DZNE
German Center for Neurodegenerative Diseases
within the Helmholtz Association

Rostock University

Dementia in an Ageing World

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GLOBAL SUSTAINABLE DEVELOPMENT GOALS IN A MEDIATIZED WORLD
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AUSTRIAN ACADEMY OF SCIENCES

World population stabilization unlikely this century

Patrick Gerland,[1]*† Adrian E. Raftery,[2]*† Hana Ševčíková,[3] Nan Li,[1] Danan Gu,[1] Thomas Spoorenberg,[1] Leontine Alkema,[4] Bailey K. Fosdick,[5] Jennifer Chunn,[6] Nevena Lalic,[7] Guiomar Bay,[8] Thomas Buettner,[9]‡ Gerhard K. Heilig,[9]‡ John Wilmoth[1]

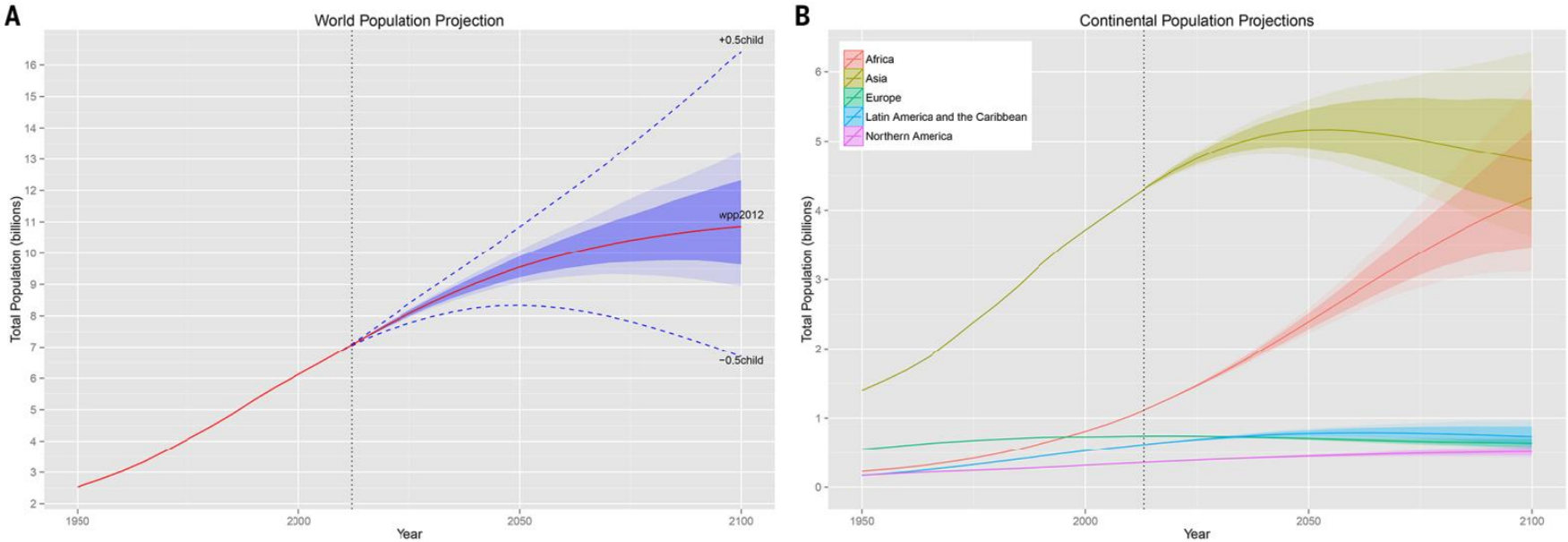


Fig. 1. (**A**) UN 2012 world population projection (solid red line), with 80% prediction interval (dark shaded area), 95% prediction interval (light shaded area), and the traditional UN high and low variants (dashed blue lines). (**B**) UN 2012 population projections by continent.

Science (2014)

What are Dementias?

Primary irreversible dementias

90% of all dementias

- *Neurodegenerative forms*
  - Alzheimer disease
  - Dementia with Parkinson
  - Dementia with Lewy bodies
  - Dementia with Chorea Huntington
  - Dementia with Trisomie 21
  - Frontotemporal lobar degeneration
  - Other
- *Non-neurodegenerative forms*
  - *Vascular forms*
    - Vascular dementia
    - Multi-infarct dementia
  - *Infectious forms*
    - Sporadic Creutzfeldt-Jakob disease
  - *Inheritable forms*
    - Fatal Familial Insomnia
    - Gerstmann-Sträussler-Scheinker Syndrome
- *Mixed forms*
  - Vascular and Alzheimer dementia
  - Degenerative-vascular dementia

Secondary, potentially reversible dementias

10% of all dementias

- Deficiency states, e.g. vitamin deficiency, folate deficiency
- Intoxication by alcohol, drugs, lead, quicksilver,
- Psychiatric diseases, e.g. depression, schizophrenia
- Neurological diseases, e.g. multiple sclerosis
- Head injury
- Metabolic diseases
- Electrolyte disorders
- Infections
- Transmission (e.g. AIDS dementia)

Alzheimer's disease (AD) is the most common form of dementia, accounting for 50–70% of cases.

