Changes in Diabetes prevalence: Decreasing mortality or Increasing incidence?

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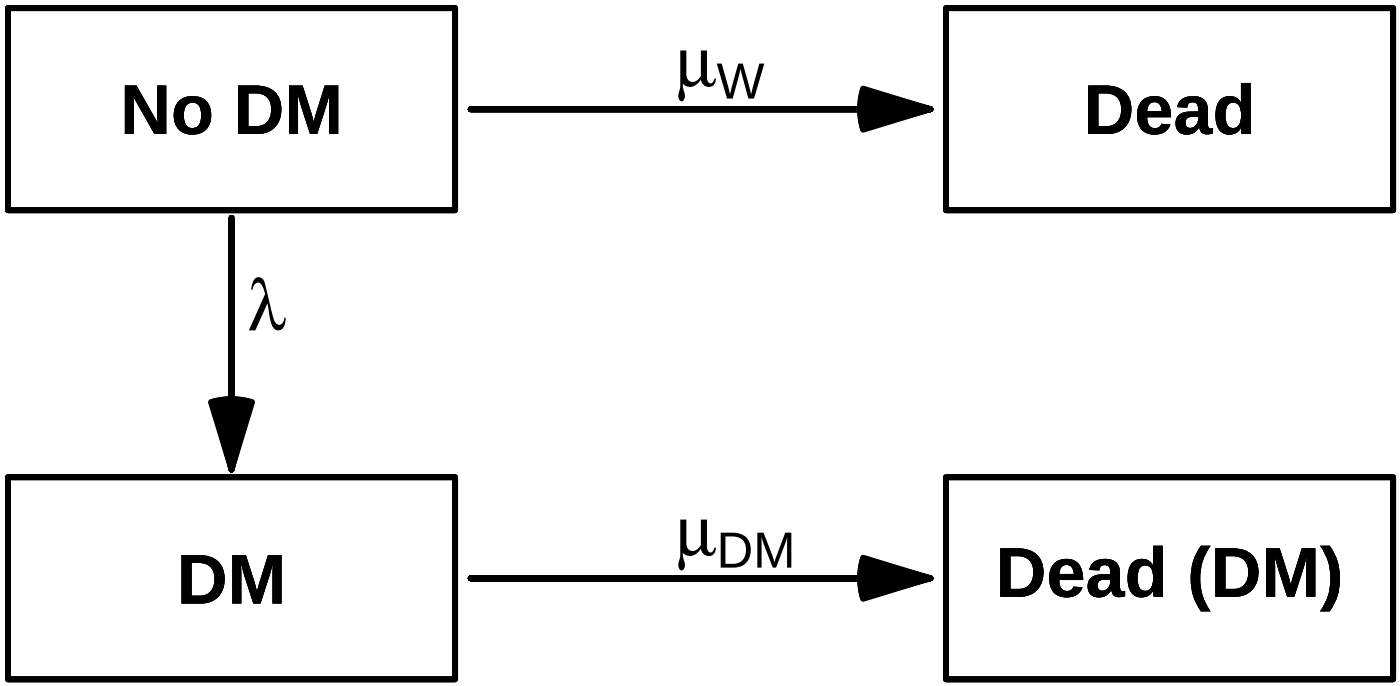
http://BendixCarstensen.com/DMreg/Prevalence

Where do the changes come from?

The period 1995–2010 for men resp. women:

- Increasing diabetes incidence:
  3.8%, 3.9% per year
- Decreasing mortality:
  non-DM: 2.5%, 1.8% per year
  DM-ptt: 3.8%, 3.4% per year
- Aim:
  How much can each factor explain?
- Look at age-specific **prevalences**,
  not the **numbers** of DM-patients.

DM prevalence prediction



If we know

- prevalence of DM in 1995
- the rates in the period 1995-2010

—then we can predict prevalence in 2010

Incidence and mortality rates

The mortality and incidence rates depend on:

Sex

Age

Date of observation (Period)

Date−Age = Date of birth (Cohort)

Estimated as Age-Period-Cohort models, separately for men and women.

- Data on DM incidence and mortality from Danish National Diabetes Register
- Population size and -mortality from Statistics Denmark data base.

