Register, Prevalence, Incidence and Mortality of T1 and T2 Diabetes in Denmark 1996–2016 and beyond

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NNFoundation, 21 January 2019

Background

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Remedy: Population based registers in Denmark

Danish Diabetes Registers - short history

- **NDR** — established 2006, last year of update 2012
  no T1D/T2D distinction

DADD:	Danish Adult Diabetes Database - quality register updated annually
NPR:	Nation Patient Register
NHSR:	National Health Services Register
RMPS:	Register of Medicinal Products Statistics - Prescription register
DiaBase:	Quality database for eye-screening of diabetes patients

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- **DMreg** — established 2018 by SDCC Clinical Epidemiology
  using Statistics Denmark, has T1D/T2D distinction, based on
  DADD, NPR, NHSR, DiaBase & RMPS.
  Covers **1996–2016** incl.

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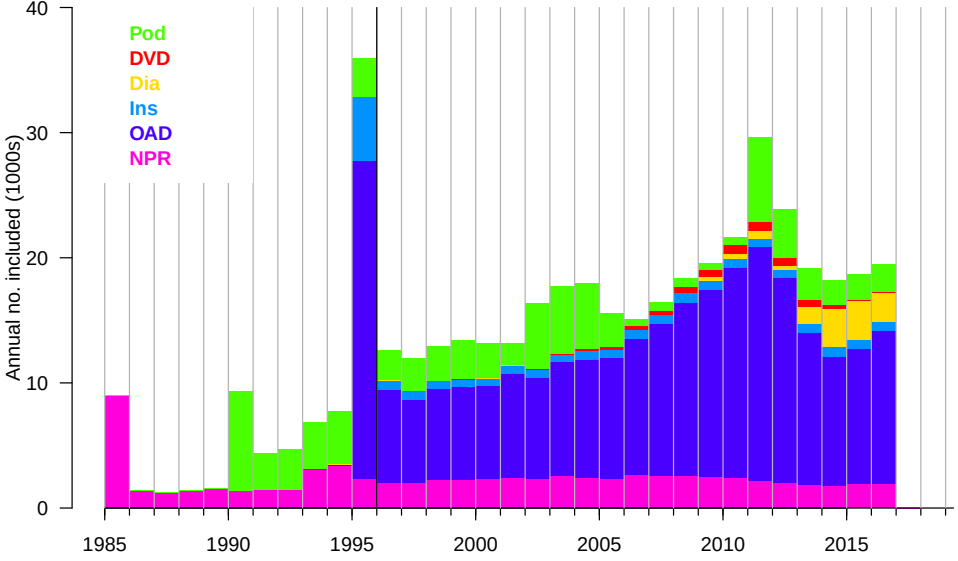
- **Inclusion date**: first of any of these

Inclusion criteria in DMreg



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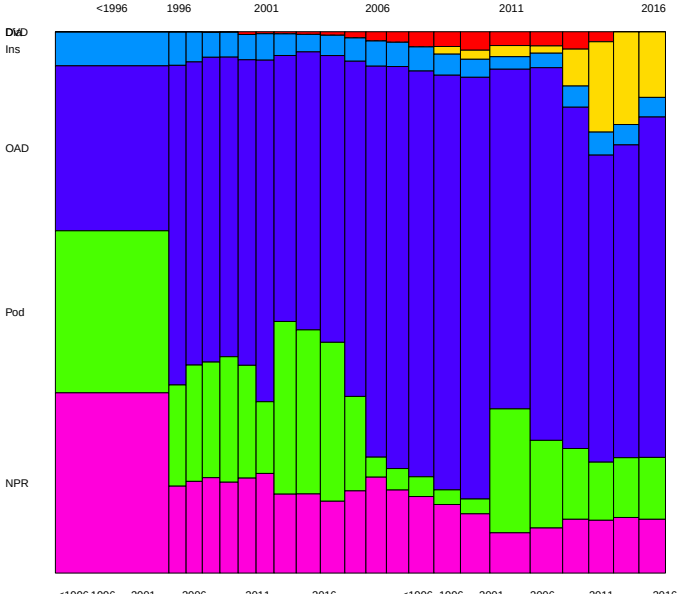

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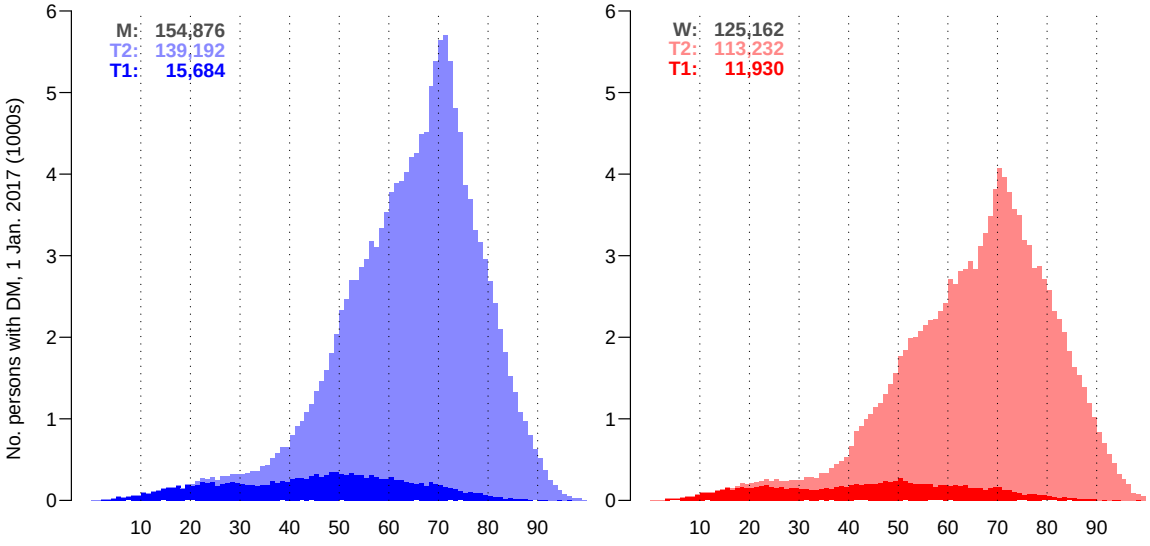
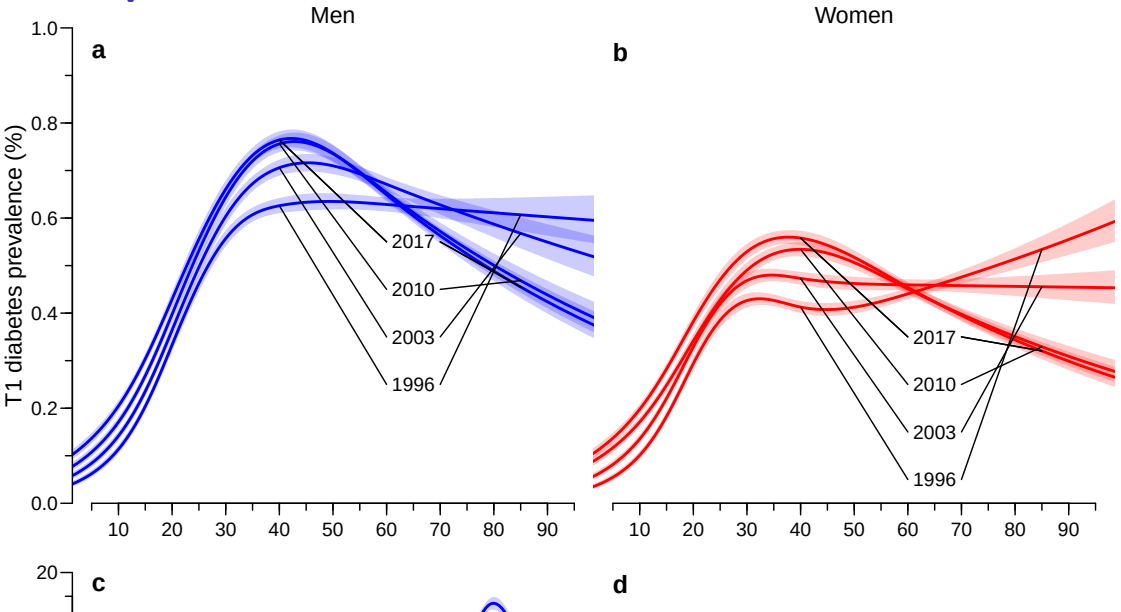
Persons not classified as T1D, are labeled T2D.
Note that we are formally conditioning on the future...