Alois Alzheimer Auguste Deter

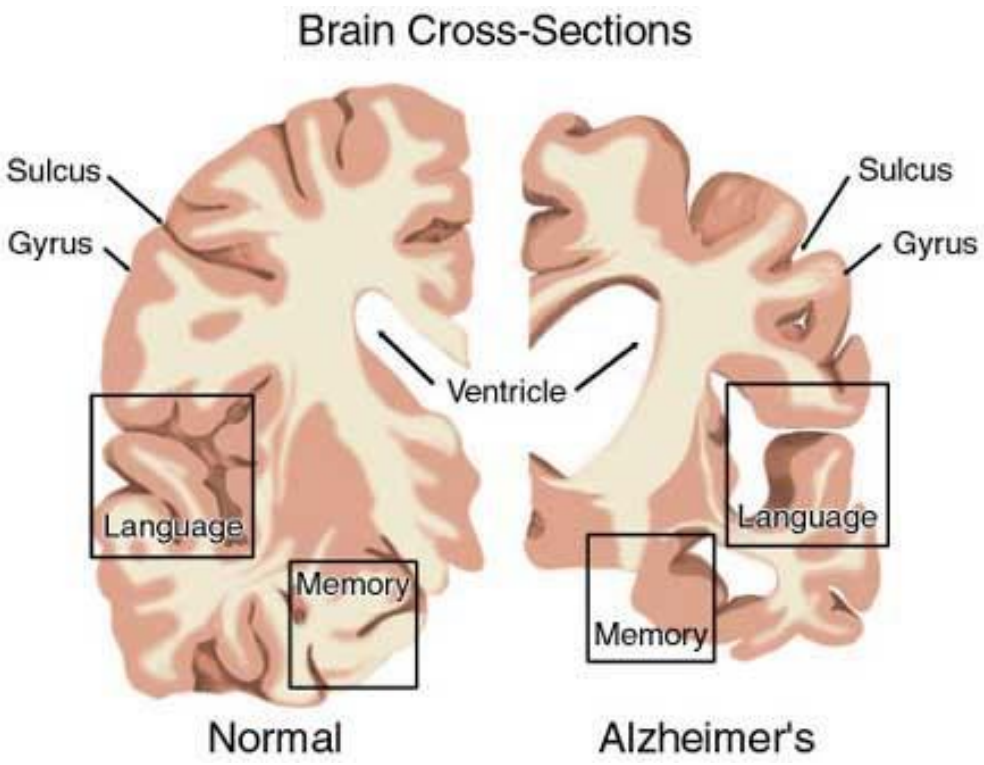
Doblhammer et al. 2017
Winbladt et al. 2016

The size of a normal brain compared to one with Alzheimer's Disease

GM: Grey Matter

WM: White Matter

ICV: Intracranial Volume



