PUBLIC HEALTH AGENCY *of* CANADA
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Life Expectancy and Health Adjusted Life Expectancy Among Canadians with Hypertension and Diabetes REVES meeting, May 27, 2011

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Public Health
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Outline

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  - **Hypertension and diabetes in Canada**
  - **Objectives of the study**
- **Methods**
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Hypertension and Diabetes in Canada

2006/07 FY

- **More than 22.7% (≈6 million) of Canadian adults (20+) were living with diagnosed hypertension[1]**
- **About 6% (≈2 million) Canadians (1+) were living with diagnosed diabetes[2]**
- **More than 60% of people diagnosed with diabetes were also diagnosed with hypertension[2]**
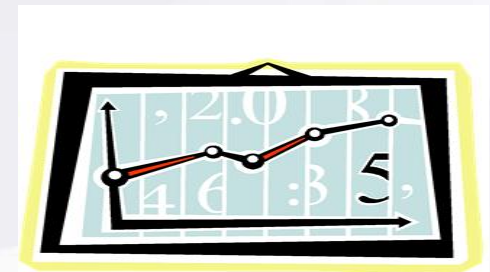- **More than 22% of adults with hypertension also had diabetes[1]**

Source: [1] Report from the Canadian Chronic disease Surveillance System: Hypertension in Canada, 2010

[2] Report from the National Diabetes Surveillance System: Diabetes in Canada, 2009

Hypertension and Diabetes in Canada (projection)

In 2011/12 FY, **it is estimated that:**

- **About 7.3 million Canadian adults (20+) are living with hypertension (an estimated increase of 25.5% from 2006/07[1])**

- **About 2.8 million Canadians (1+) are living with diabetes (an estimated increase of 25% from 2006/07[2])**

Source: **[1] Report from the Canadian Chronic disease Surveillance System: Hypertension in Canada, 2010**

[2] Report from the National Diabetes Surveillance System: Diabetes in Canada, 2009

Objectives of the study

- **To estimate Life Expectancy (LE) and Health Adjusted Life Expectancy (HALE) for Canadians without and with hypertension and diabetes**

- **To evaluate the loss (health gap) in LE and HALE associated with DM and/or HBP**

HALE

- **Health adjusted life expectancy is a useful population health measure, which combines morbidity and mortality in a single indicator of population health.**

- **Health-adjusted life expectancy is the number of years in full health that an individual can expect to live given the current morbidity and mortality conditions. Health-adjusted life expectancy uses the Health Utilities Index (HUI) to weigh years lived in good health higher than years lived in poor health. Thus, health-adjusted life expectancy is not only a measure of quantity of life but also a measure of quality of life (Statistics Canada).**
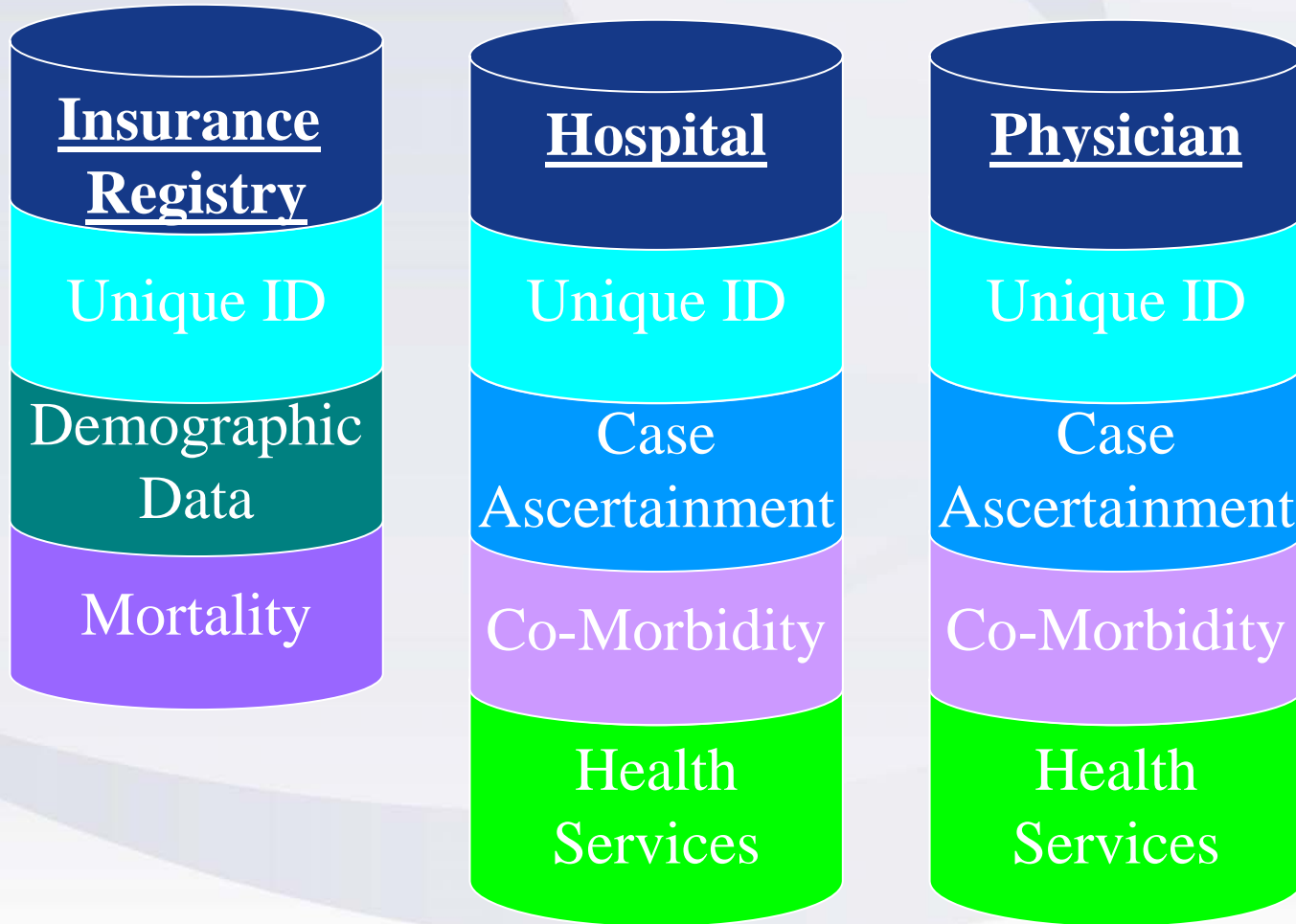
Data sources

