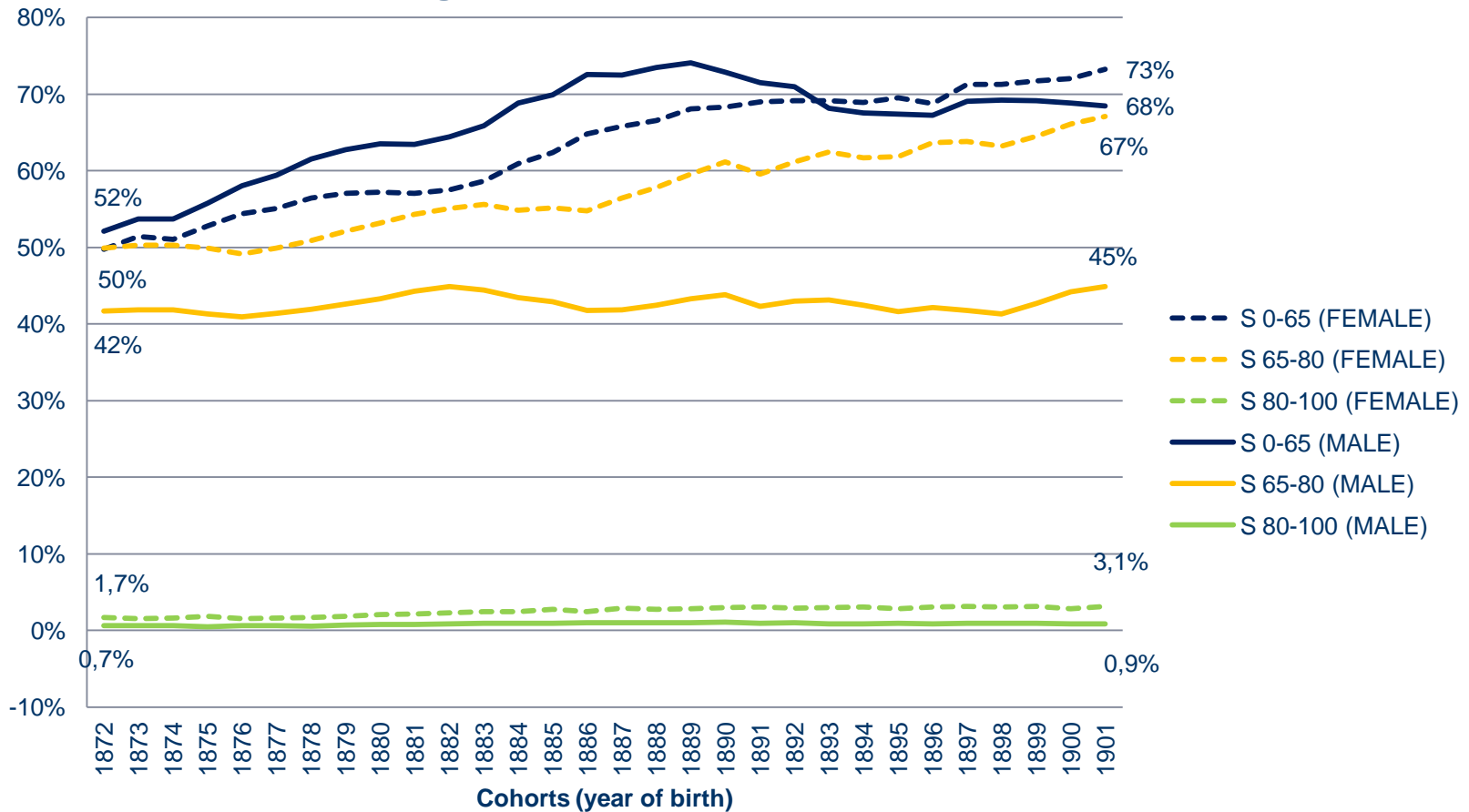


Sources: Preliminary Population Estimates on Census Day for 2001 to 2011 and unpublished estimates for the 1971-1996 period.



Improvement in mortality for cohorts born between 1872 and 1901

Survival rates between ages (0-65, 65-80 and 80-100) by gender and cohort, Canada



Source: Centenarians: Official Population Estimates for 2001 to 2011 and non-official Population estimates for 1971-1996.
Other groups: Official Population Estimates from 1921 to 2011



Demographic components contributing to the recent centenarians population growth

| Factors | Increases of centenarians between 1972 and 2001 | |
|--|---|-------------|
| | Male | Female |
| Increase in # births between 1872-1901 | 1.32 | 1.41 |
| Improved survival from birth to age 65 | 1.31 | 1.47 |
| Improved survival from age 65 to 80 | 1.08 | 1.34 |
| Improved survival from age 80 to 100 | 1.34 | 1.84 |
| Improved survival above age 100 (Ratio of 100+ over # age 100) | 0.95 | 1.15 |
| Net growth due to net migration and other causes | 1.16 | 0.99 |
| | | |
| <i>Total increases in the number of centenarians between 1972 and 2001</i> | <i>2.76</i> | <i>5.86</i> |

Conclusion

- Death records seems to be less affected by age overstatement than the census in Canada.
- Centenarians are still overestimated in Census but less in recent periods.
- Census age overestimation is still more important for male than female.
- The number of centenarians between 1972 and 2001 was multiplied by almost 3 for male and 6 for female.
- Improved survival at all ages was greater for female than male.
- The largest single cause of the growth of centenarians has been the increasing survival rates between age 80 and age 100.



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THANK YOU!