Credit http://www.drjack.co.uk/wp-content/uploads/2011/07/alzheimers-brain.jpg

Number of people with dementia in Europe & ranking of causes of death

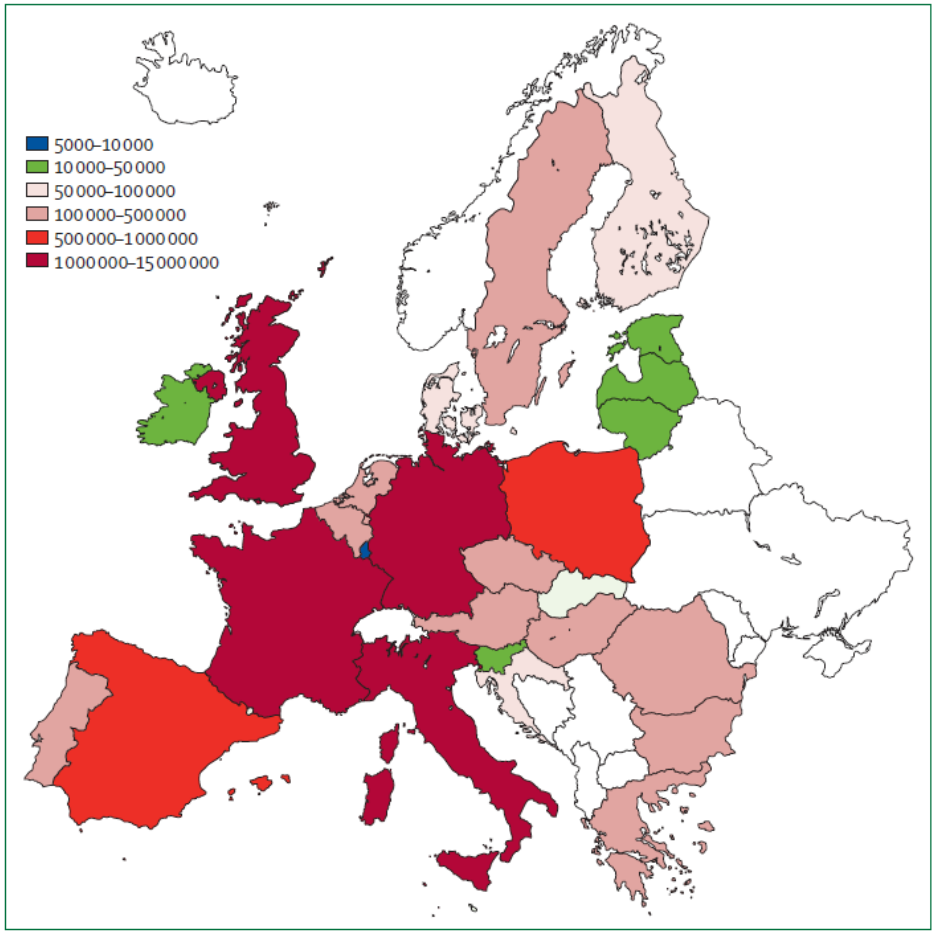
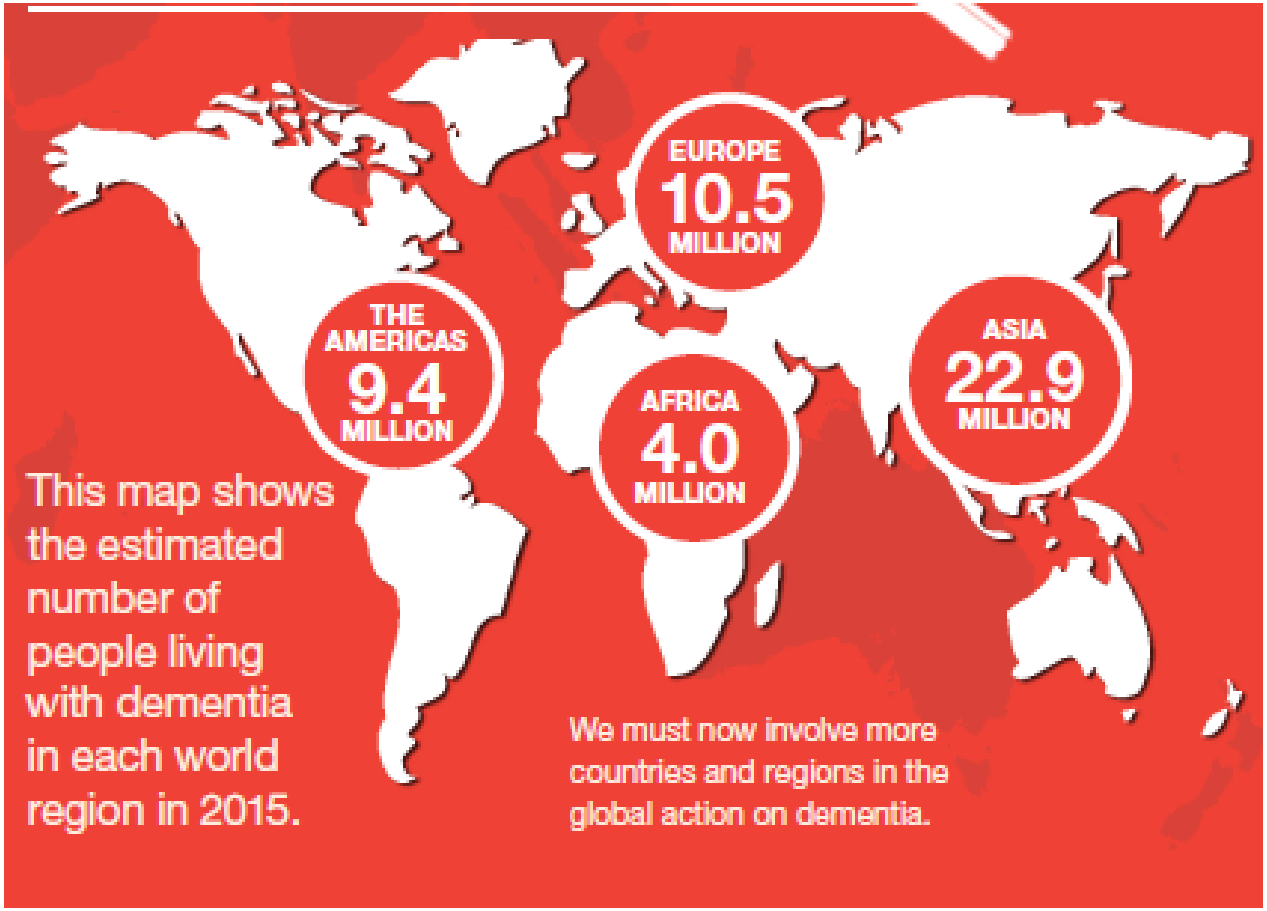