- **Canadian Chronic Disease Surveillance System (CCDSS)**
  - ➢ *mortality and population data for people without and with diabetes and/or hypertension*

- **Canadian Community Health Survey (CCHS)**

  - ➢ *Health Utilities Index mark 3 (HUI3)*
  - ➢ *c1.1-c3.1 combined*

CCDSS

- The Canadian Chronic Disease Surveillance System is a collaborative network of provincial and territorial chronic disease surveillance systems, supported by the Public Health Agency of Canada;

- It collects information on prevalence, incidence, mortality and use of health care services;

- In each province and territory, the health insurance registry database is linked to the physician billing and hospitalization databases to generate summarized data for residents of Canada who have used the Canadian health care system;

- If there was sufficient evidence of use due to a certain disease, it was assumed that a person had diagnosed disease;

CCDSS – Data Sources

Insurance Registry
Unique ID
Demographic Data
Mortality

Hospital
Unique ID
Case Ascertainment
Co-Morbidity
Health Services

Physician
Unique ID
Case Ascertainment
Co-Morbidity
Health Services

CCHS

- Canadian Community Health Survey is an ongoing cross-sectional national health survey conducted by Statistics Canada

- CCHS collects information related to health status, health care utilization and health determinants for non institutionalised Canadians 12 years old and over

- It includes large sample size (≈130,000) to provide reliable estimates at the local health region level

- The respondents of the first 3 cycles were asked if they have any of 26-30 chronic conditions including hypertension and diabetes

Health Utilities Index (HUI3)

- **vision**
- **hearing**
- **speech**
- **ambulation**
- **dexterity**
- **pain**
- **cognition**
- **emotion**

$$mHUI = 1.371 * \prod_{k=1}^{8} b_k - 0.371$$

b_k-single attribute utility score
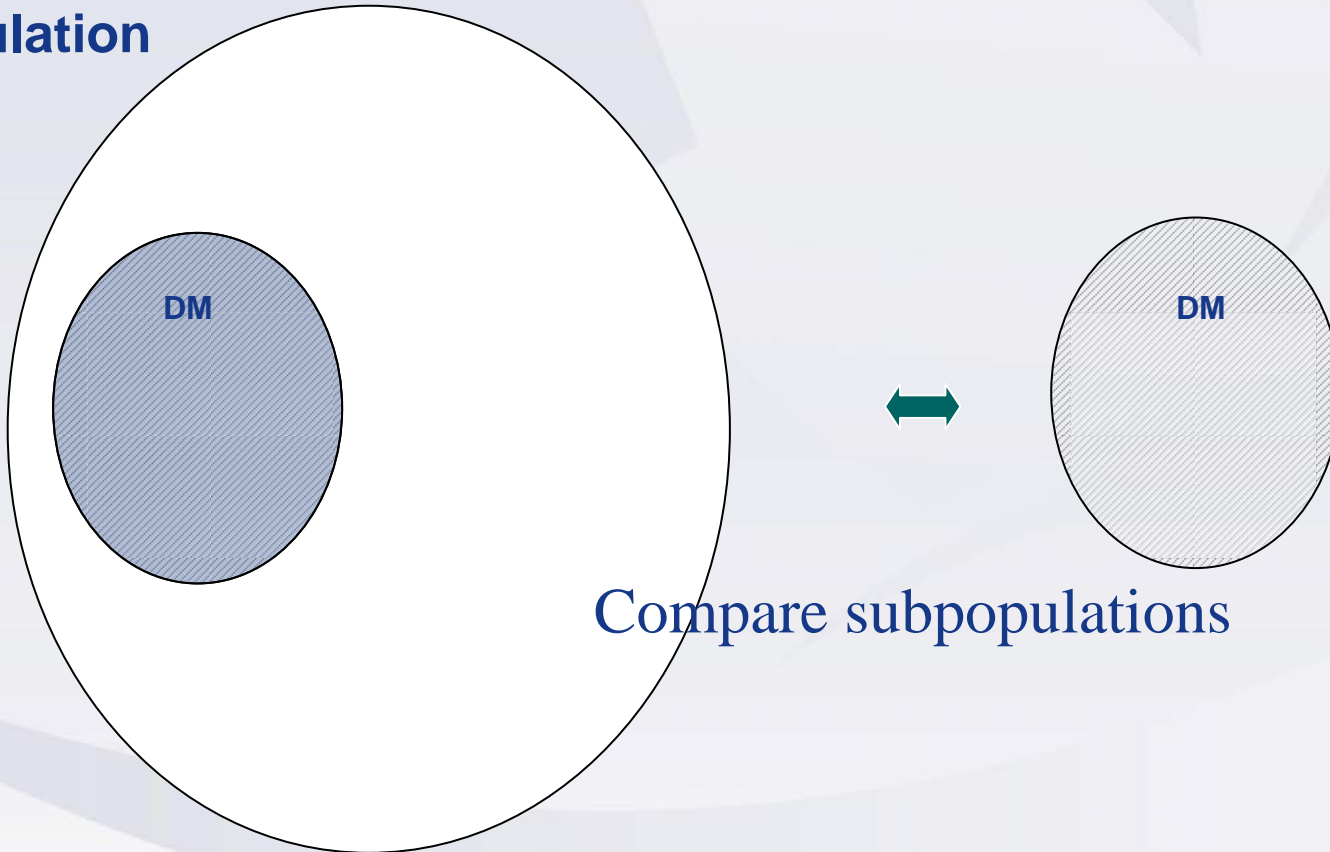
min(HUI3) =-0.36
(worse than death)