Updating age-specific prevalences:

- Prevalences at 1.1.1995 in age a as start
- Use incidence and mortality for 1995 in age a to predict prevalence at 1.1.1996 in age $a+1$.
- Repeat for all ages.
- Repeat for 1996
- Cycle through all years

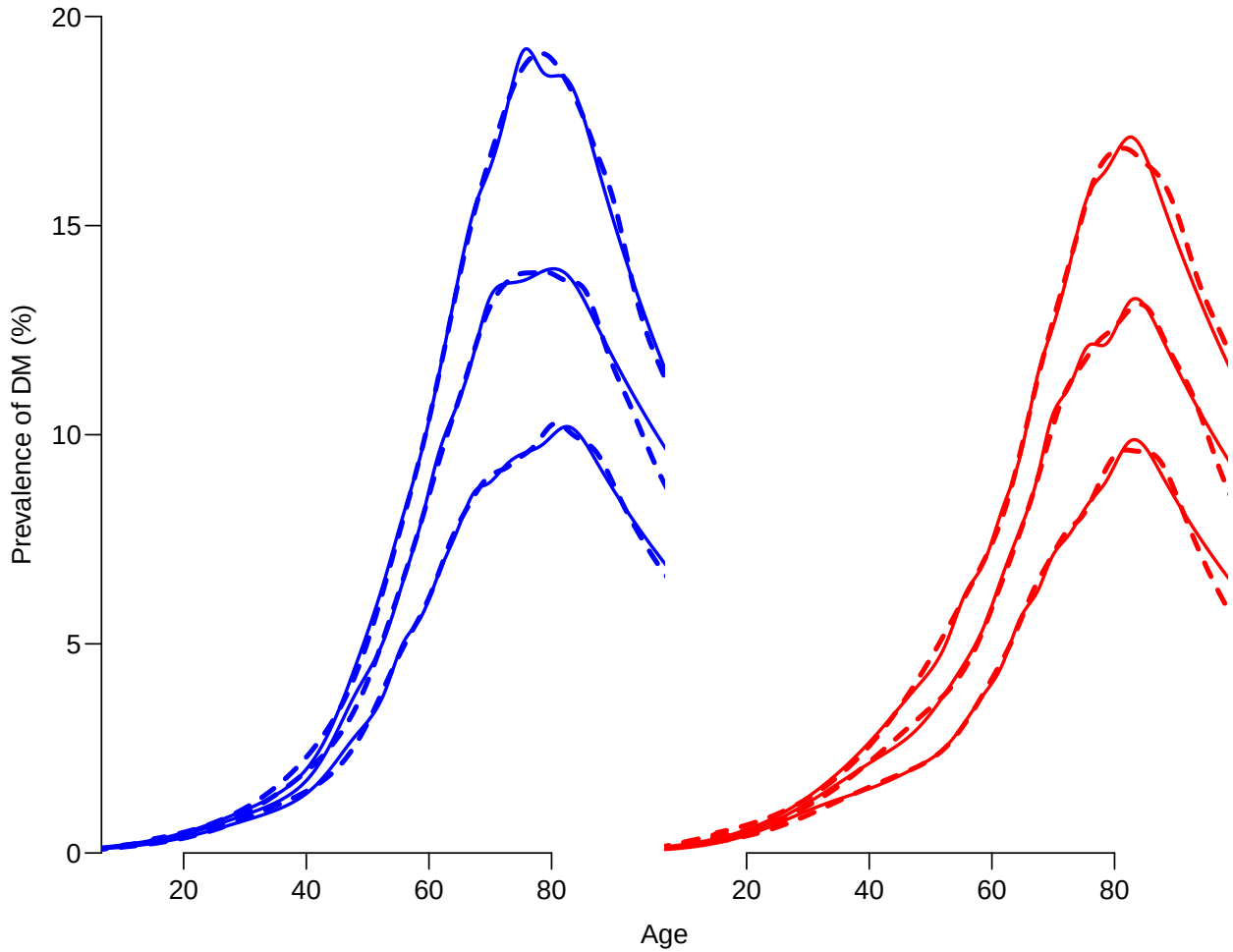
Input (year y, all ages):

- Prevalence at 1 Jan
- Mortality rate for the year
- Incidence rate for the year

Output: age-specific prevalences 1 Jan year $y+1$

Actual updating interval used: $1/10$ year

It works using the observed rates:

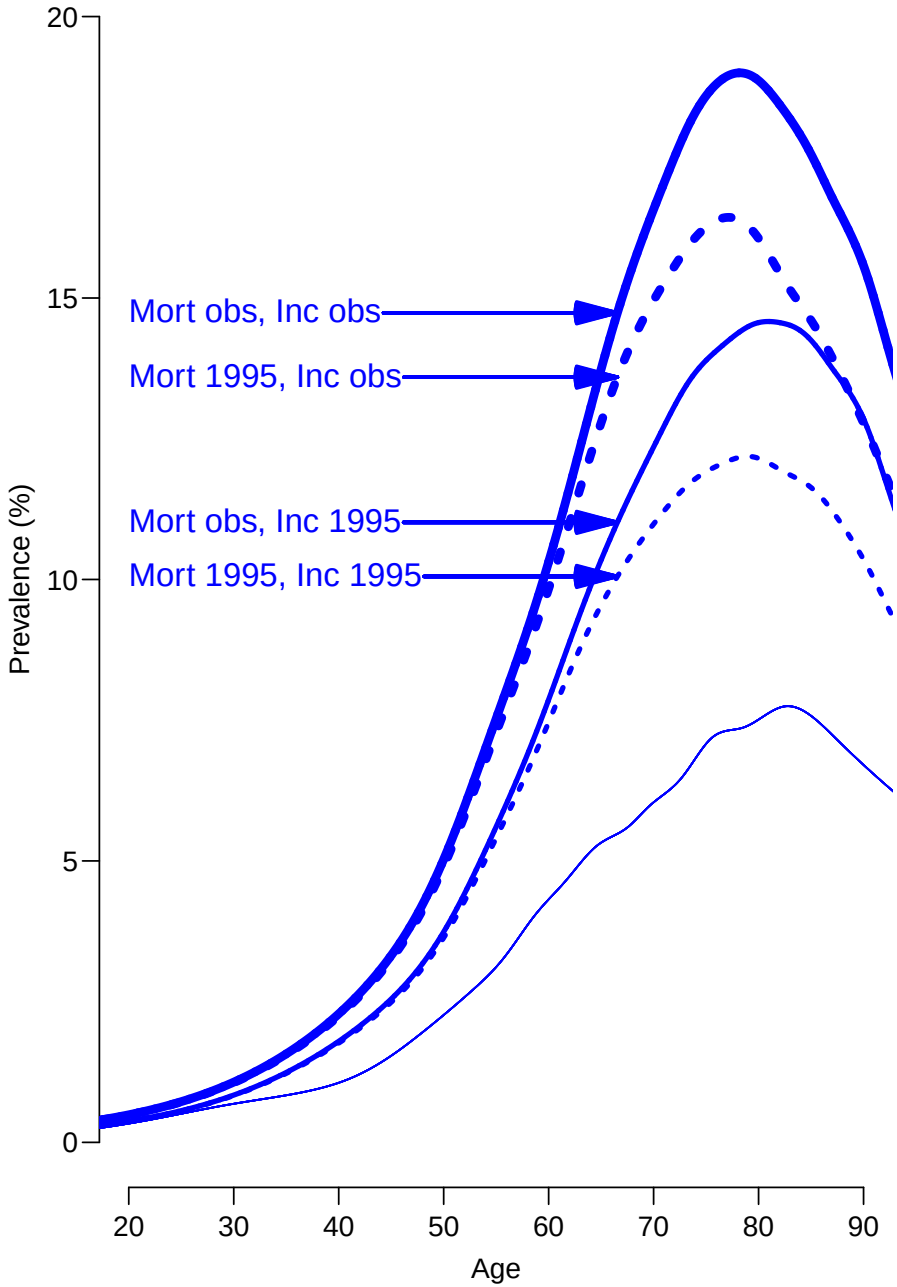


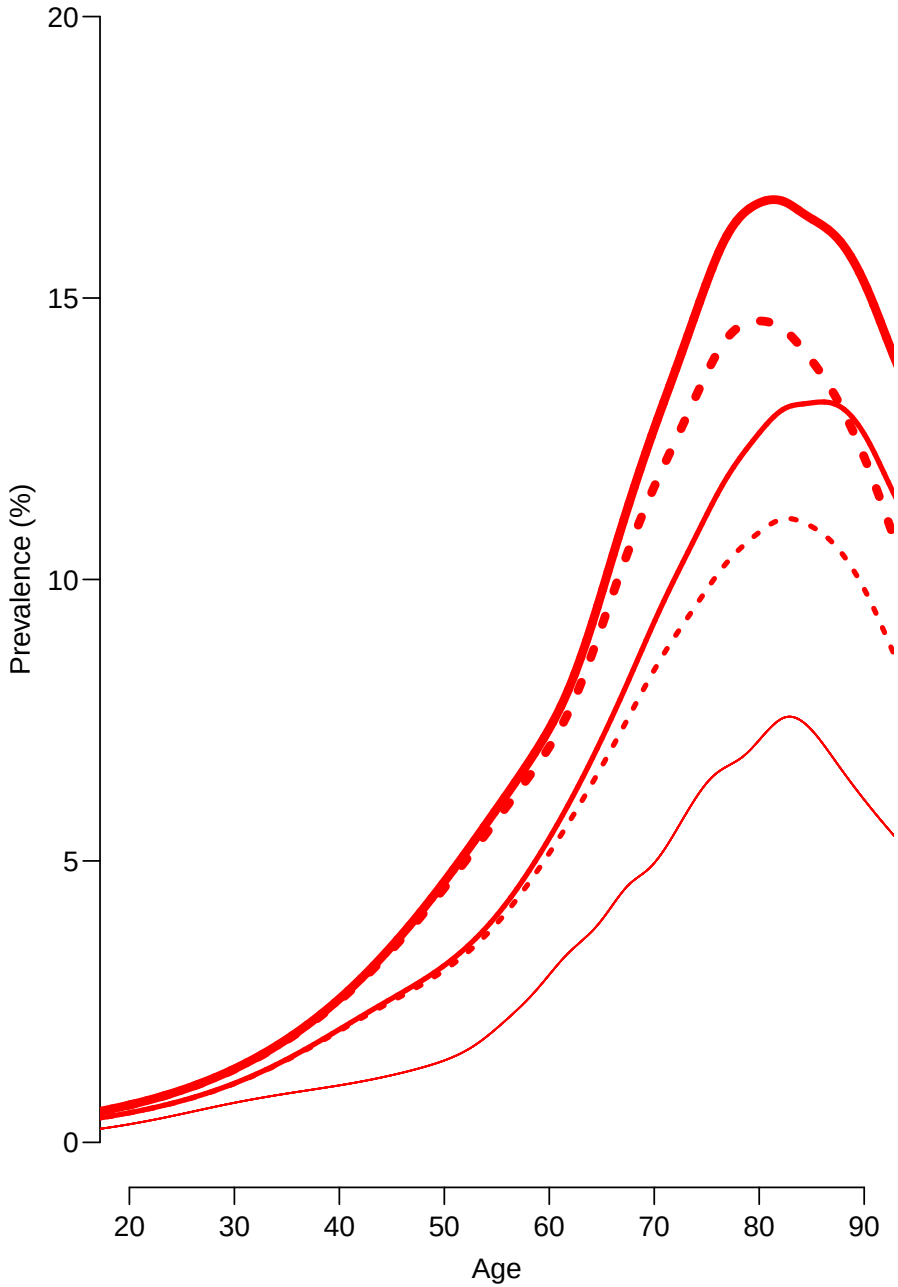
Full: Obs. prevalence 2000, 2005, 2010
Broken: Predictions using APC-models

DM prevalence components

- Four scenarios:
  - Rates develop as observed
  - Mortality rates fixed at 1995 level
  - Incidence rates fixed at 1995 level
  - Both mortality and incidence rates fixed at 1995 level
- Differences between these can be transformed to 4 **components** of prevalence:

Mort:	DM-ptt. alive because of declining mortality
Inc:	DM-ptt. because of increasing incidence
Const:	DM-ppt. attributable to non-equilibrium in 1995
Org:	DM-ptt. corresponding to 1995 age-specific prevalences


