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Is Alzheimer's Disease Incidence Really Declining?

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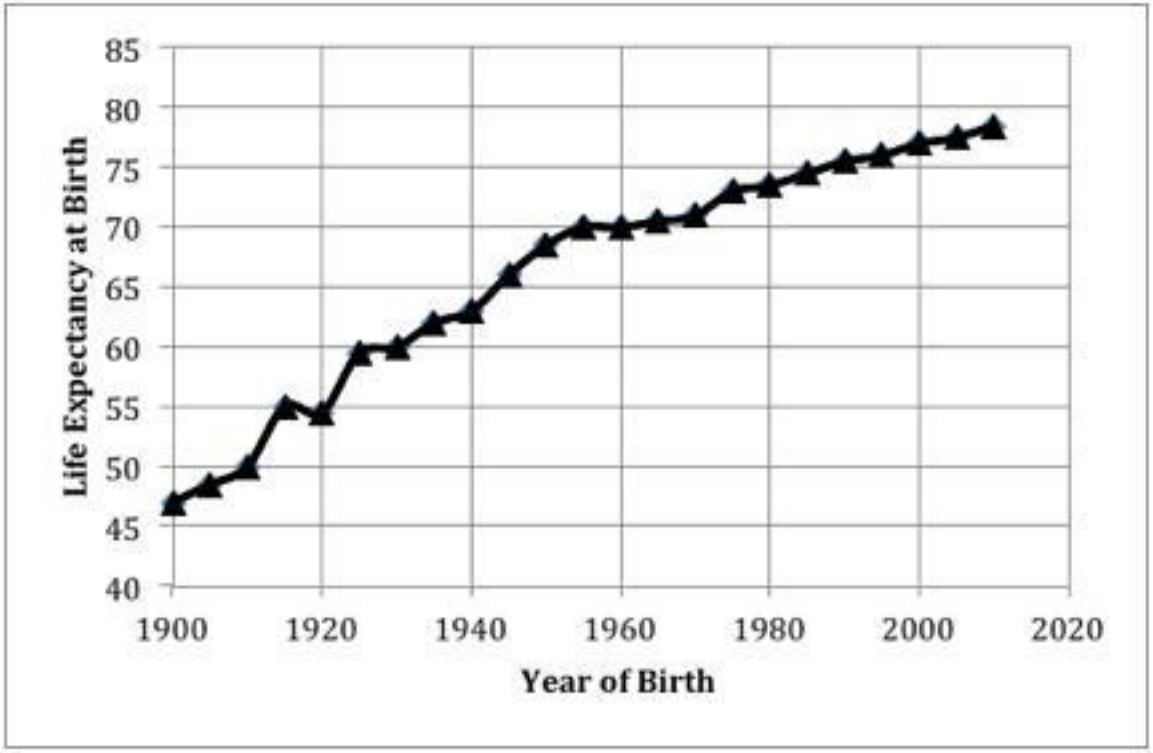
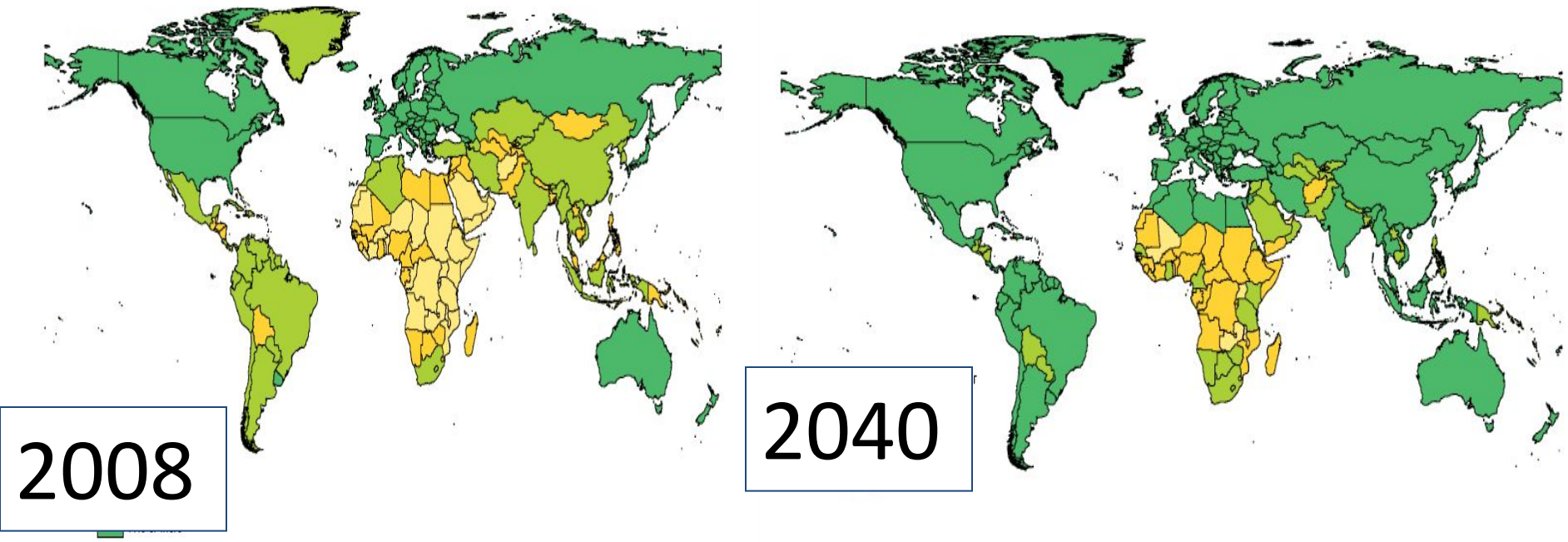
Background