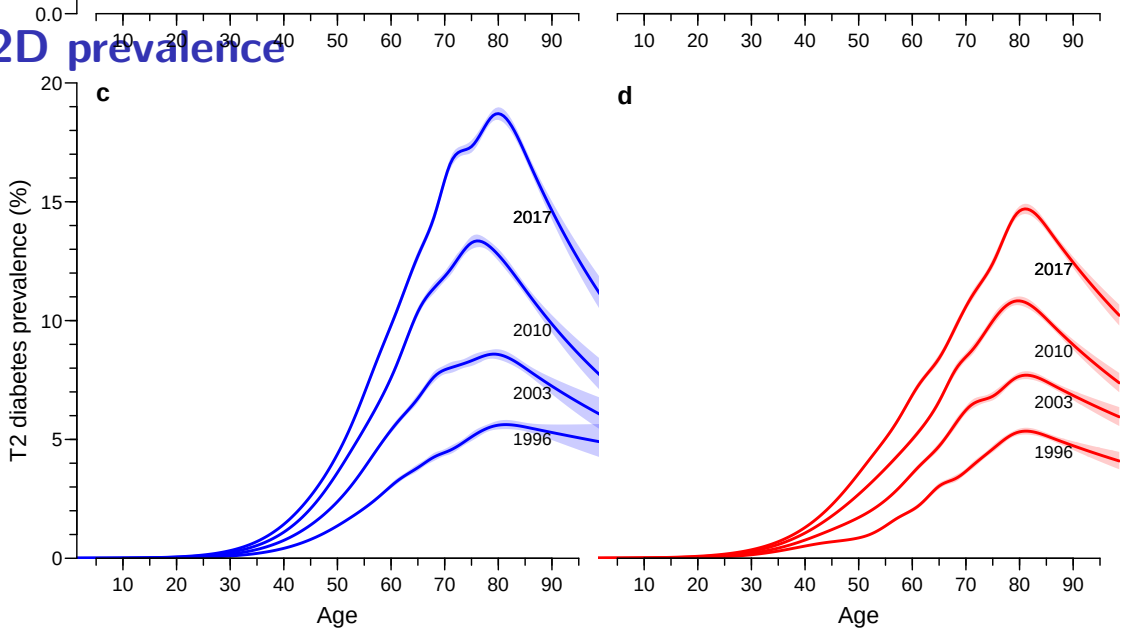
Prevalence of diabetes 2017-01-01



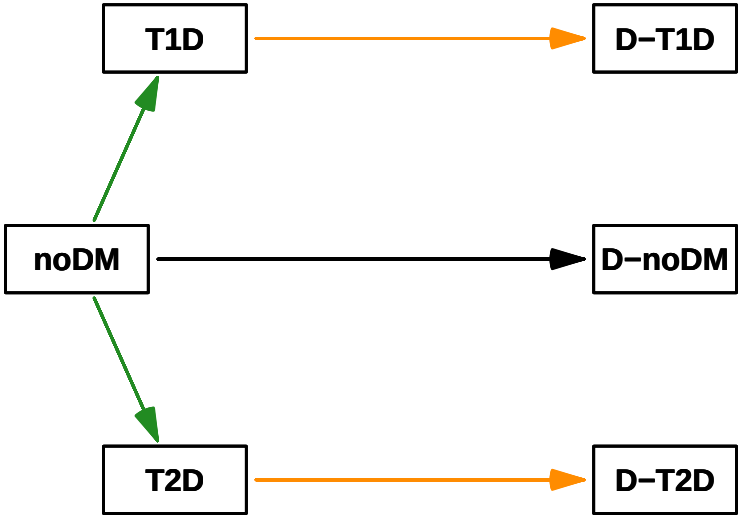
T1D prevalence



T2D prevalence



Incidence and mortality rates



Methods for incidence and mortality rates

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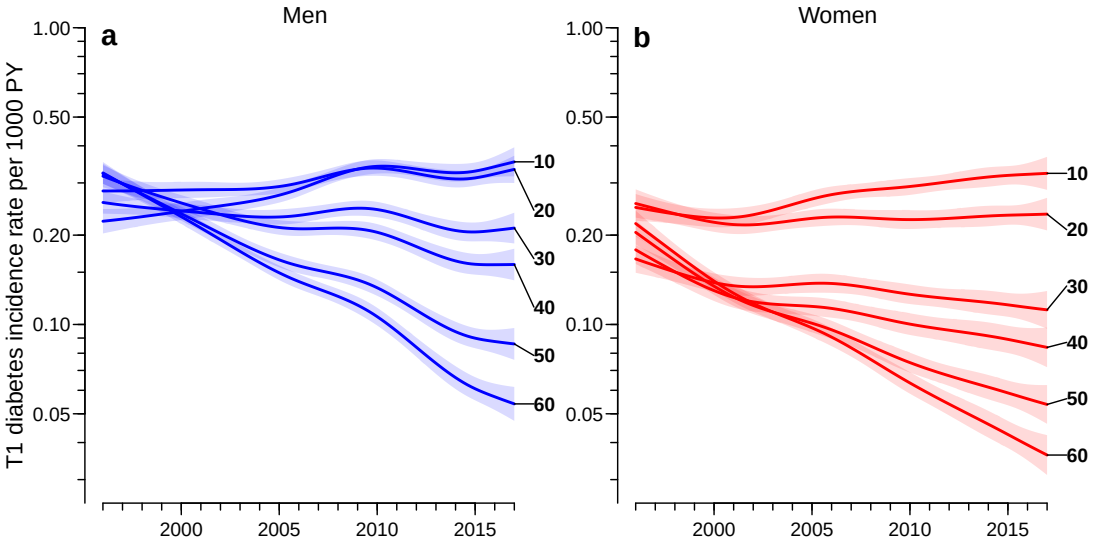
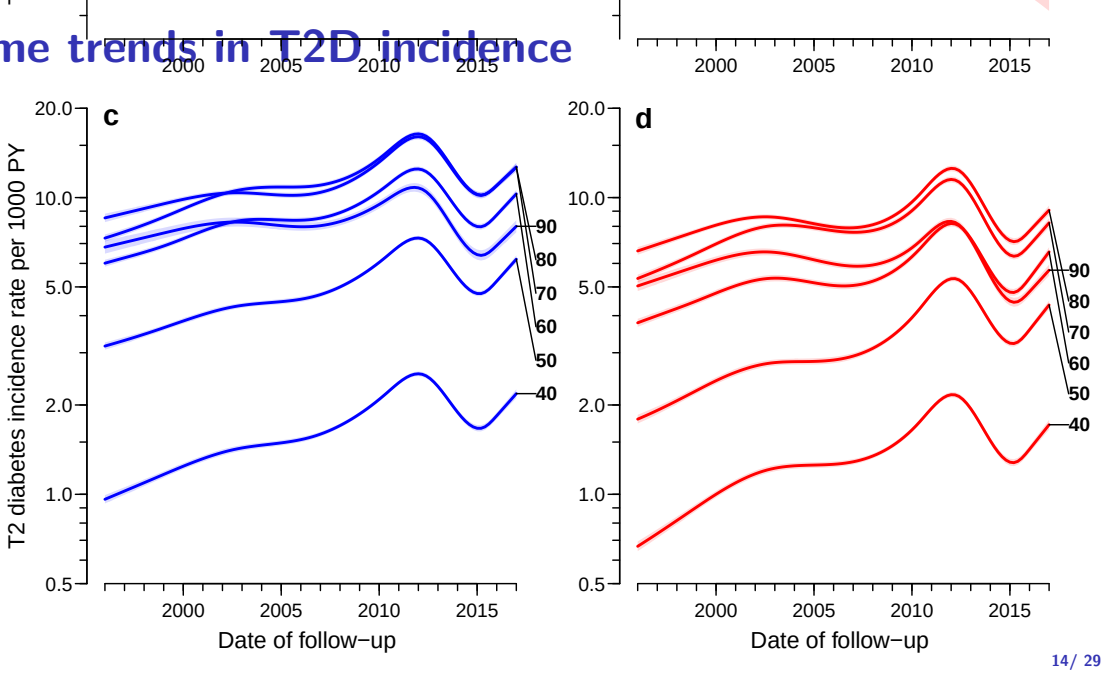
- **Incidence** rates at different ages by calendar time
- **Mortality** rates by age for different ages at diagnosis — RR by calendar time

Time trends in T1D incidence



Time trends in T2D incidence



Incidence conclusion

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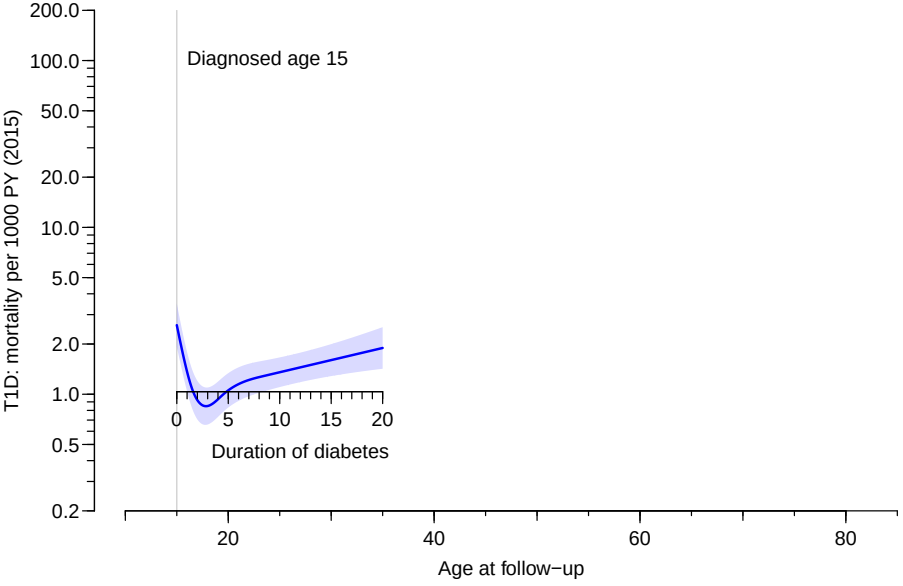
- influence of HbA_{1c} criteria — no data (yet)