HUI3 =0
(death)

max(HUI3) =1
(perfect health)

Ages 0-12: HUI=0.999

Disease deleted method
(subpopulation approach)
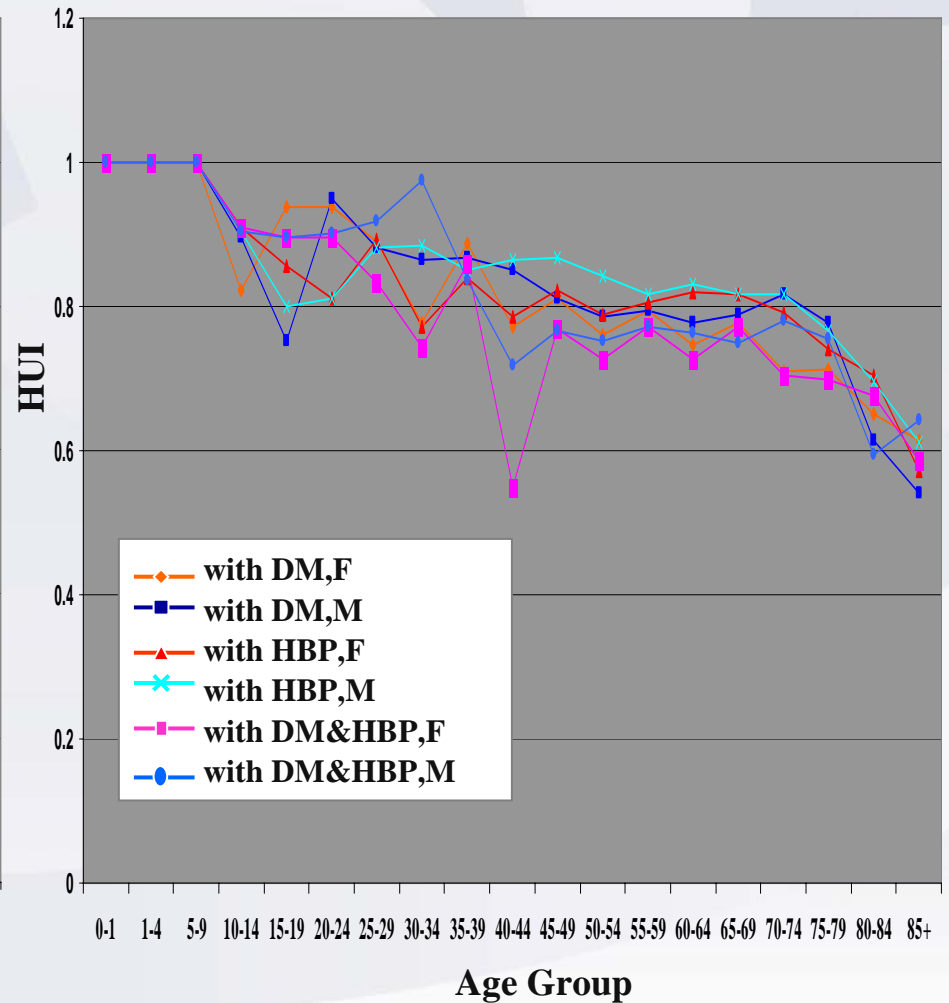
Population