- In high-income countries like the US, life expectancy is long and getting longer.



% of population aged 65+ years

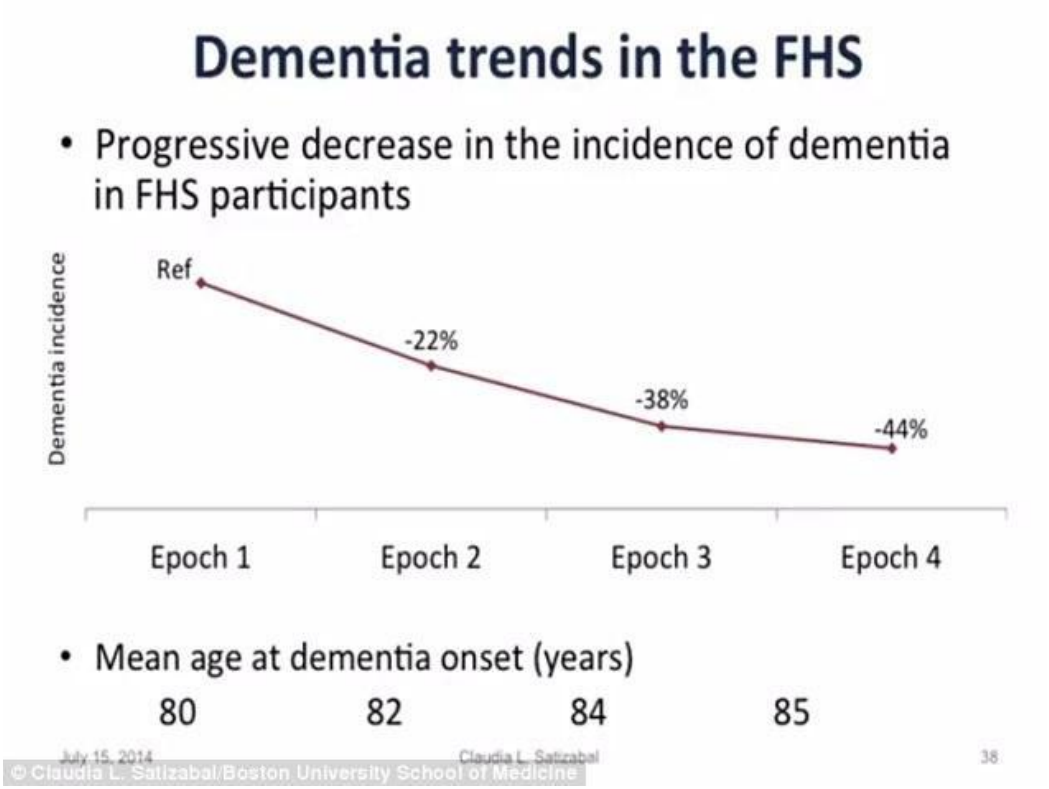


US Census, International Database, 2008

As the world ages, what is happening to Alzheimer's disease?

- Studies from high-income countries are starting to show that the incidence of Alzheimer's disease (AD) is starting to decline.