T1D mortality



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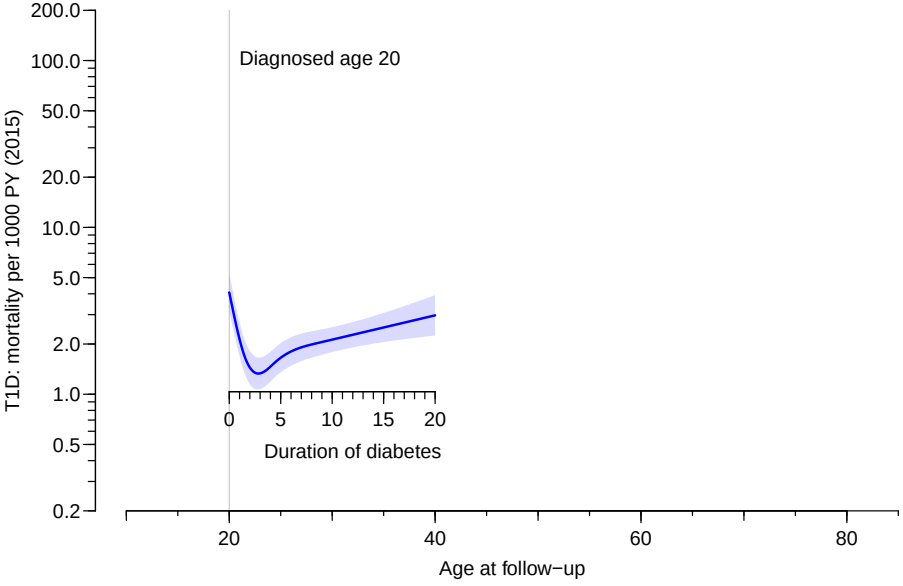

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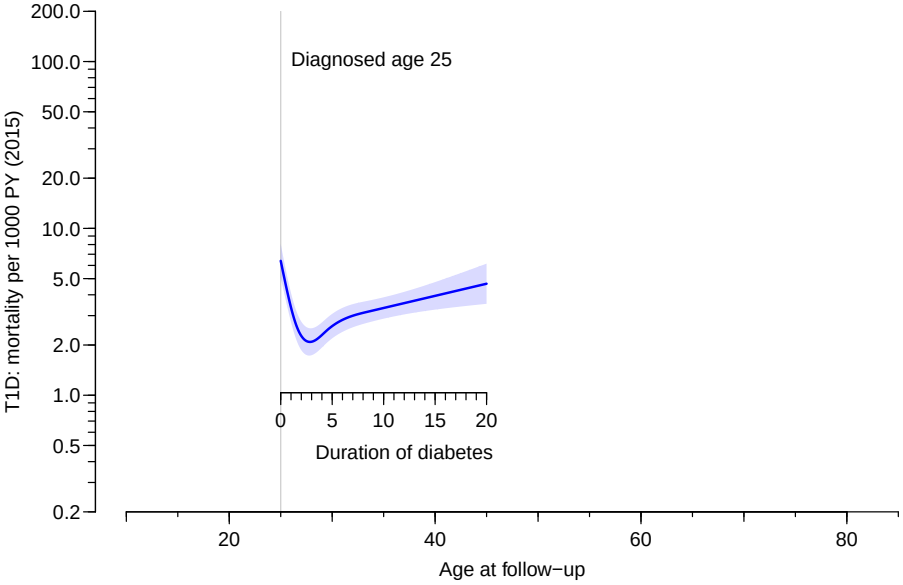

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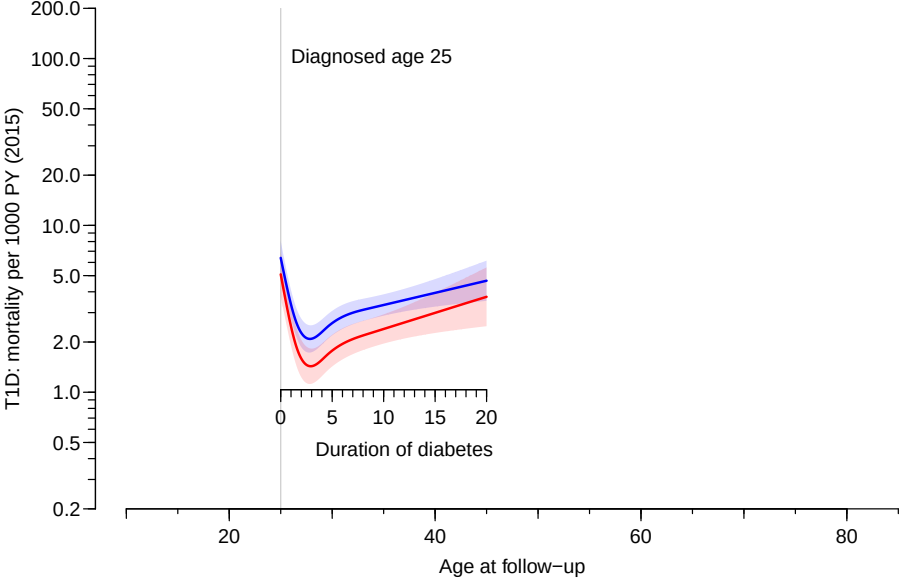

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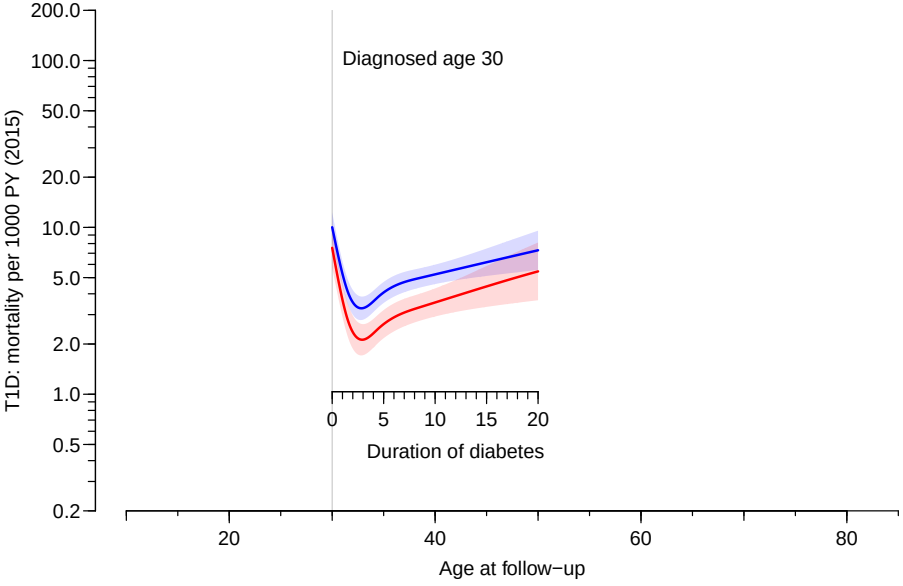

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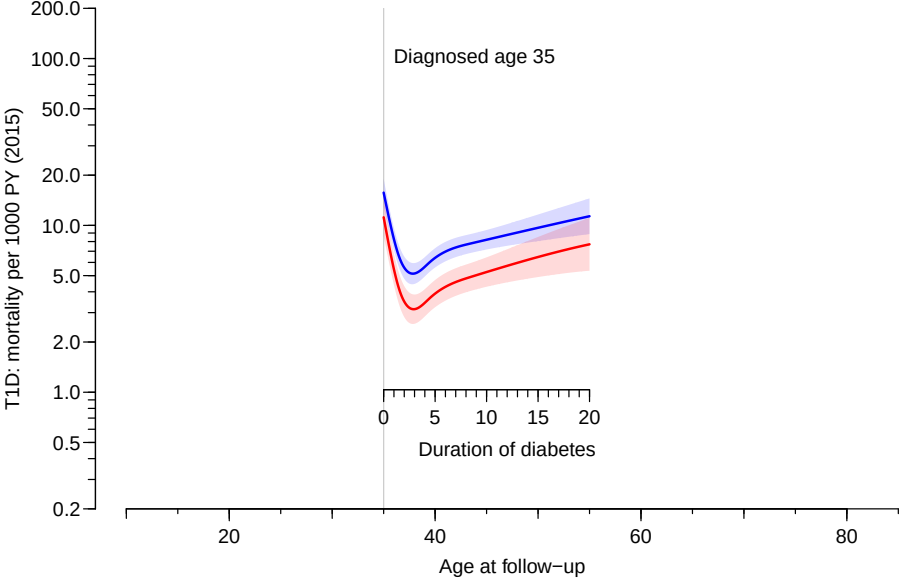

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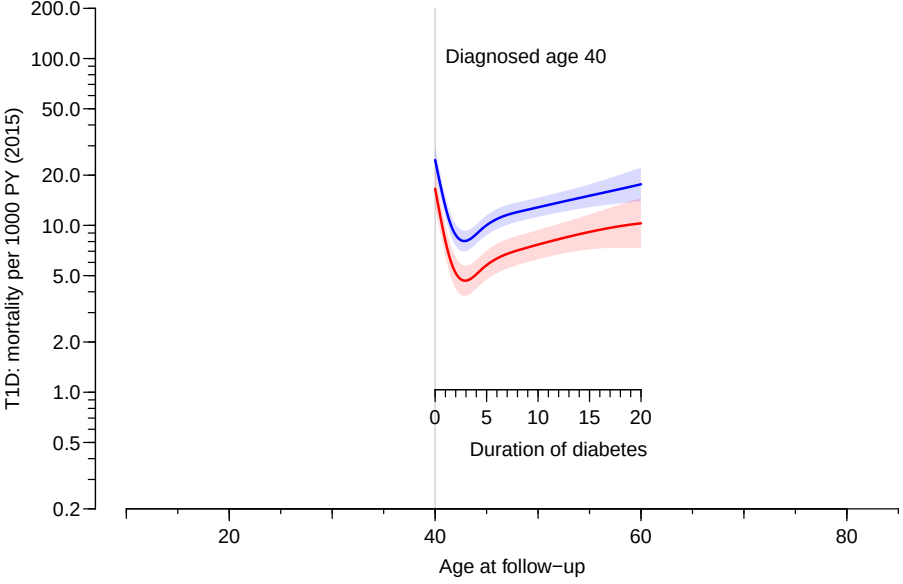
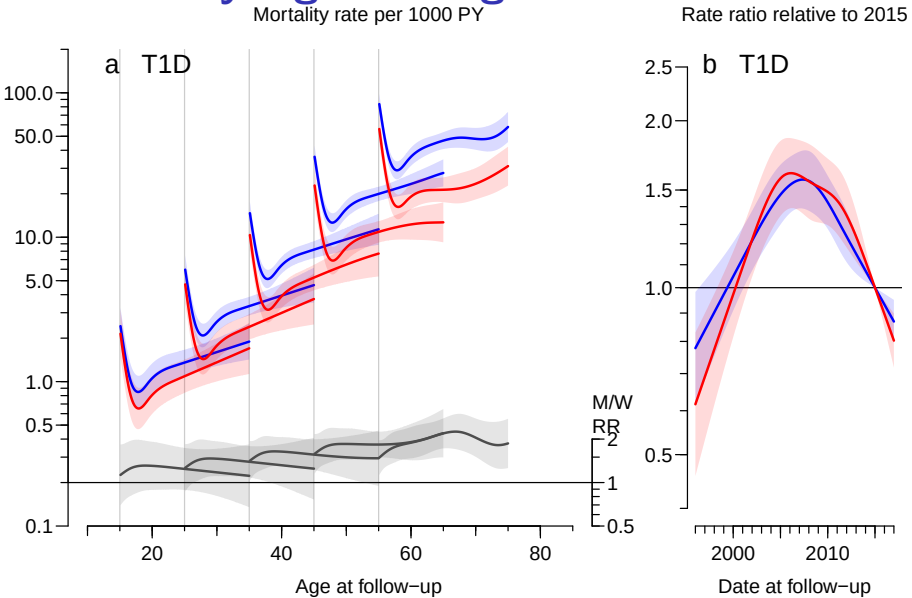
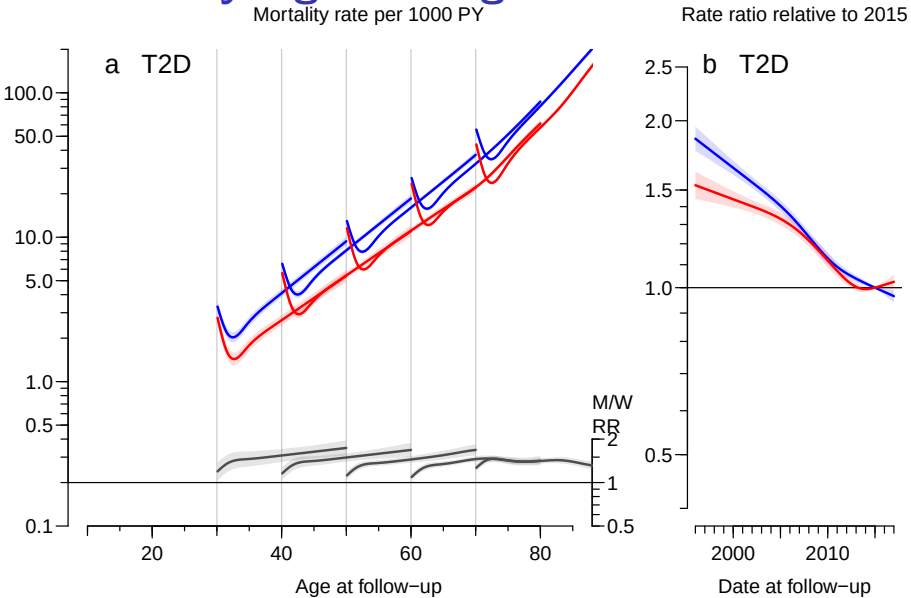
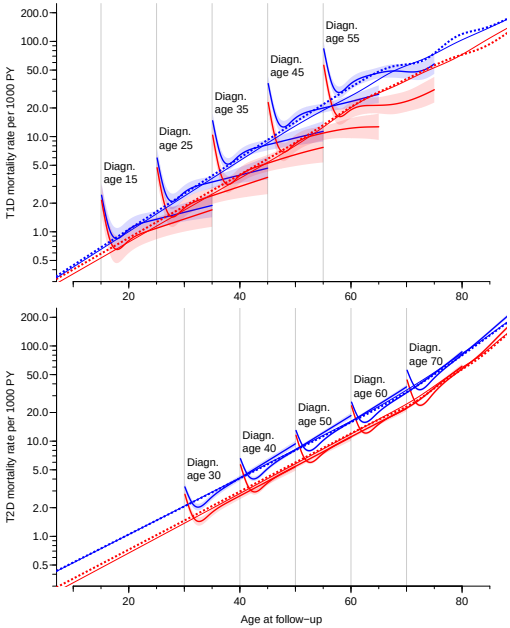