Figure 1: **Number of people with dementia in 28 European countries in 2013**
Estimates of the total number of people with dementia in each of 28 European countries were obtained from Alzheimer Europe.[26]

Rank	WHO 2015, 70+		
	ICD-10 code	GHE code	GHE cause of death
1	I20-I25	113	Ischaemic heart disease
2	I60-I69	114	Stroke
3	F01-F03, G30-G31	95	Alzheimer's disease and other dementias
4	J40-J44	118	Chronic obstructive pulmonary disease
5	C33-C34	68	Trachea, bronchus, lung cancers

Winbladt et al 2016

The prevalence of dementia worldwide



WorldAlzheimerReport 2015

Age-specific prevalence of dementia worldwide

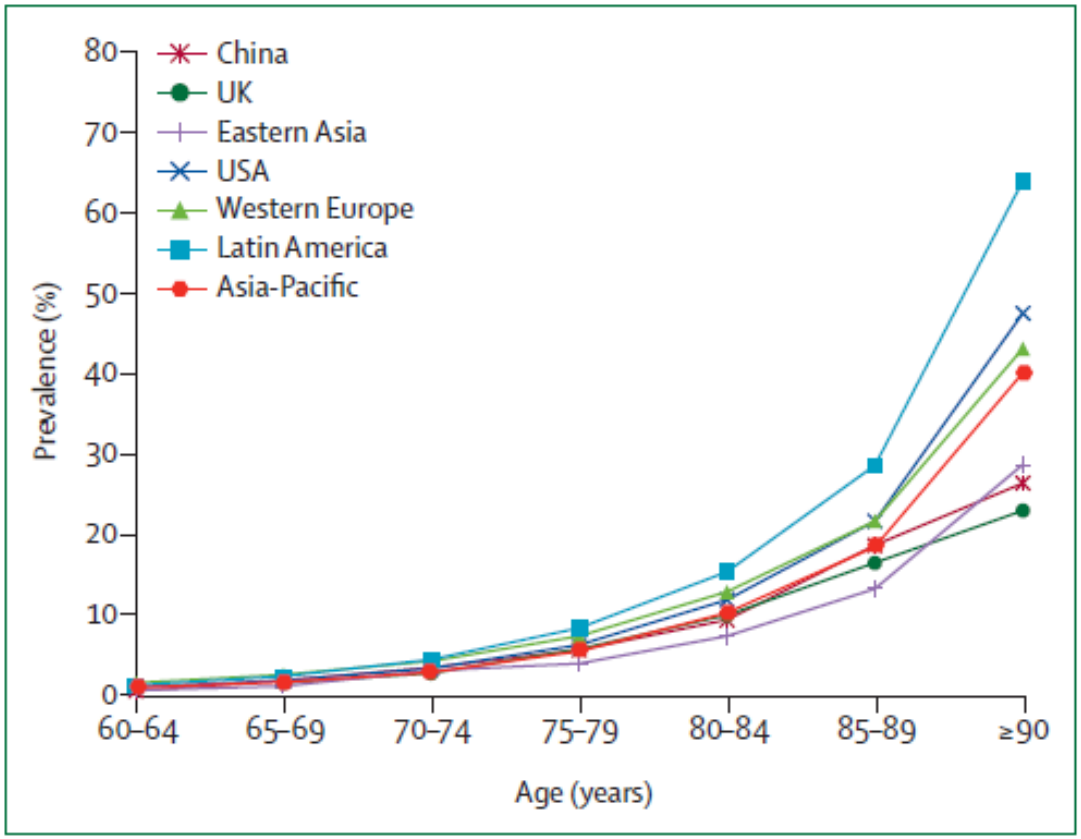
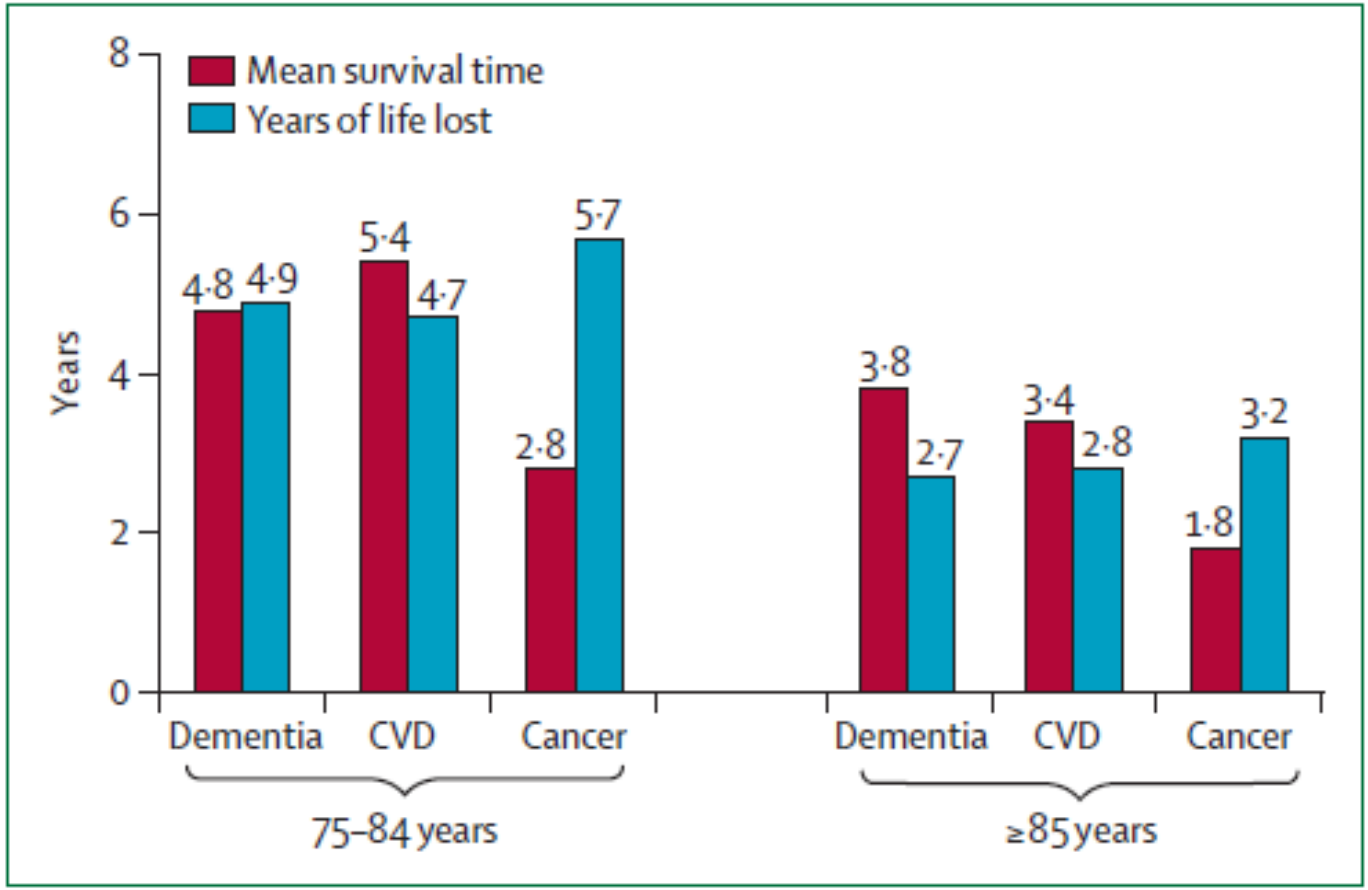


Figure 3: **Age-specific prevalence of dementia by world region and in major countries**

Patterns of age-specific prevalence of dementia are similar across worldwide regions, but vary substantially among the oldest old (age ≥90 years).[72–75]