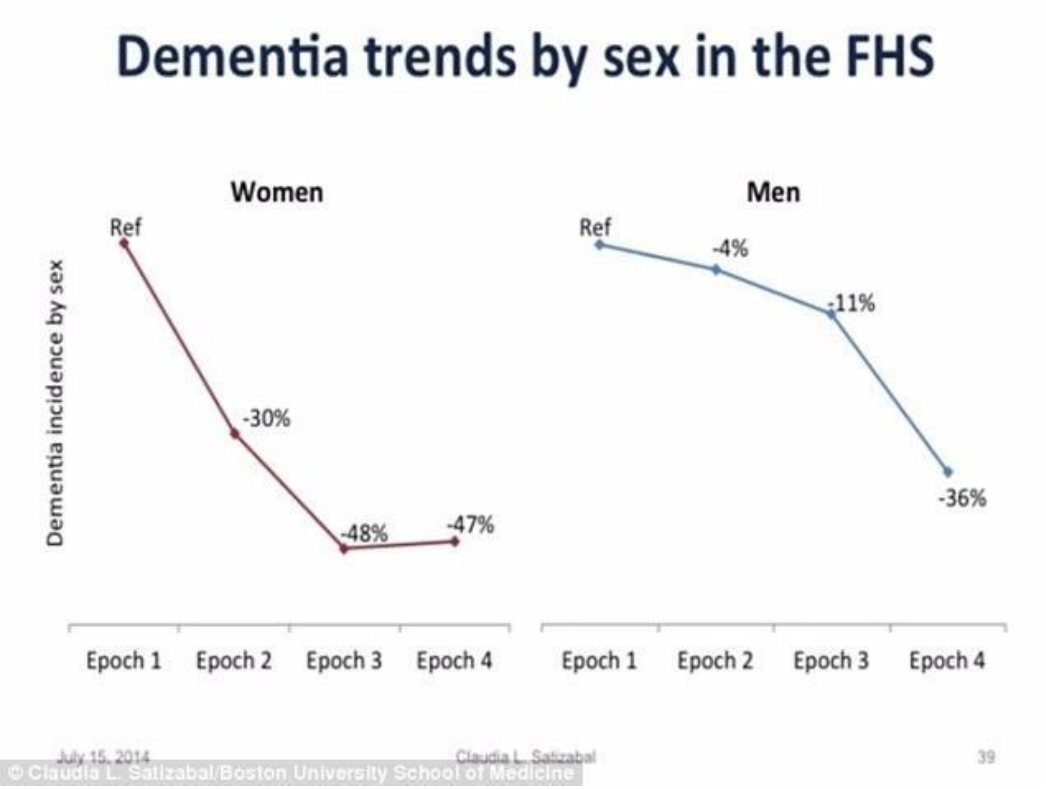
Framingham Health Study (FHS)



Epoch 1: late 1970s-early 1980s
Epoch 2: late 1980s-early 1990s
Epoch 3: late 1990s-early 2000s
Epoch 4: late 2000s-early 2010s