T1D mortality, age at diagnosis 15, 25, 35, 45 and 55



T2D mortality, age at diagnosis 30, 40, 50, 60 and 70




T1D mortality rate per 1000 PY
200.0
100.0
50.0
20.0
10.0
5.0
2.0
1.0
0.5
Diagn. age 15
Diagn. age 25
Diagn. age 35
Diagn. age 45
Diagn. age 55
20
40
60
80
T2D mortality rate per 1000 PY
Diagn. age 30
Diagn. age 40
Diagn. age 50
Diagn. age 60
Diagn. age 70
Age at follow−up

Mortality conclusion

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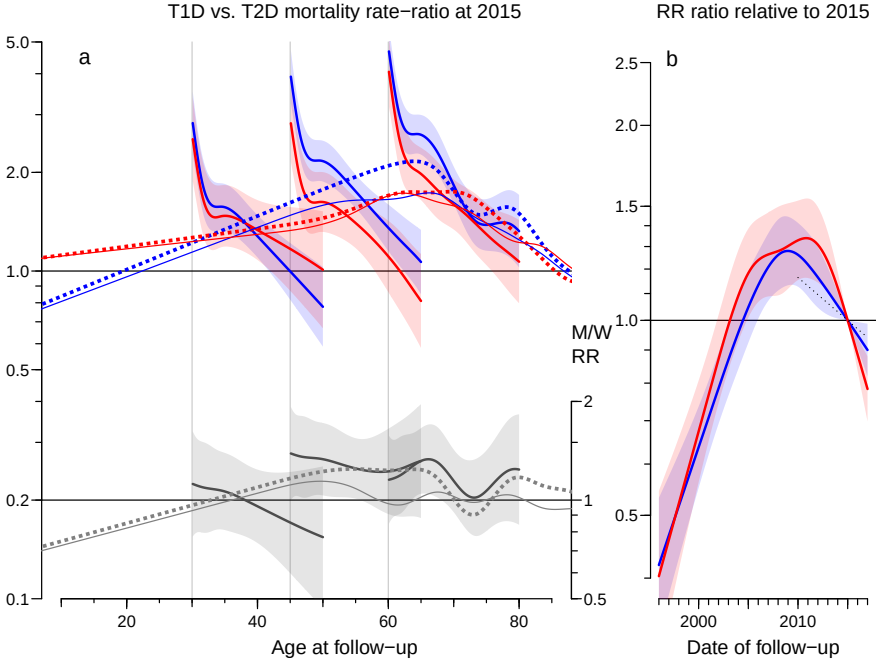
- M/W mortality RR is about 1.5 regardless of sex and type

Summary of time trends in DK — % per year

% change per year	T1D	T2D	no DM
Prevalence	0.5	5.5	
Incidence rate	−3.5	3.8	
Mortality rate	−0.3	−2.9	−2.6

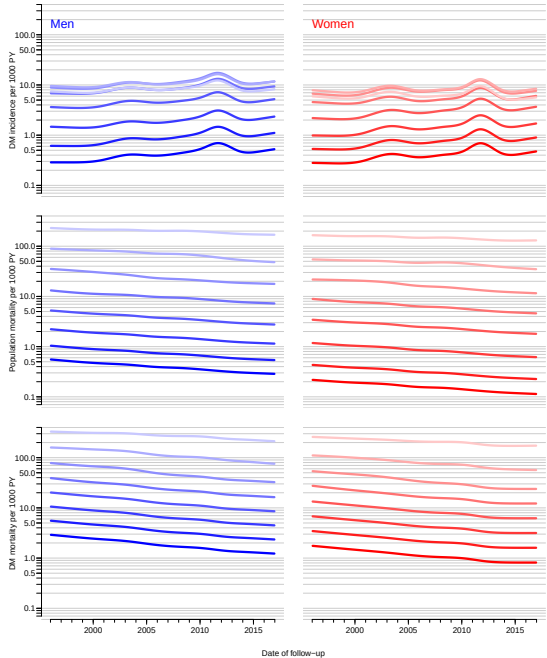
Relative mortality T2D vs. T1D: **0.58**
— T2D patients have a 42% **lower** mortality than T1D

Relative mortality Men vs. Women: **1.6**
— averaged over type and age

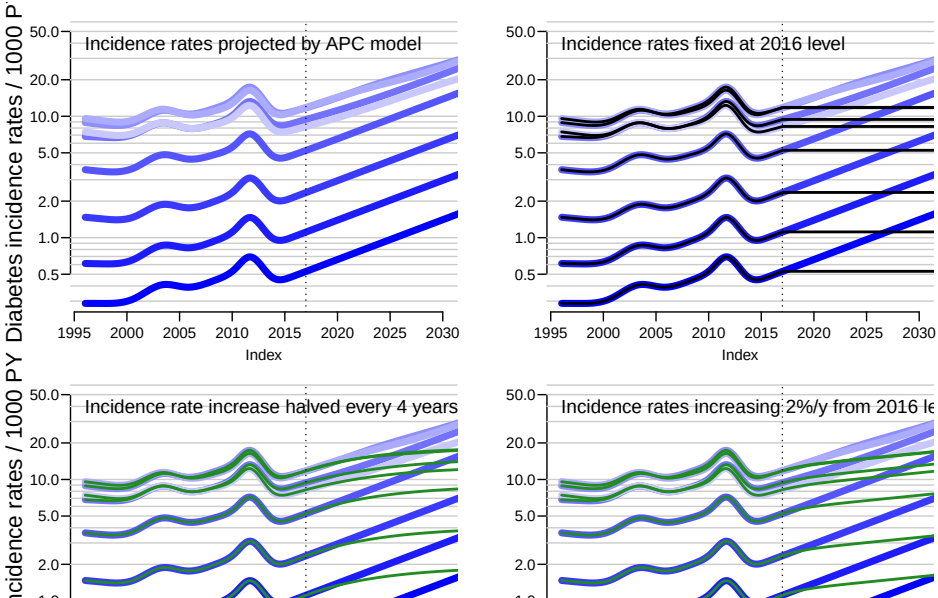

T1D vs. T2D mortality rate−ratio at 2015
RR ratio relative to 2015
a
b
5.0
2.0
1.0
0.5
0.2
0.1
2.5
2.0
1.5
1.0
0.5
M/W
RR
2
1
0.5
20
40
60
80
2000
2010
Age at follow−up
Date of follow−up