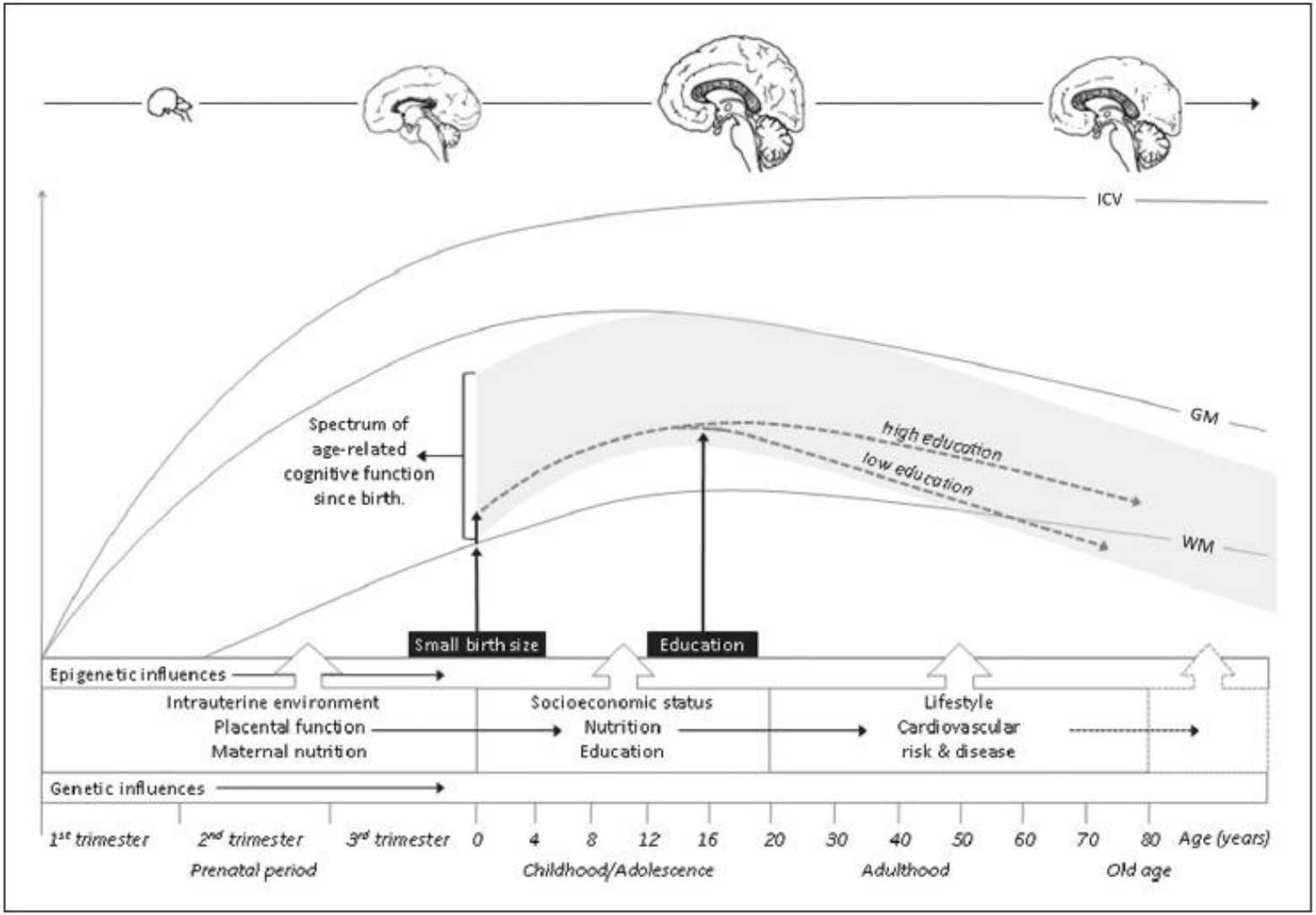
Winbladt et al 2016

Dementia and life expectancy



Winbladt et al 2016

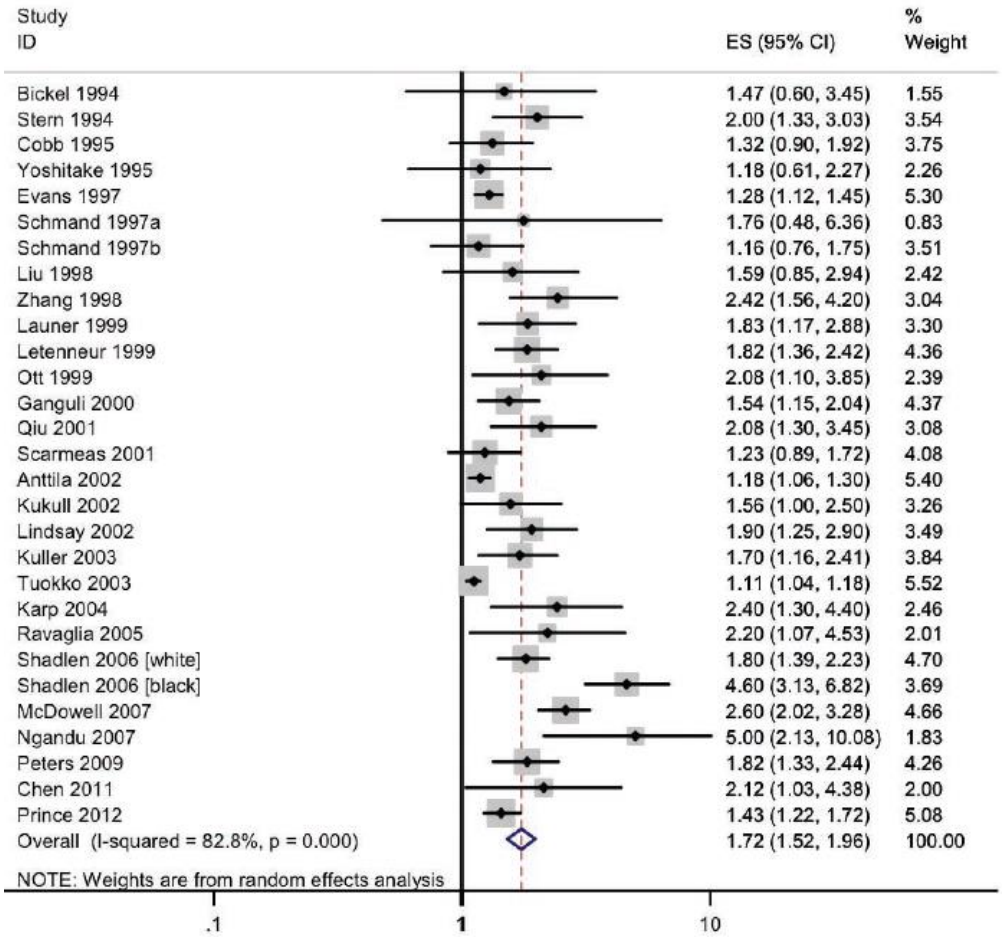
A life-course approach to the risk of dementia