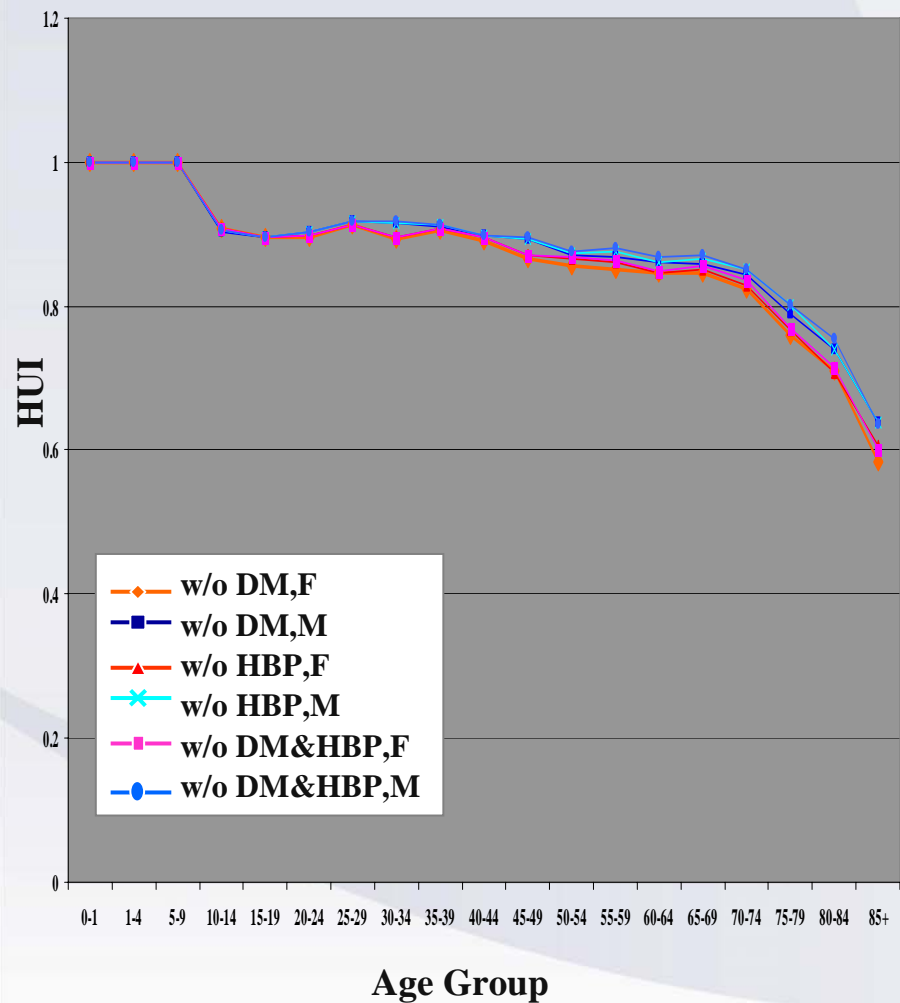
Compare subpopulations

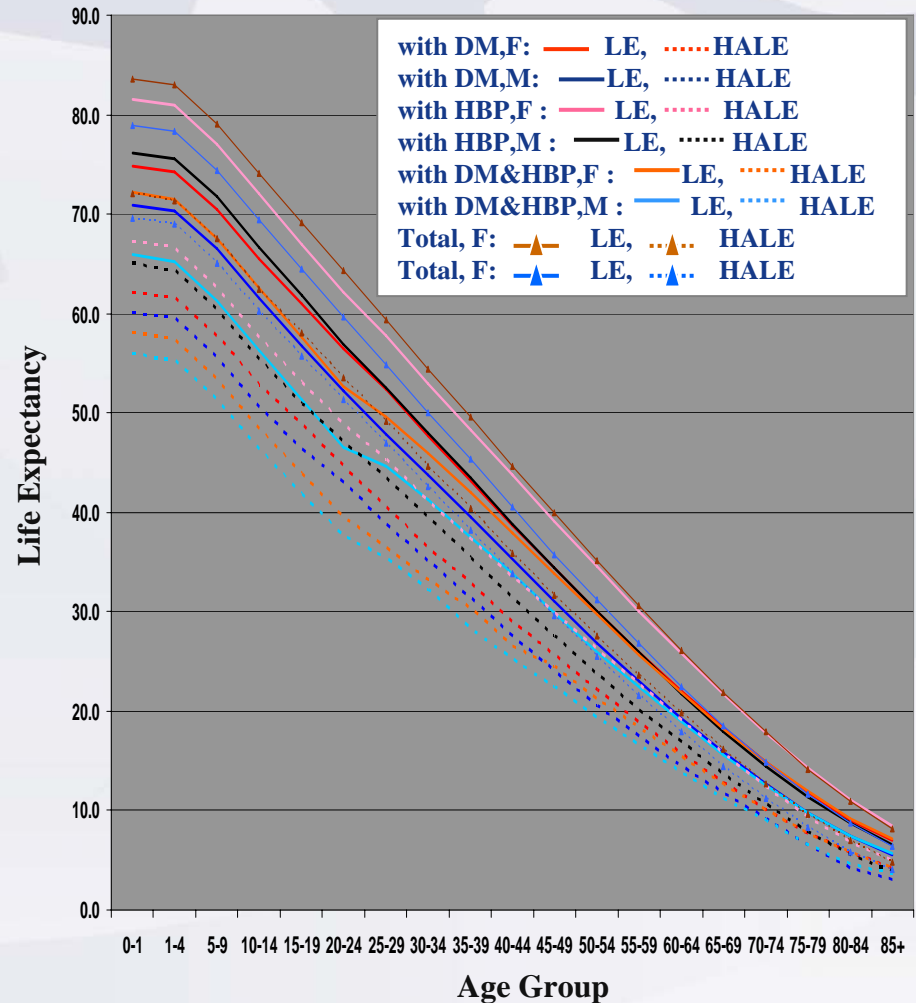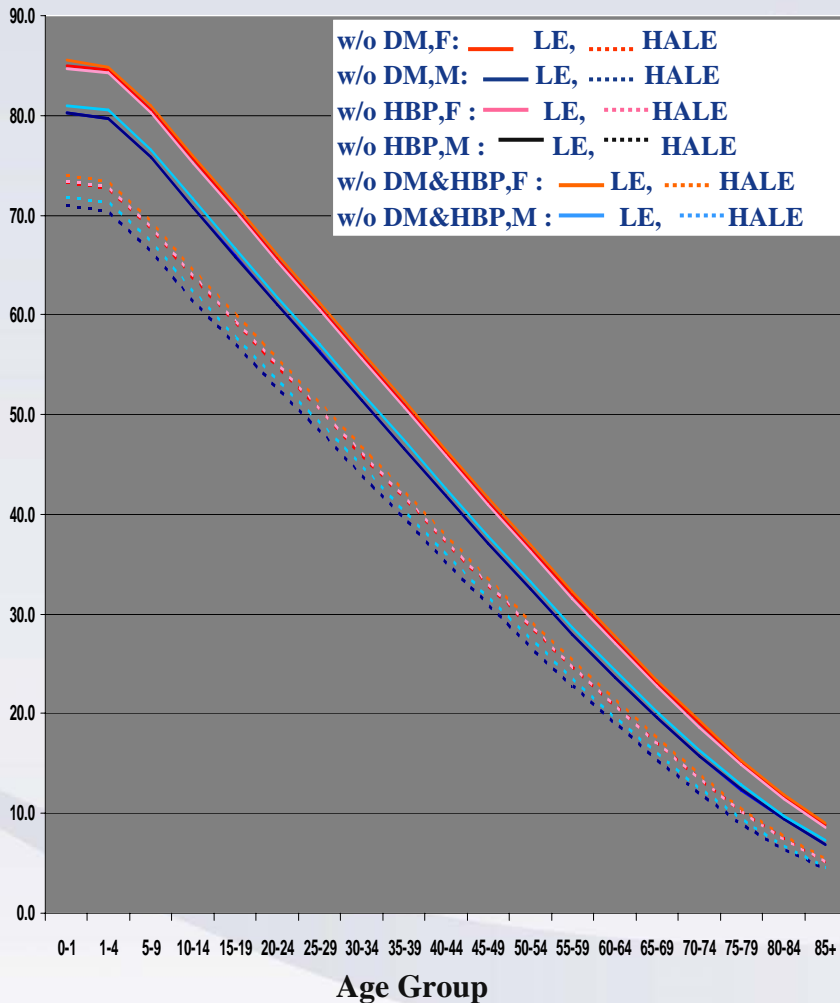**LOSS in LE associated with a *disease***

Life table analysis

- **Chiang abridged life table**
  -Hsieh method to close life table (last age group: 85+)

- **Sullivan method to compute HALE**
  -Self Report disease status used to construct HUI weights

RESULTS

Mean HUI3 for people without and with DM and/or HBP by sex

LE and HALE by sex, age and disease status

Legend (left chart):
- w/o DM,F: —— LE, ... HALE
- w/o DM,M: —— LE, ... HALE
- w/o HBP,F: —— LE, ... HALE
- w/o HBP,M: —— LE, ... HALE
- w/o DM&HBP,F: —— LE, ... HALE
- w/o DM&HBP,M: —— LE, ... HALE

Legend (right chart):
- with DM,F: —— LE, ...HALE
- with DM,M: —— LE, ... HALE
- with HBP,F: —— LE, ... HALE
- with HBP,M: —— LE, ... HALE
- with DM&HBP,F: —— LE, ... HALE
- with DM&HBP,M: —— LE, ... HALE
- Total, F: —▲— LE, ..▲.. HALE
- Total, F: —▲— LE, ..▲.. HALE

- **LE and HALE are lower for people with disease.**

- **The difference between LE and HALE decreases with age.**

LE and HALE by sex and disease category

Sex	LE/HALE	Canadian Population (I)	Without DM&HYP (II)	Without DM (III)	Without HBP (IV)	With DM (V)	With HBP (V)	With DM&HBP (VII)	Loss in LE/HALE with DM (III-V)	HBP (IV-VI)	DM&HBP (II-VII)
					at birth[1]						
F	LE	83.6	85.5	85.0	84.7	74.9	81.5	72.2	10.1*	3.2*	13.3*
F	HALE	72.1	74.0	73.3	73.4	62.2	67.2	58.1	11.1*	6.2*	15.9*
M	LE	78.9	81.0	80.2	80.2	70.9	76.2	65.9	9.3*	4.0*	15.1*
M	HALE	69.6	71.8	70.9	71.1	60.1	65.0	56.0	10.8*	6.1*	15.8*
						at age 20 years					
F	LE	64.3	66.1	65.7	65.4	56.5	62.1	52.7	9.2*	3.3*	13.4*
F	HALE	53.6	55.6	54.8	55.0	44.7	48.9	39.5	10.1*	6.1*	16.1*
M	LE	59.6	61.8	61.0	61.0	52.2	56.9	46.5	8.8*	4.1*	15.3*
M	HALE	51.3	53.5	52.6	52.8	43.0	47.1	37.6	9.6*	5.7*	15.9*
						at age 55 years					
F	LE	30.6	32.3	32.0	31.6	26.0	30.1	25.7	6.0*	1.5*	6.6*
F	HALE	23.6	25.3	24.7	24.7	18.9	22.7	18.4	5.8*	2.0*	6.9*
M	LE	26.8	28.7	28.0	28.0	23.0	25.9	22.4	5.0*	2.1*	6.3*
M	HALE	21.6	23.5	22.8	22.9	17.5	20.2	16.7	5.3*	2.7*	6.8*