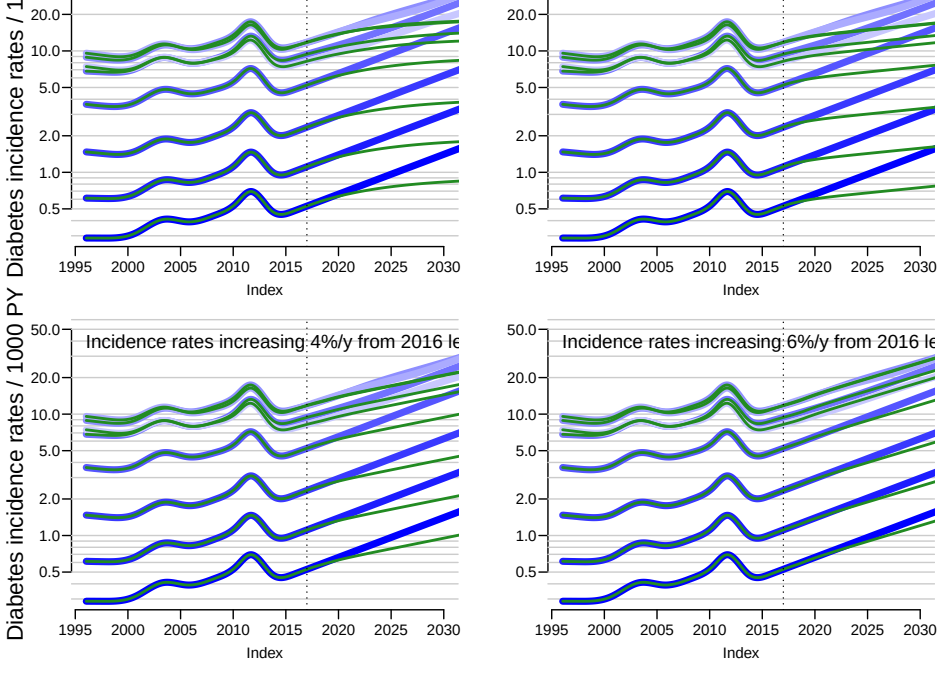
Incidence and mortality rates

ages 20, 30, . . . , 90

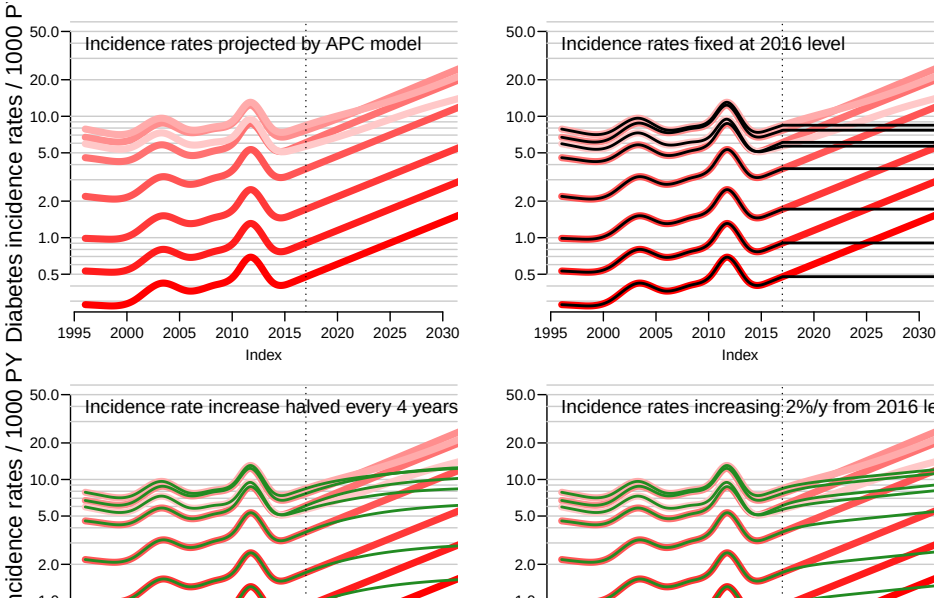


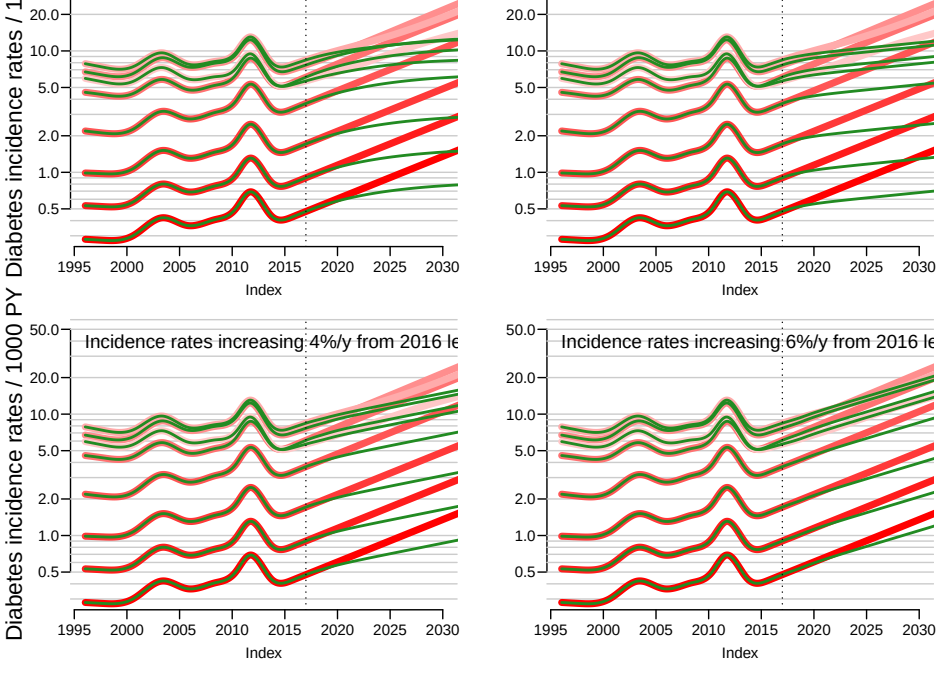
Incidence rates in the future




Diabetes incidence rates / 1000 PY
50.0
20.0
10.0
5.0
2.0
1.0
0.5
1995
2000
2005
2010
2015
2020
2025
2030
Index
Incidence rates increasing 4%/y from 2016 le
Incidence rates increasing 6%/y from 2016 le