Müller M et al. 2014

Education and Dementia

Meta-Analysis: Effect of low education on the risk of dementia



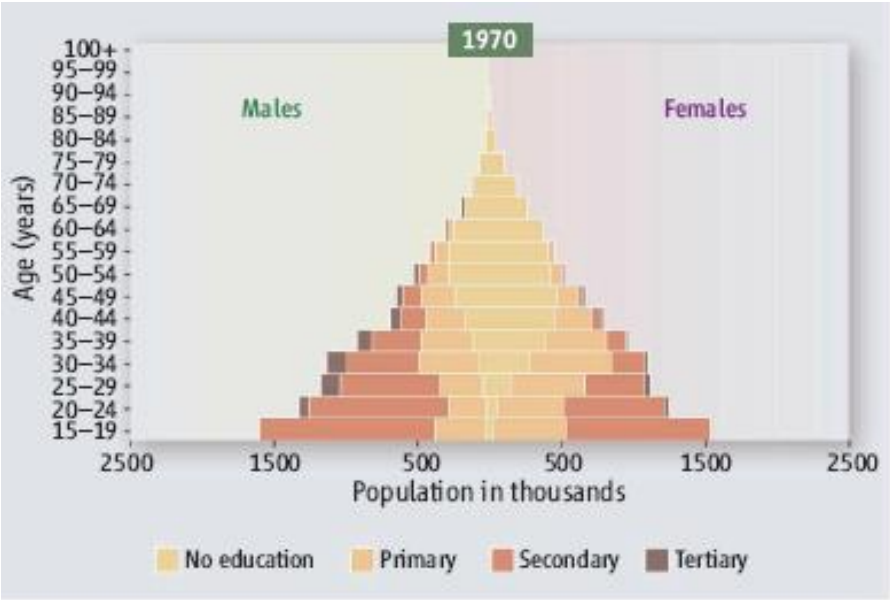
WorldAlzheimerReport 2014

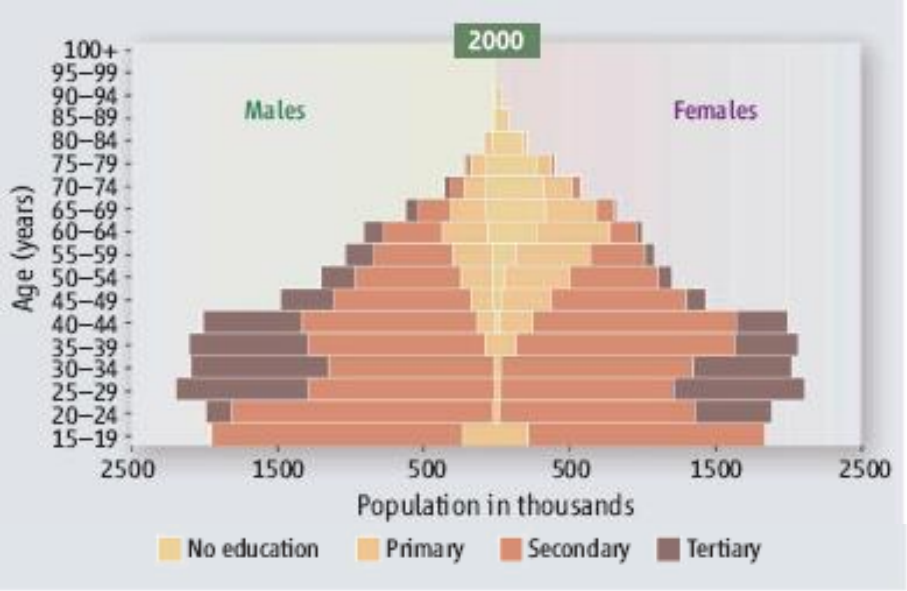
Education increases cognitive reserve ->

People with higher educational achievement, can tolerate more of the pathologic brain changes than others and maintain function.

Tucker & Stern (2011)

South Korea: Educational Expansion 1970-2000





Lutz, Cuaresma, Sanderson; Science 2008

Trends in the Prevalence of Dementia Germany 2007-2009

Reference year: 2009=100

Age-specific trends for ages 65-74, 75-84, 85-100+

		Females Prevalence Indexed to 2009	Sign.	Males Prevalence Indexed to 2009	Sign.
Age-specific trends					
65-74					
	2007	98		99	
	2008	98		98	
	2009	100		100	
75-84					
	2007	104	***	101	
	2008	102	**	101	
	2009	100		100	
85-100+					
	2007	99		102	
	2008	101		102	
	2009	100		100	

* in person-years; ** variance bootstrapped with 1000 replications; NB regression: age modelled by a third degree polynomial; Data source: AOK claims data, own calculations

Doblhammer et al. (2014)

Trends in Dementia Occurance Germany 2006/7-2009/10

Incidence, Mortality of the Non-Demented and the Demented

		Females Rate Indexed to 2009/10=100	Sign.	Males Rate Indexed to 2009/10=100	Sign.
Dementia Incidence	2006/2007	111	***	113	***
	2009/2010	100	↓	100	↓
Mortality without dementia	2006/2007	100		104	
	2009/2010	100		100	
Mortality with dementia	2006/2007	89	***	98	
	2009/2010	100	↑	100	

***: p<=0.001

Reference period 2009/10 = 100

Doblhammer et al. (2015)
AOK health claims data

Increase in healthy life years
Compression of years with dementia

Between 2006/7 and 2009/10 in Germany

Men	gained 1.9 healthy months	incidence ↓
	lost 0.5 months with dementia	incidence ↓
Women	gained 1.5 healthy months	incidence ↓
	lost 1.5 months with dementia	incidence ↓ mortality of the demented ↑

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New Insights into the Dementia Epidemic

Eric B. Larson, M.D., M.P.H., Kristine Yaffe, M.D., and Kenneth M. Langa, M.D., Ph.D.

Selected Recent Studies of the Dementia Epidemic.

Study	Outcome	Data Source	Key Findings	Factors
Manton et al. (United States)[1]	Prevalence of severe cognitive impairment	National long-term care survey interviews, 1982–1999	Decline in dementia prevalence among people ≥65 yr of age (5.7% to 2.9%)	Higher educational level, decline in stroke incidence
Langa et al. (United States)[2]	Prevalence of cognitive impairment	Ongoing population-based survey of people ≥51 yr of age	Prevalence of cognitive impairment among people ≥70 yr of age (12.2% in 1993 vs. 8.7% in 2002)	Higher educational level; combination of medical, lifestyle, demographic, and social factors
Schrijvers et al. (Rotterdam)[3]	Incidence of dementia	Population-based cohort ≥55 yr of age in 1990, extended in 2000	Incidence rate ratios (6.56 per 1000 person-yr in 1990 vs. 4.92 per 1000 person-yr in 2000)	Higher educational level, reduction in vascular risk, decline in stroke incidence
Qiu et al. (Stockholm)[4]	Prevalence of DSM-III-R dementia*	Cross-sectional survey of people ≥75 yr of age, 1987–1989 and 2001–2004	Age- and sex-standardized dementia prevalence (17.5% in 1987–1989 vs. 17.9% in 2001–2004); lower hazard ratio for death in later cohort suggests decreased dementia incidence	Favorable changes in risk factors, especially vascular risk; healthier lifestyles
Matthews et al. (England)[5]†	Prevalence of dementia in 3 regions	Survey interviews of people ≥65 yr of age, 1989–1994 (in CFAS I) and 2008–2011 (in CFAS II)	Dementia prevalence (8.3% in CFAS I vs. 6.5% in CFAS II)	Higher educational level, better prevention of vascular disease

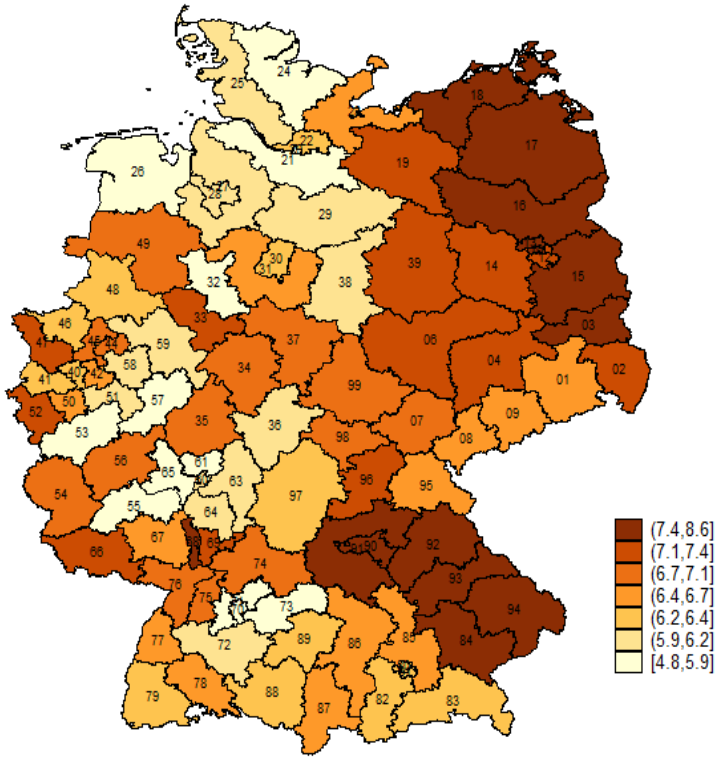
* In the study by Qiu et al., dementia was diagnosed according to the criteria provided in the *Diagnostic and Statistical Manual of Mental Disorders*, third edition, revised (DSM-III-R).
† CFAS denotes Cognitive Function and Ageing Study.

N ENGL J MED 369;24 NEJM.ORG DECEMBER 12, 2013

Mid-Life Risk Factors and Dementia

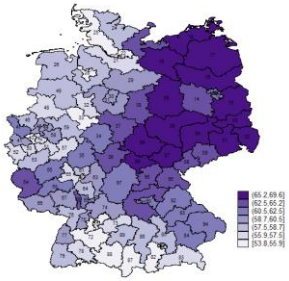
Regional Distribution in Germany Prevalence Ages 65+