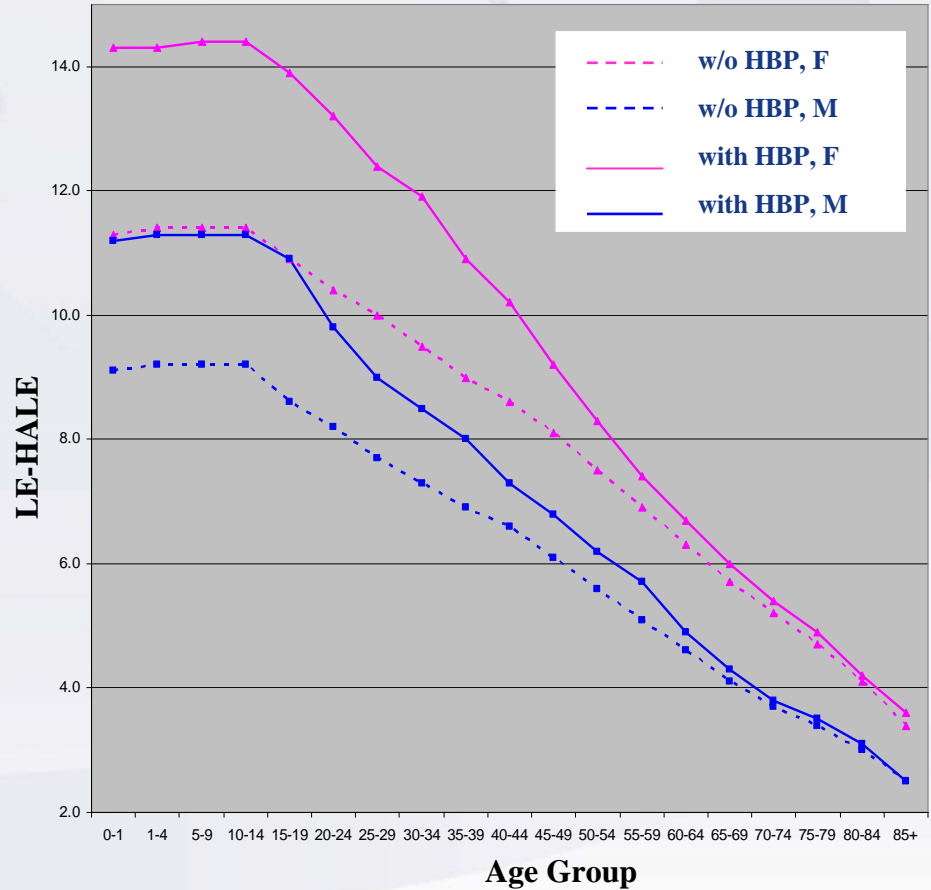* statistically significant (p-value<0.0001)

[1] Manuel et al. (2004)

Years spent in poor health by disease categories, sex and age group
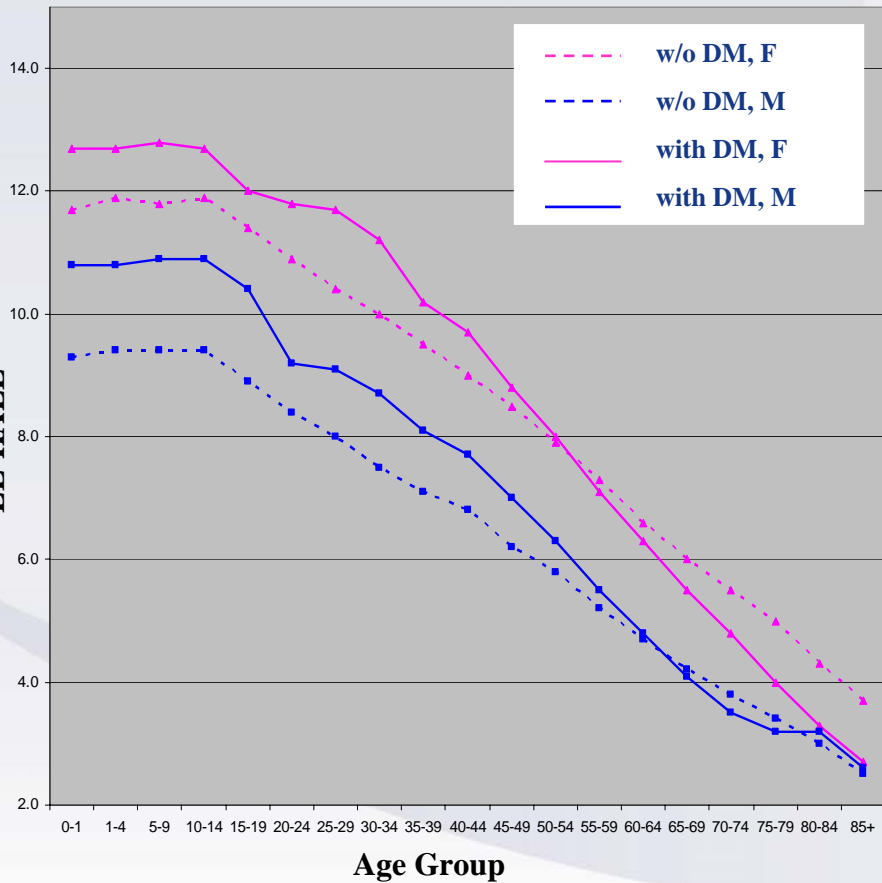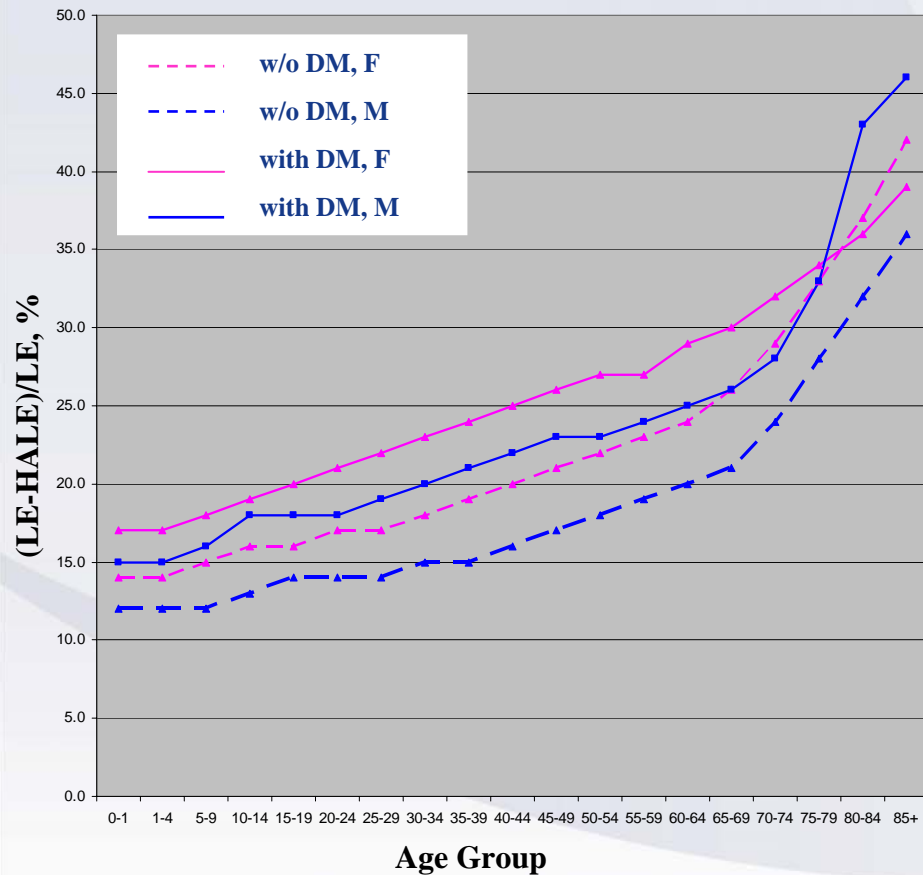

DIABETES

HYPERTENSION

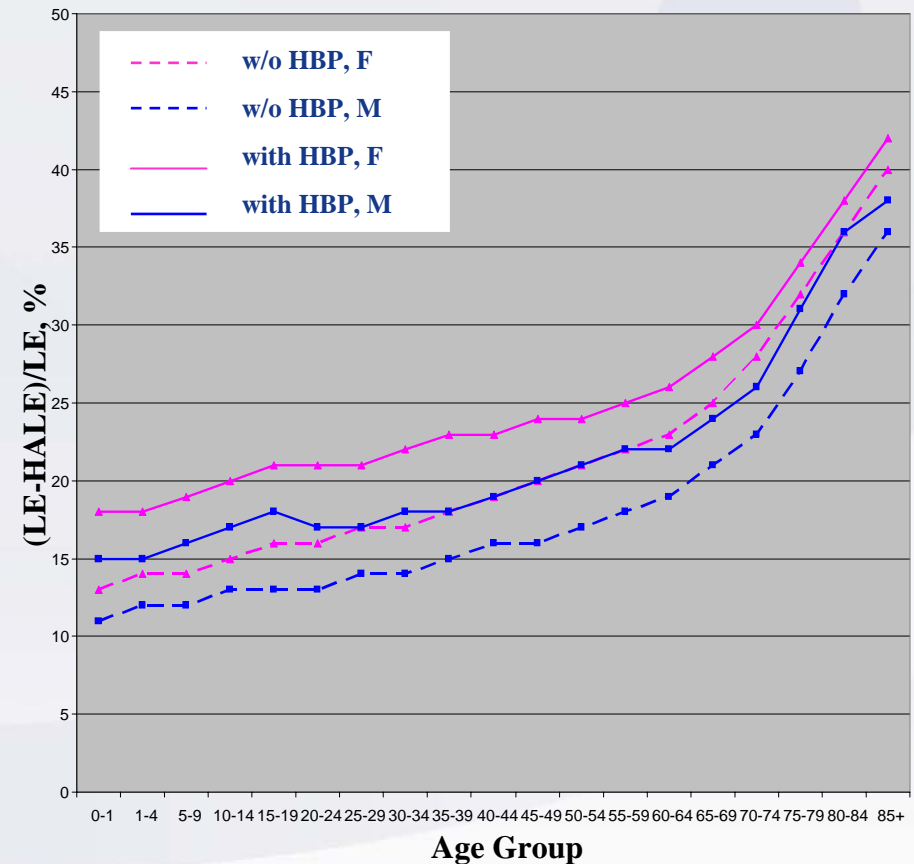• **Females spend grater number of years in poor health than males.**

Proportion of life spent in poor health by disease categories, sex and age group

DIABETES

HYPERTENSION



• **Proportion of life spent in poor health increases with age.**

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Differences in LE and HALE between Females and Males with and without Hypertension and Diabetes

	LE(F)-LE(M)	HALE(F)-HALE(M)
At age 20 years		
With HBP	5.2*	1.8**
Without HBP	4.4*	2.2*
With DM	4.3*	1.7
Without DM	4.7*	2.2*
At age 55 years		
With HBP	4.2*	2.5*
Without HBP	3.6*	1.8*
With DM	3.0*	1.4**
Without DM	4.0*	1.9*
At age 80 years		
With HBP	2.4*	1.3 *
Without HBP	2.1*	1.0 **
With DM	1.6**	1.5**
Without DM	2.3*	1.0*

*statistically significant (p-value<0.0001)
** statistically significant (p-value<0.05)

All-cause mortality rate ratios (Males VS Females) by disease category
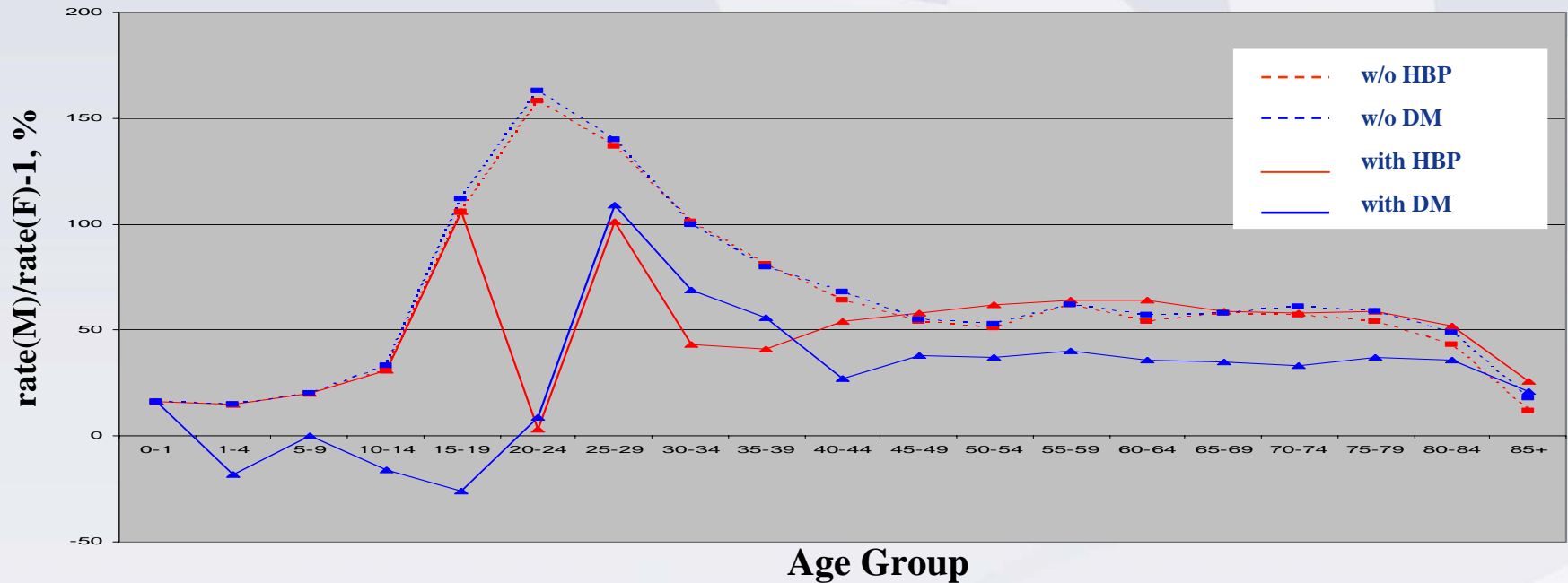
- **Hypertension is associated with an increase of the gap in LE between females and males.**

- **Diabetes is associated with a decrease of the gap in LE between females and males.**

Conclusions

- Diabetes and Hypertension are not only associated with a reduction in life expectancy (LE), they are also associated with a decrease in the number of healthy years (HALE)
- Diabetes is associated with greater loss of LE and HALE than Hypertension
- Females live longer but spend a greater portion of life in poor health than males
- The method of LE/HALE estimation can be used as a standard for such calculations for all chronic diseases in Canada, where data are available

THANK YOU!

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Questions……….