Satizabal et al., 2016

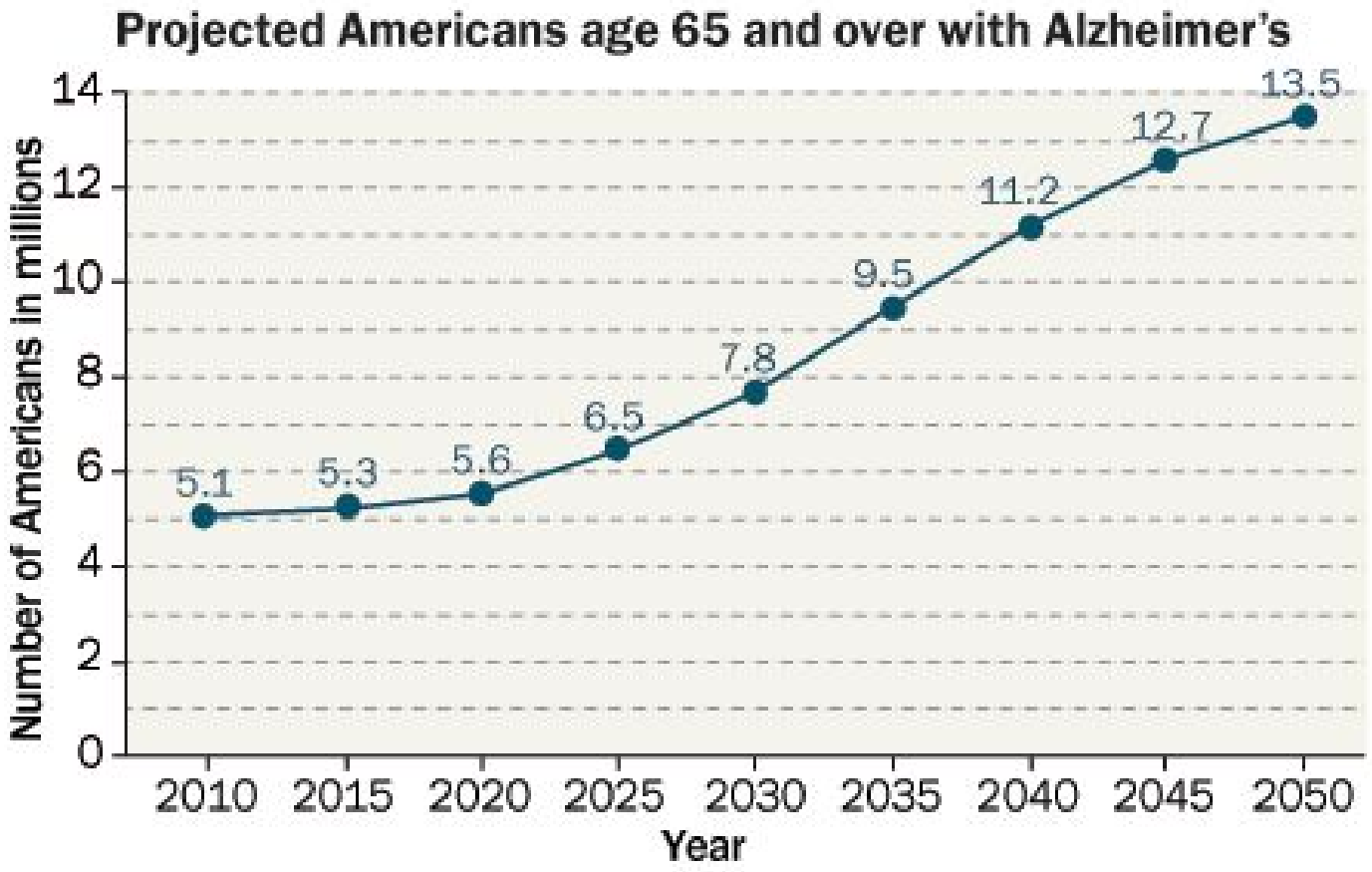
Incidence among Men and Women



???

- What could this mean?
- Can it be real?
- Doesn’t it seem to us that there are more people with AD all the time?

Number of people with AD



“Prevalence”

- Prevalence is the proportion (e.g. percent) of people with AD in a community at any given time.

$$\frac{\textit{Number of people with AD}}{\textit{Number of people altogether in that community}} \textit{ X 100}$$

“Incidence”

- Incidence is the proportion of <u>new</u> cases of AD every year,
- i.e., the rate at which new disease develops in a community.

$$\frac{\textit{Number of } \textbf{\textit{new}} \textit{ cases of AD}}{\textit{Number of people who didn't already have AD}} \times 100$$

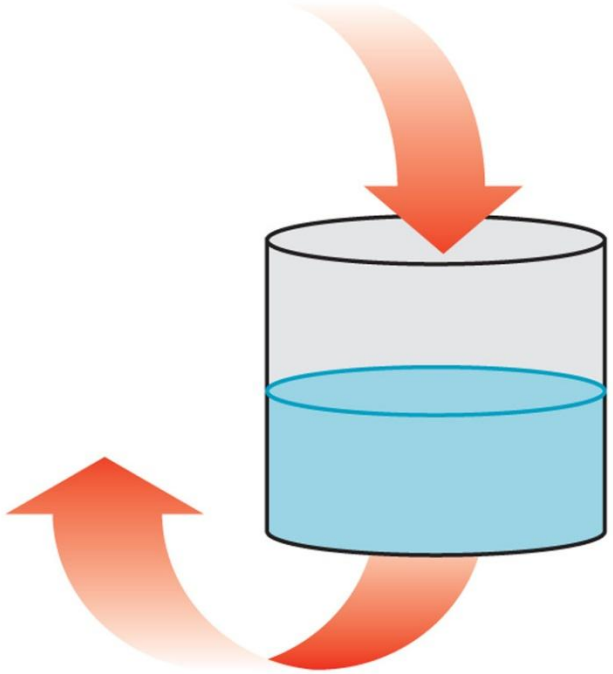
What's the difference between Prevalence and Incidence?

- **Incidence** : new cases
- **Prevalence:** all cases
- The relationship between incidence and prevalence is how long people live with the disease (duration of survival).

- *Incidence x Duration = Prevalence*

Incidence, Prevalence, and Mortality

Incidence: proportion of new dementia cases



Prevalence: proportion of people with dementia

Mortality: proportion of people who die

Wu et al., 2015

Simultaneous trends in prevalence and incidence

Increasing prevalence of dementia

Decreasing incidence of dementia

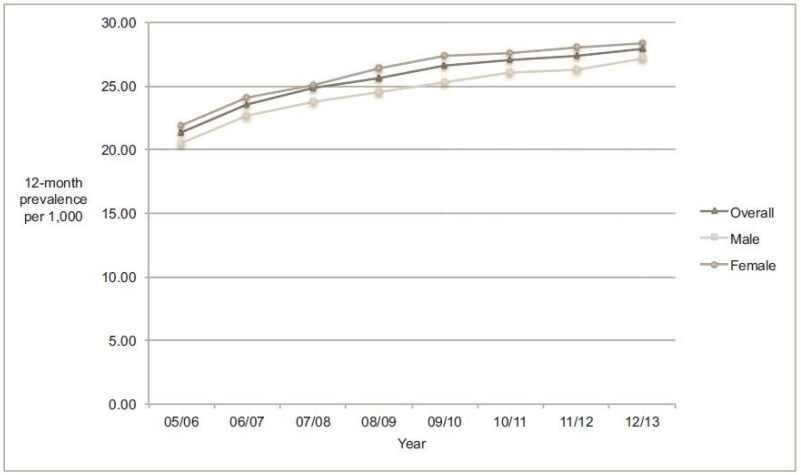


Figure 2. Age-standardized 12-month prevalence of dementia among adults 45 years of age and older, Saskatchewan, from 2005/2006 to 2012/2013.

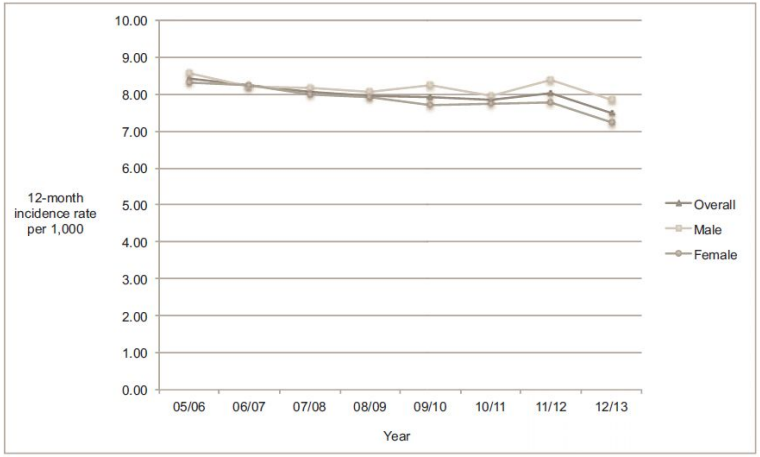


Figure 1. Age-standardized 12-month incidence rate of dementia among adults 45 years of age and older, Saskatchewan, from 2005/2006 to 2012/2013.

Saskatchewan, Canada, from 2005/6 – 2012/13

Kosteniuk et al., 2016

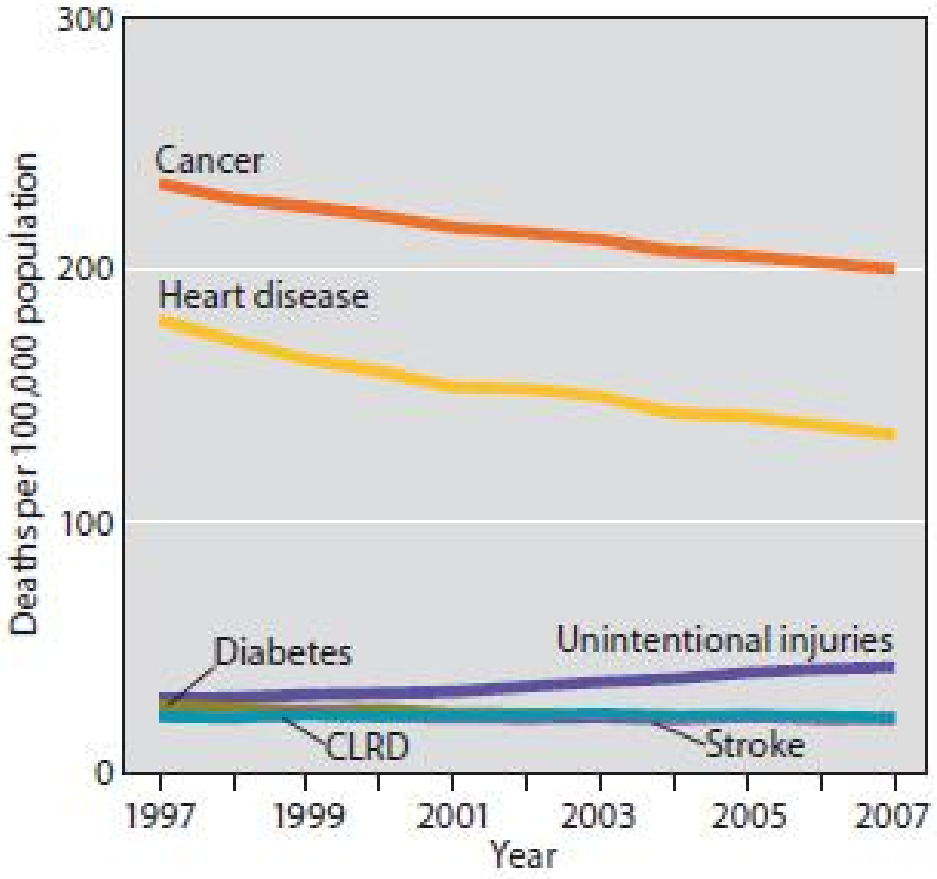
In words,

- People in the US are living longer on average than they used to.
- So, even if fewer new cases are developing in the population (*incidence*), they are surviving longer.
- Thus there may be no decrease in the percentage of older people with disease (*prevalence*).
- No decrease in need for services.