Dementia*

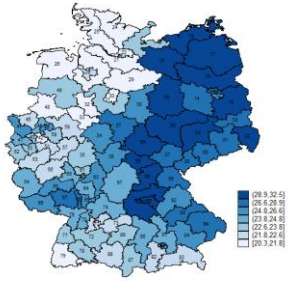


Cardio-Vascular Risk Factors

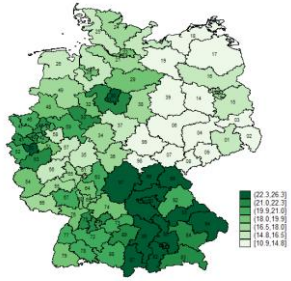
Blood Pressure*



Diabetes Mellitus*



Hypercholesterolemia*



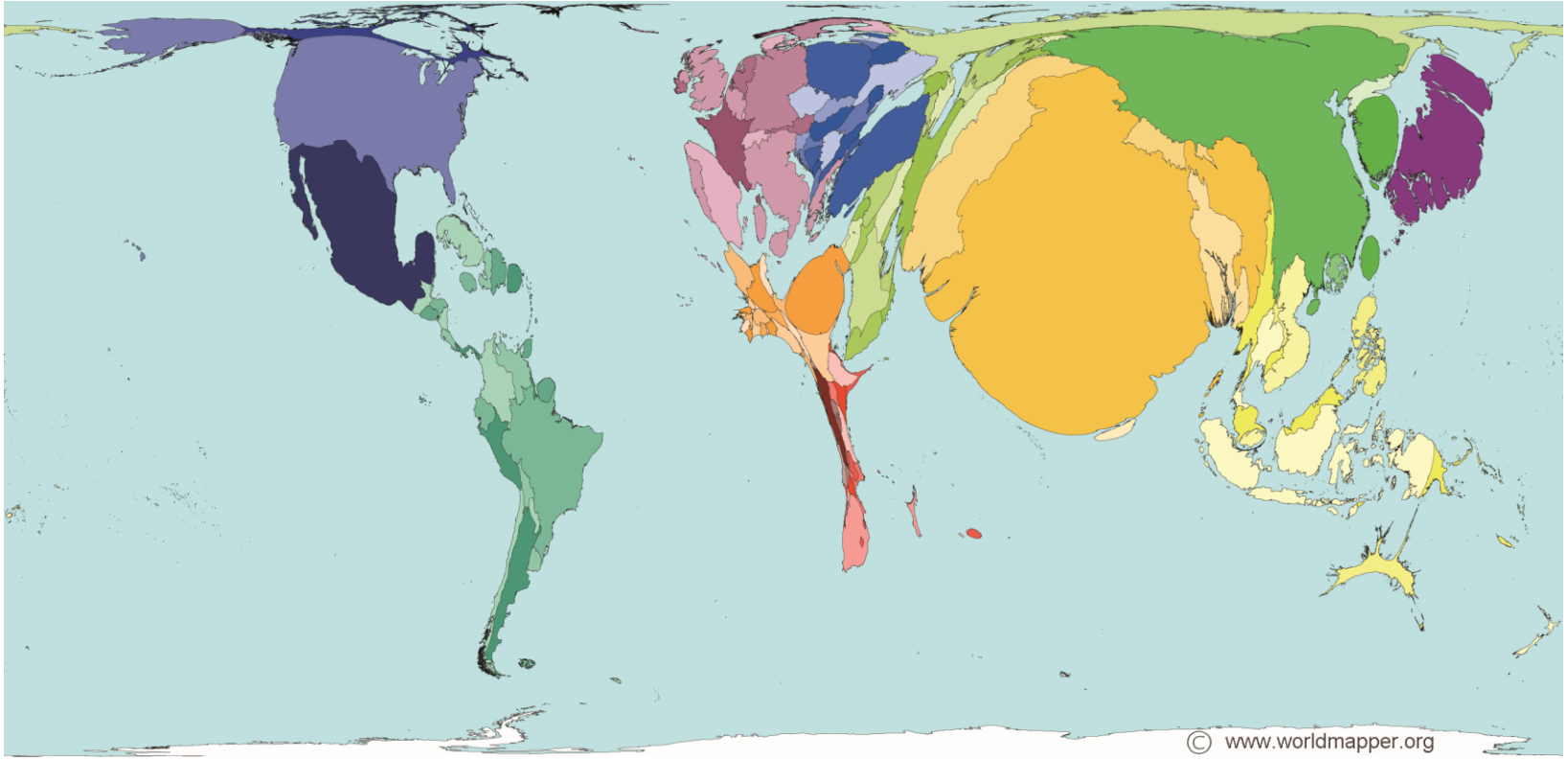
Regional Correlation with Dementia

0.38*** 0.38*** 0.30***

Doblhammer et al. 2015

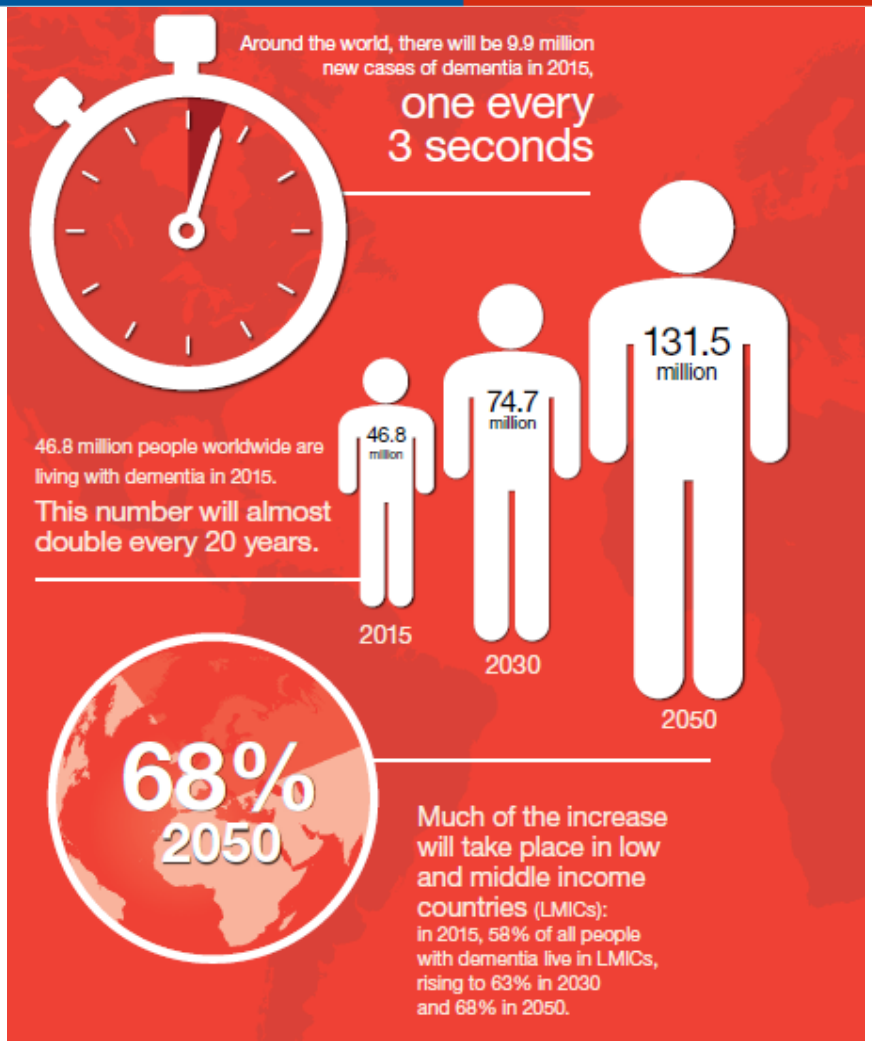
Data Source: AOK 2007, own calculations
*age standardized

Worldwide Diabetes Prevalence



Data Source: WHO 2002

Dementia Projections



WorldAlzheimerReport 2015

Thank you!

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