Incidence rates in the future

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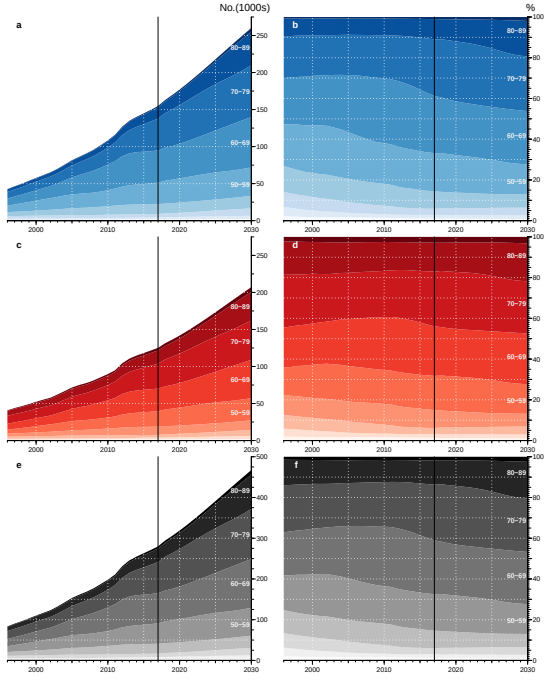
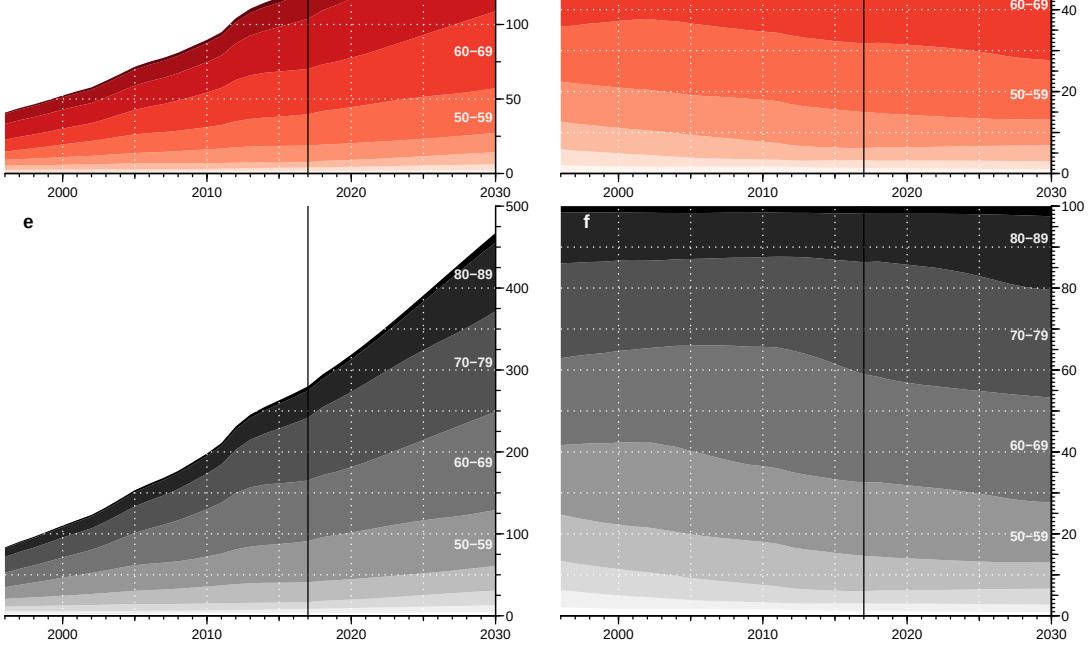
Number of future prevalent cases of DM

. . . using attenuation: halving of slope every 5 years




60–69
50–59
0
50
100
2000
2010
2020
2030
60–69
50–59
0
20
40
e
80–89
70–79
60–69
50–59
0
100
200
300
400
500
f
80–89
70–79
60–69
50–59
0
20
40
60
80
100