People Are Getting Healthier

- People are getting access to better health care, nutrition, sanitation, etc. than previous generations did.
- They are getting less heart disease than in previous generations (better treatment for blood pressure and high cholesterol)
- They are smoking less than in previous generations.
- So, they are entering old age with healthier brains and more “brain reserve” than their parents did.

Death rates for leading causes among persons 45-64, 1997-2007



CLRD = chronic lower respiratory disease

But

- Living longer gives us greater opportunity to develop dementia.
- And more people are also getting obesity and diabetes which are risk factors for dementia.

Framingham Heart Study

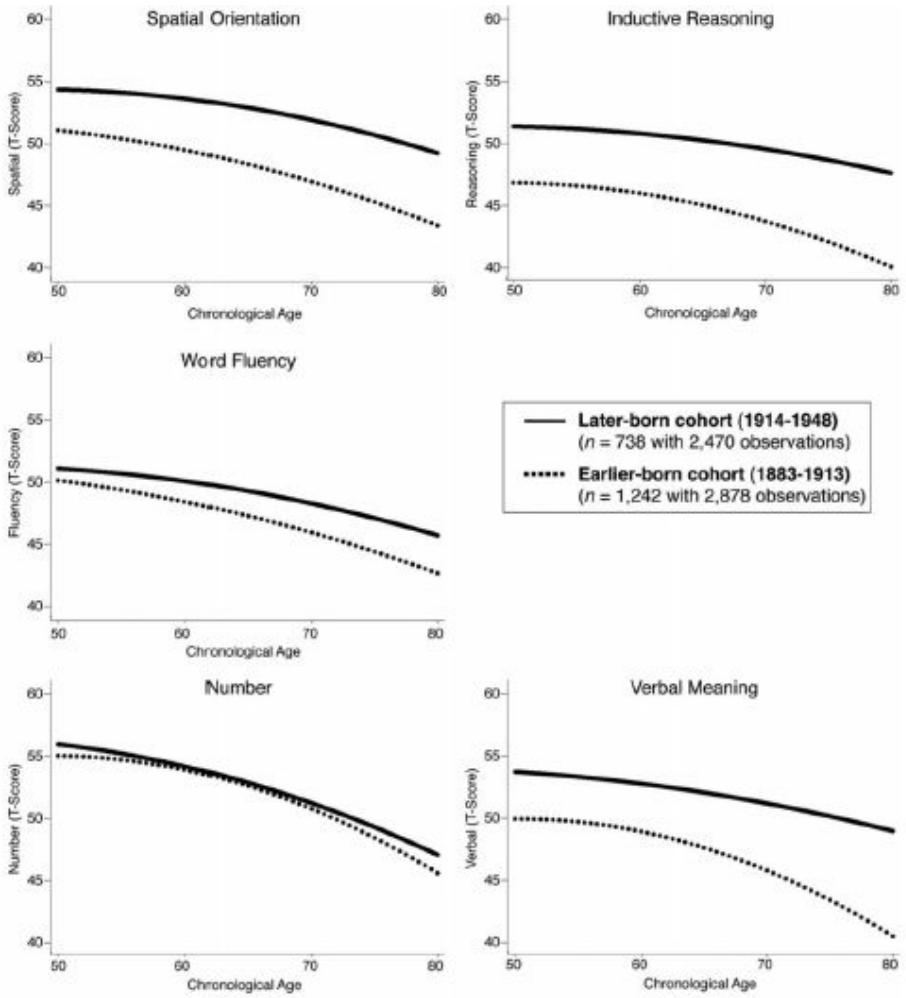
Incidence of dementia came down;

- But only among people with at least high school education.
- All the cardiovascular risk factors for dementia (heart disease, high blood pressure, smoking, etc) also came down *except obesity and diabetes.*
- But this did not explain why dementia incidence came down.

People Are Getting Smarter

- People born in later decades appear to have higher IQ and reasoning capacity than people born in earlier decades.
- They also have better educational and occupational opportunities than previous generations did.
- This may allow them to build up enough “cognitive reserve”
- So they should be better able to withstand and compensate for brain disease and avoid or delay getting to the dementia stage of Alzheimer’s disease.

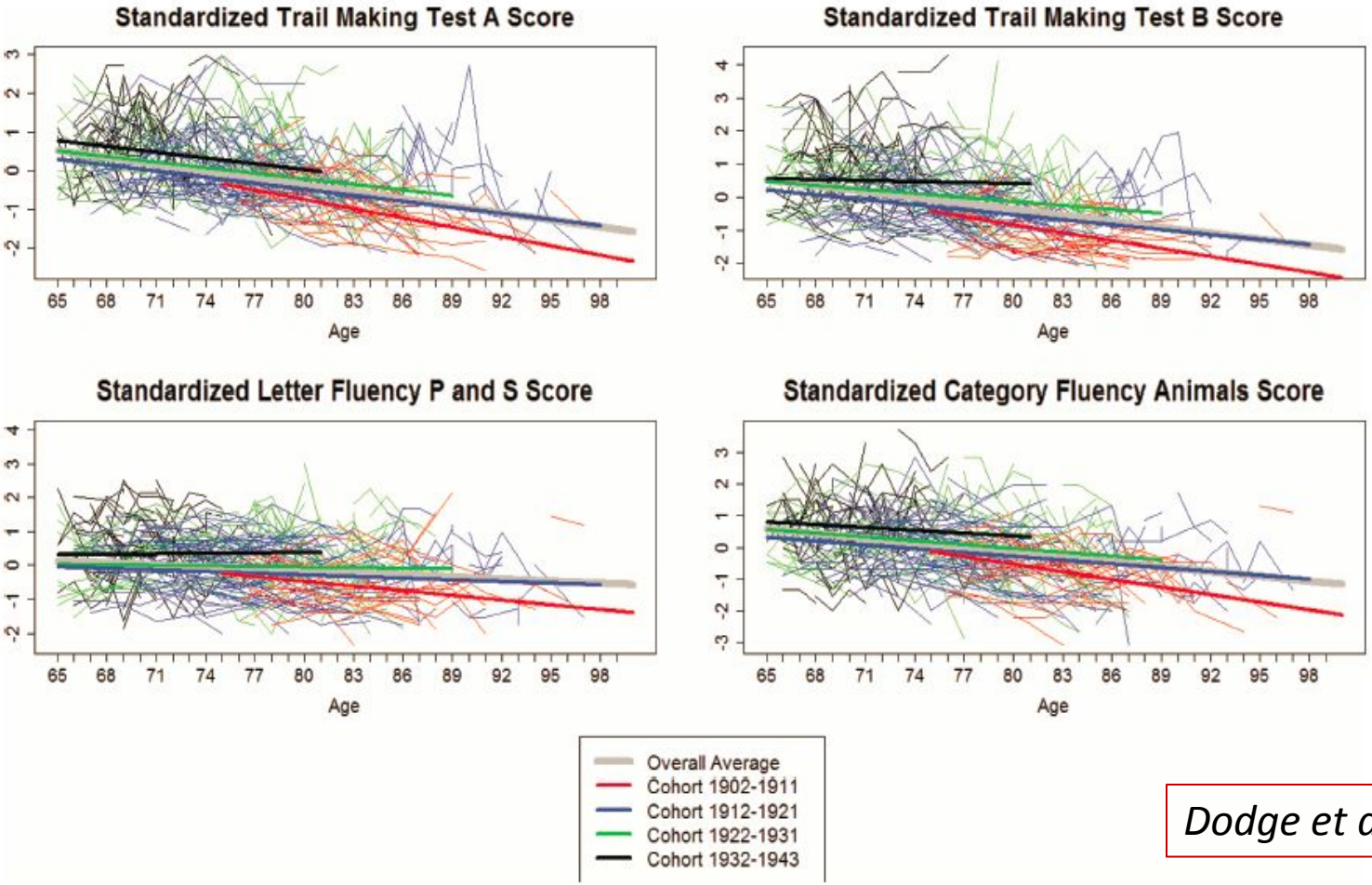
Cohort Differences in Cognitive Aging



Seattle Longitudinal Study

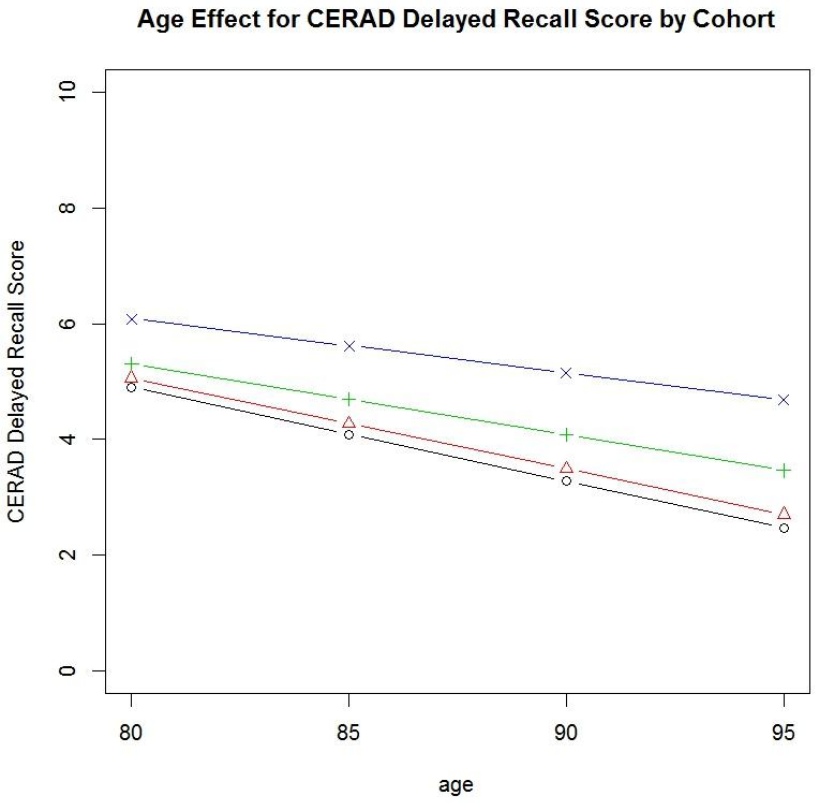
Gerstof et al., 2011

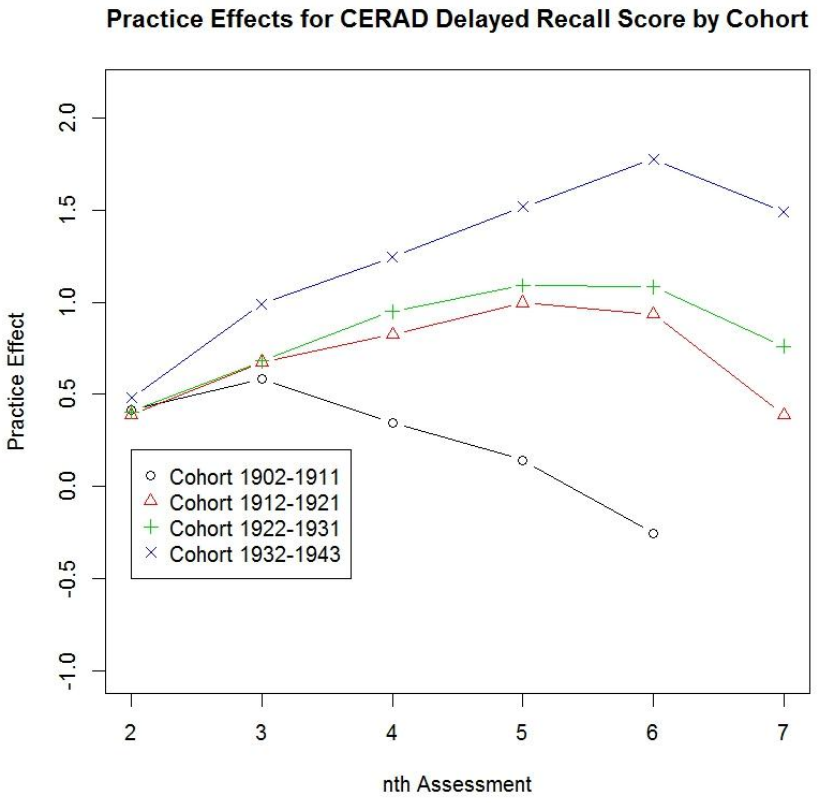
Cohort effects in processing speed, executive function, and language



Dodge et al., 2014

Delayed Recall: Age and practice effects by cohort





Dodge et al., 2016

Possible Effects of Society Living Longer

"Compression of morbidity:"

People live longer and are healthy for most of their lives, they are sick for a shorter period before they die.

"Expansion of morbidity:"

People live longer but are sick for most of that extended life.

Health and Retirement Study

Comparing people aged 70 in 1993 and people aged 70 in 2004,

In the later-born group:

- Fewer people had cognitive impairment.
- People with cognitive impairment died faster.

This suggests "compression of morbidity."

Langa et al., 2008

Take-home Message

- Life expectancy continues to increase.
- Incidence of dementia may be coming down, but:
- Prevalence will remain high for the foreseeable future.
- We cannot back off on finding a cure;
- We cannot slack off on providing services.
- But, for the future:
- We must control diabetes and obesity.
- We must invest in formal education in childhood and cognitively stimulating activity throughout adulthood.
- This will build cognitive reserve and help lower our society's burden of dementia.

Thank you!
And now, back to the beach.