Mort obs, Inc obs
Mort 1995, Inc obs
Mort obs, Inc 1995
Mort 1995, Inc 1995
Prevalence (%)
0
5
10
15
20
20
30
40
50
60
70
80
90
Age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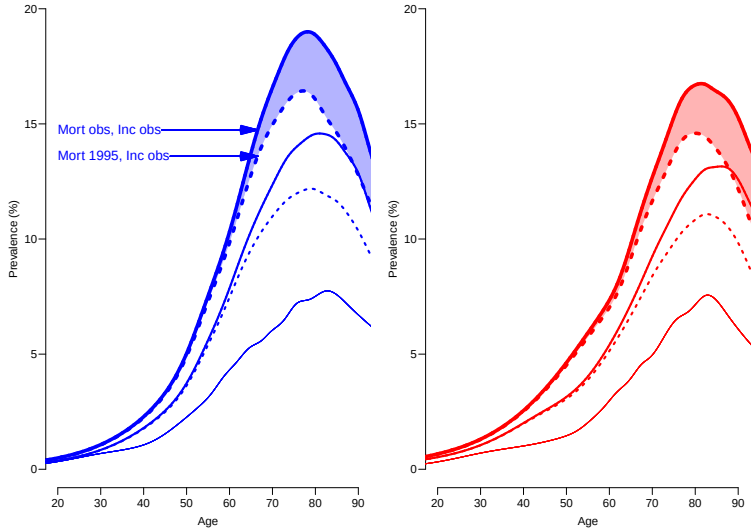
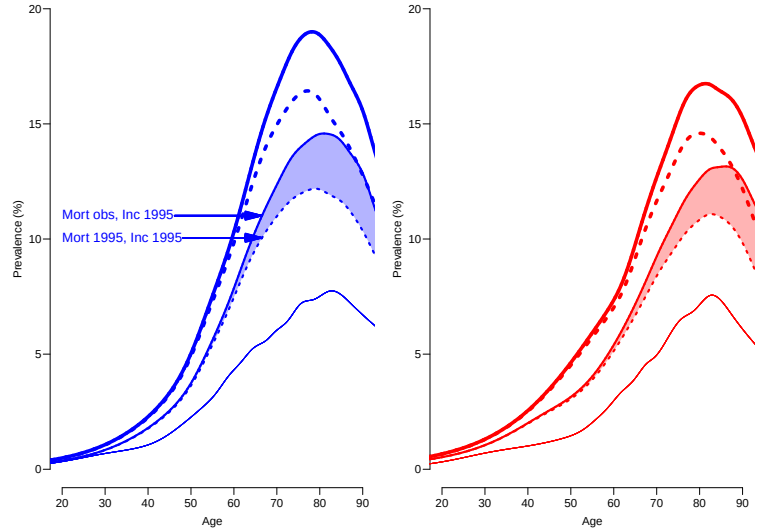
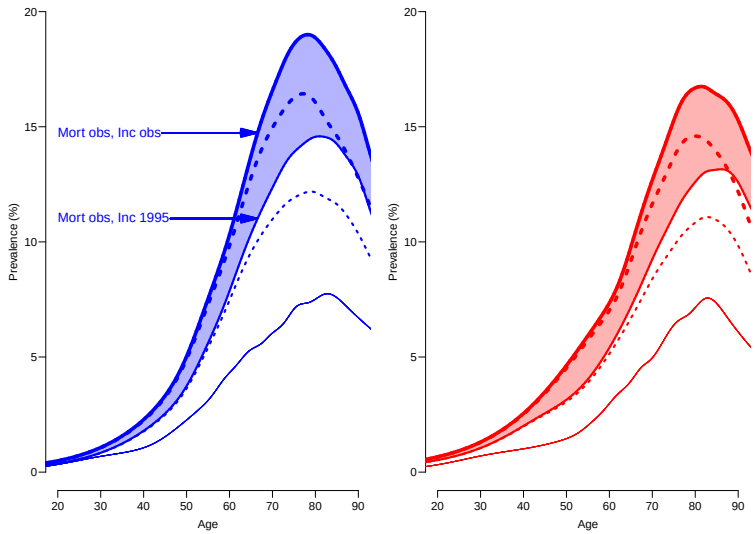
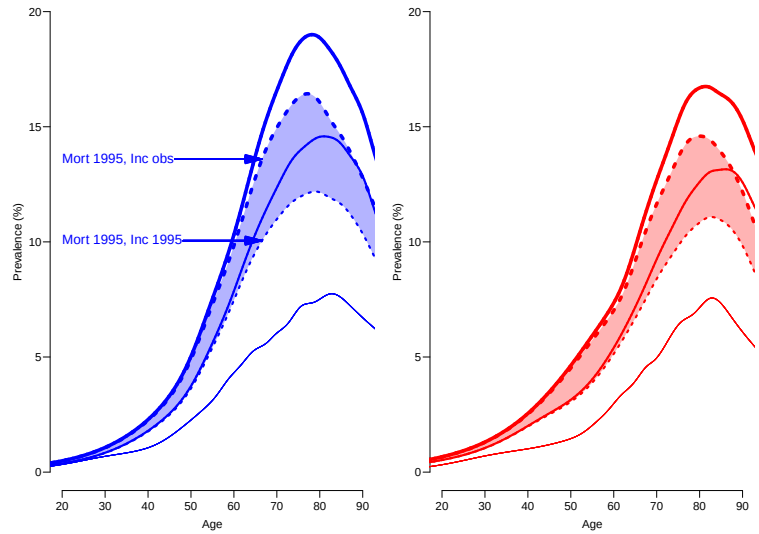
Effect of mortality change:





Effect of incidence change:





— use the average

Age-specific prevalences, 2010: