Klinisch-chemisches Kolloquium

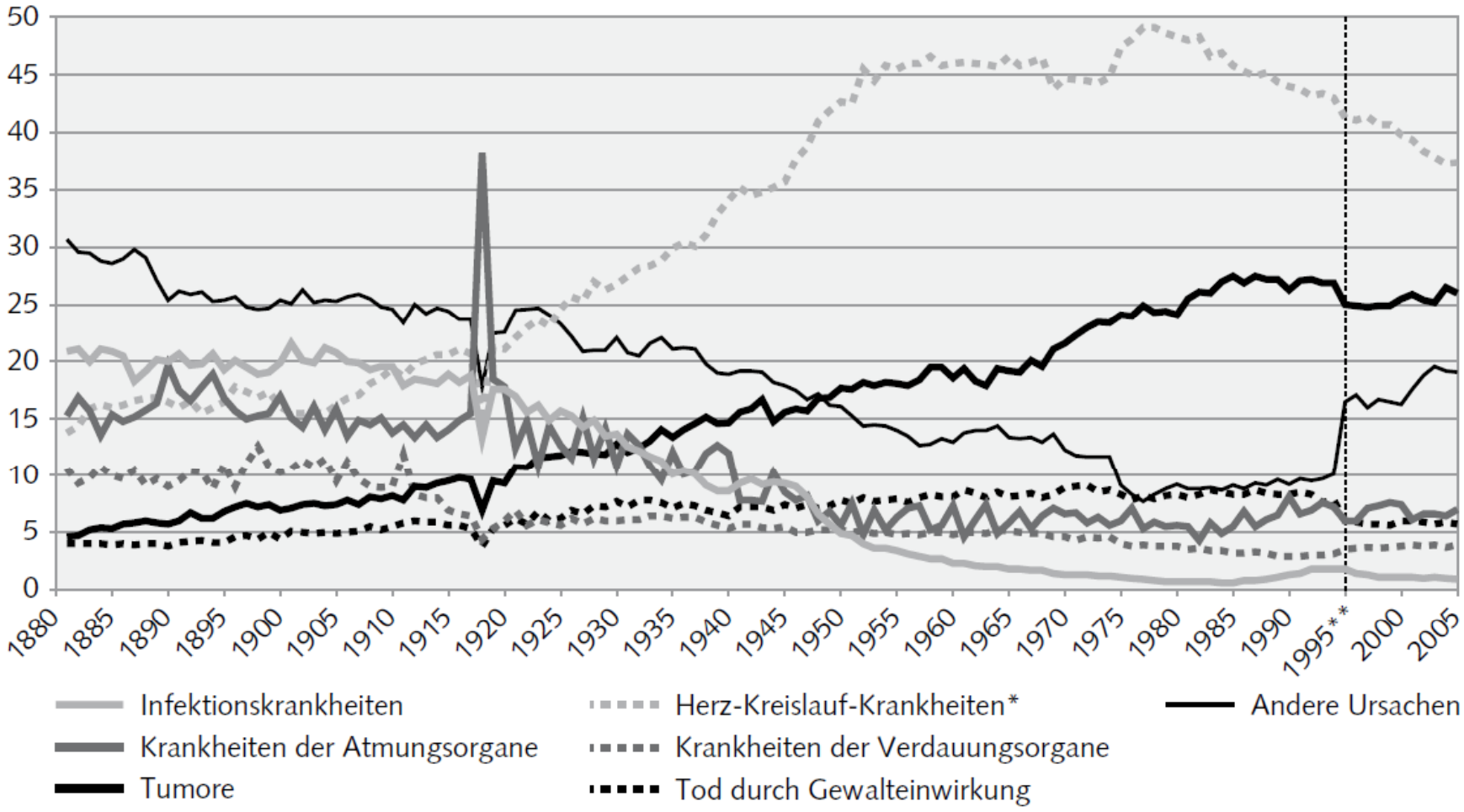
Prevalence, trends and significance of cardiovascular risk factors and mortality in Switzerland

David Fäh

Institute of Social and Preventive Medicine

Universität Zürich[UZH]

Anteil der Todesfälle nach Haupttodesursachengruppen, 1881–2005 G 1



* mit Krankheiten des Nervensystems bis 1900
** Änderung der Klassifikation der Todesursachen (Übergang von CIM-8 zu CIM-10)

© Bundesamt für Statistik (BFS)

Raymond Kohli, Sterblichkeit nach Todesursachen, 1998/2003

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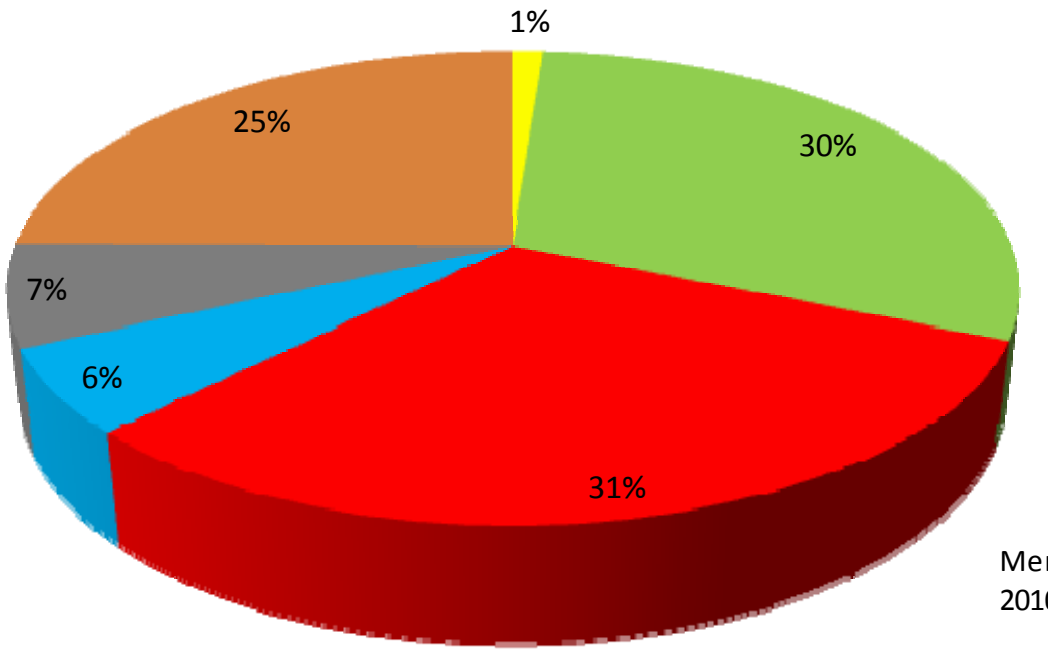
Proportion of causes of death: Age standardized death rates per 100,000, Switzerland



Men and Women
2010

Infectious
Cancer
Cardiovascular
Respiratory
Injury
Andere

Bundesamt für Statistik, 2010

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Cardiovascular disease (CVD)

Mortality

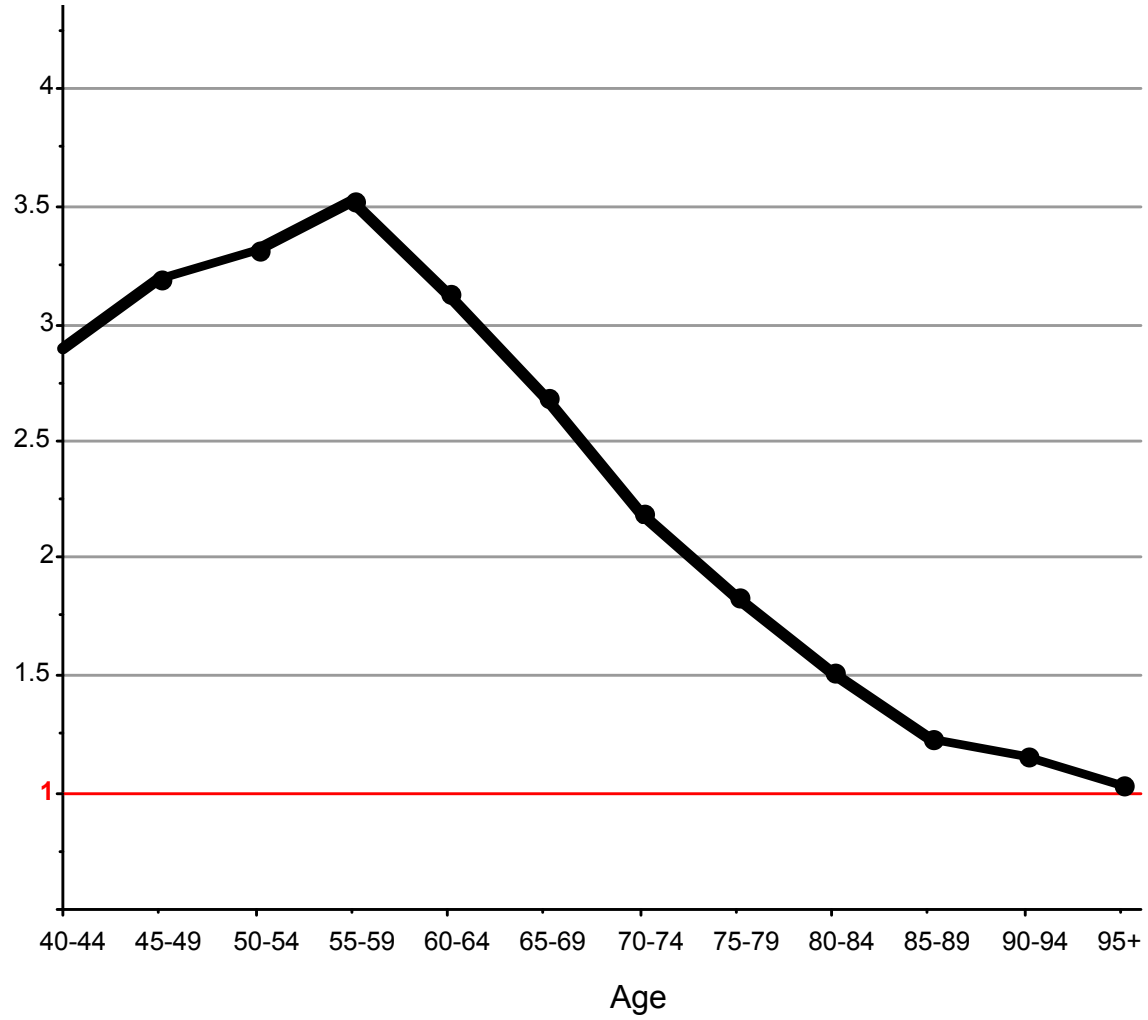
2010: 20´000 † (32% of all †);
IHD: 8´300 †;
Stroke: 3‘800 †
M>F
90% of deaths after age 65

Morbidity

60´000 cases / year of myocardial infarction, stroke and cardiac arrest;
135´000 Hospitalisationen wegen HKK (2008)

Swiss Heart Foundation, BFS

Sex-ratio (men vs. women) in CVD-mortality (Switzerland 2001-2005)



Datenquelle: Todesursachenstatistik (BFS)

mb 2007

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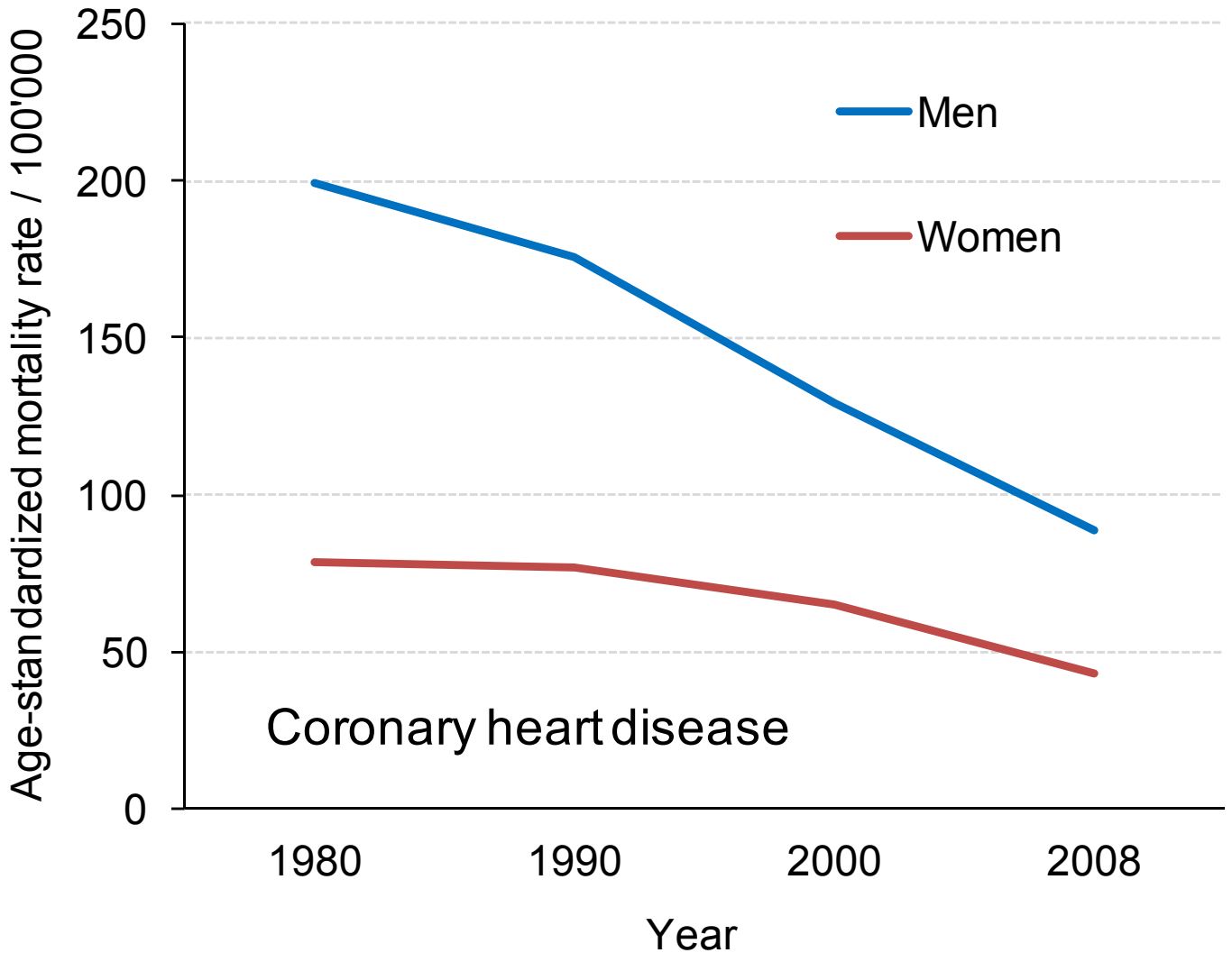
CHD mortality, Switzerland, 1980-2008



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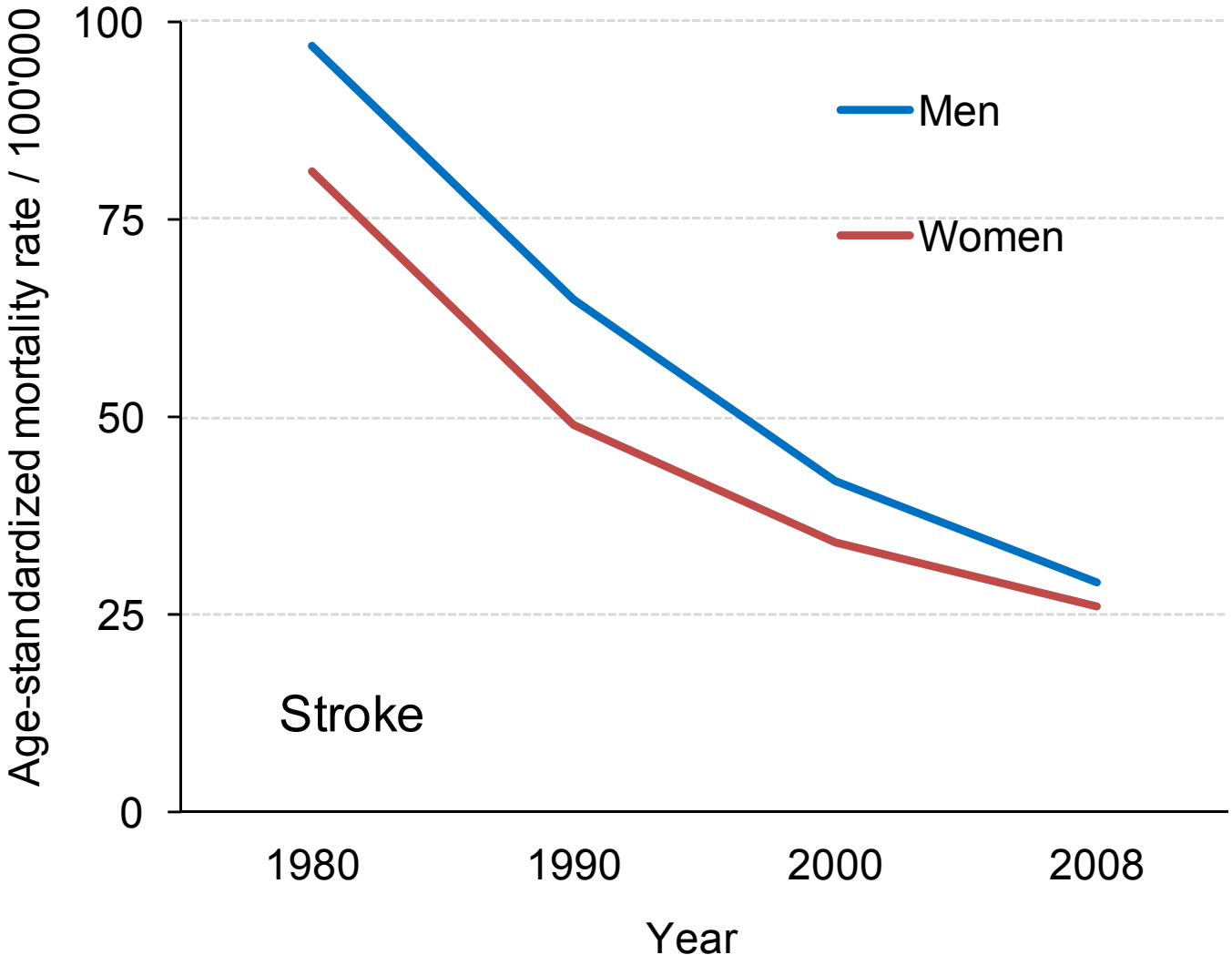
Stroke mortality, Switzerland, 1980-2008



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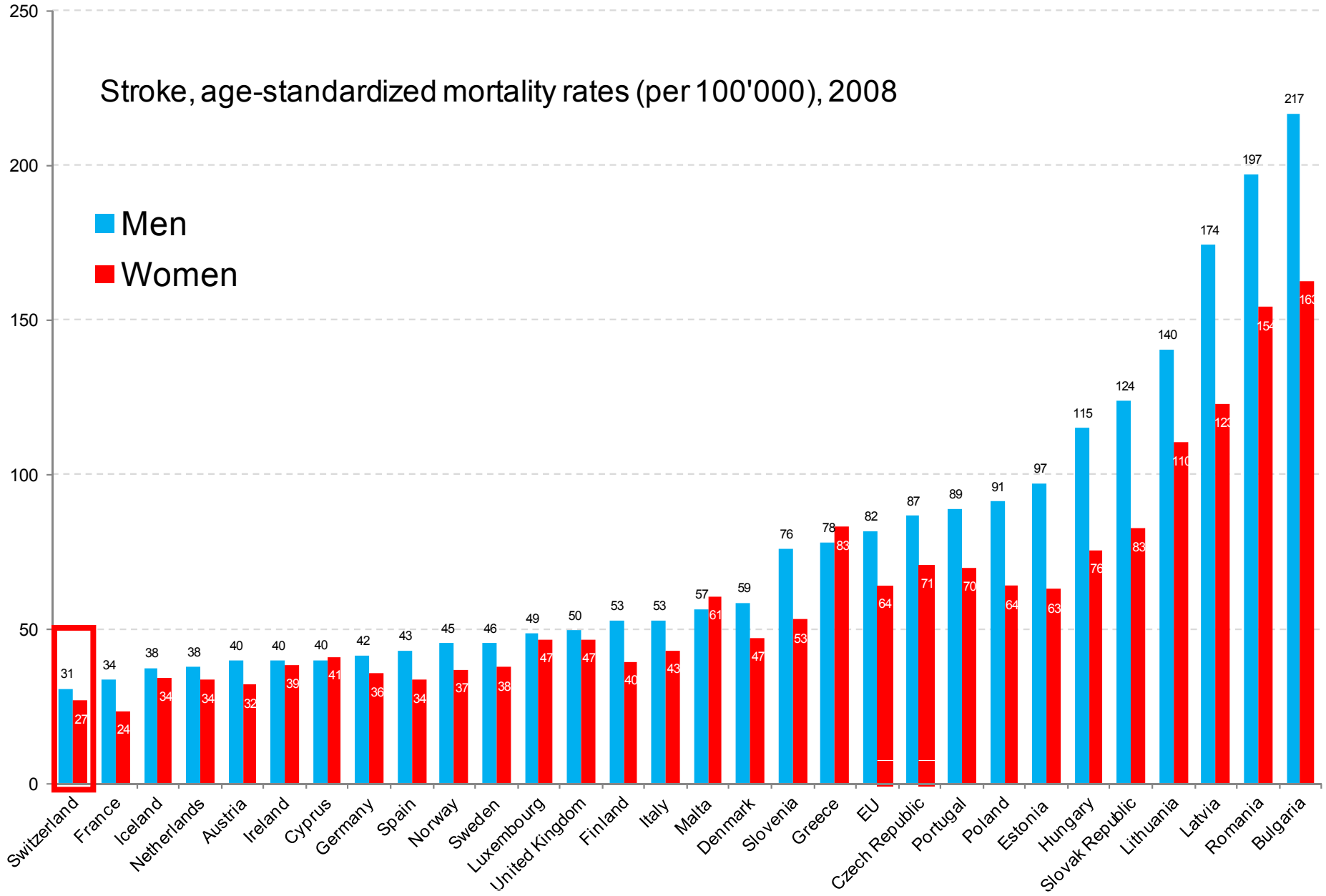

OECD Gesundheitsbericht, 2010

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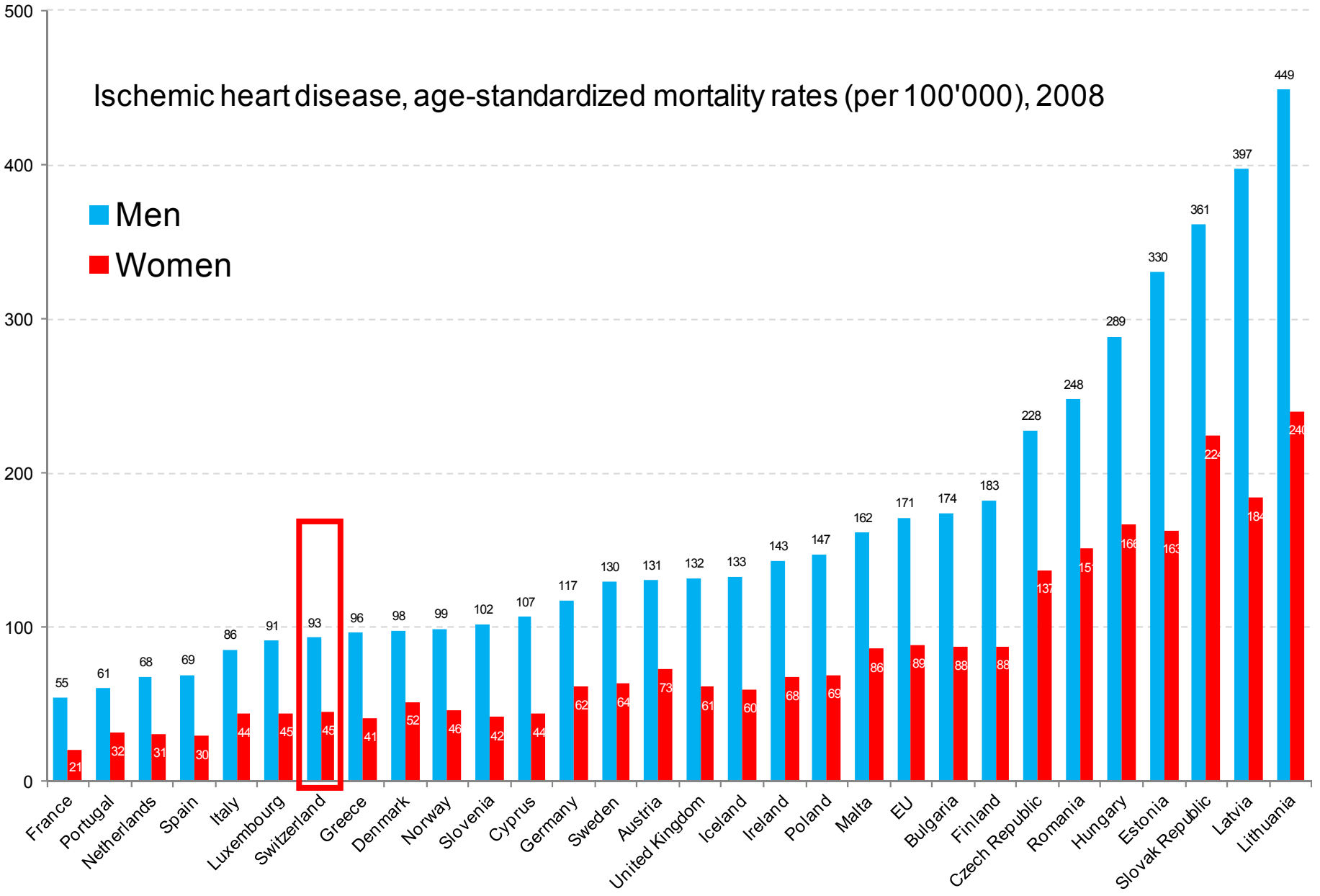

OECD Gesundheitsbericht, 2010

Institute of Social and Preventive Medicine
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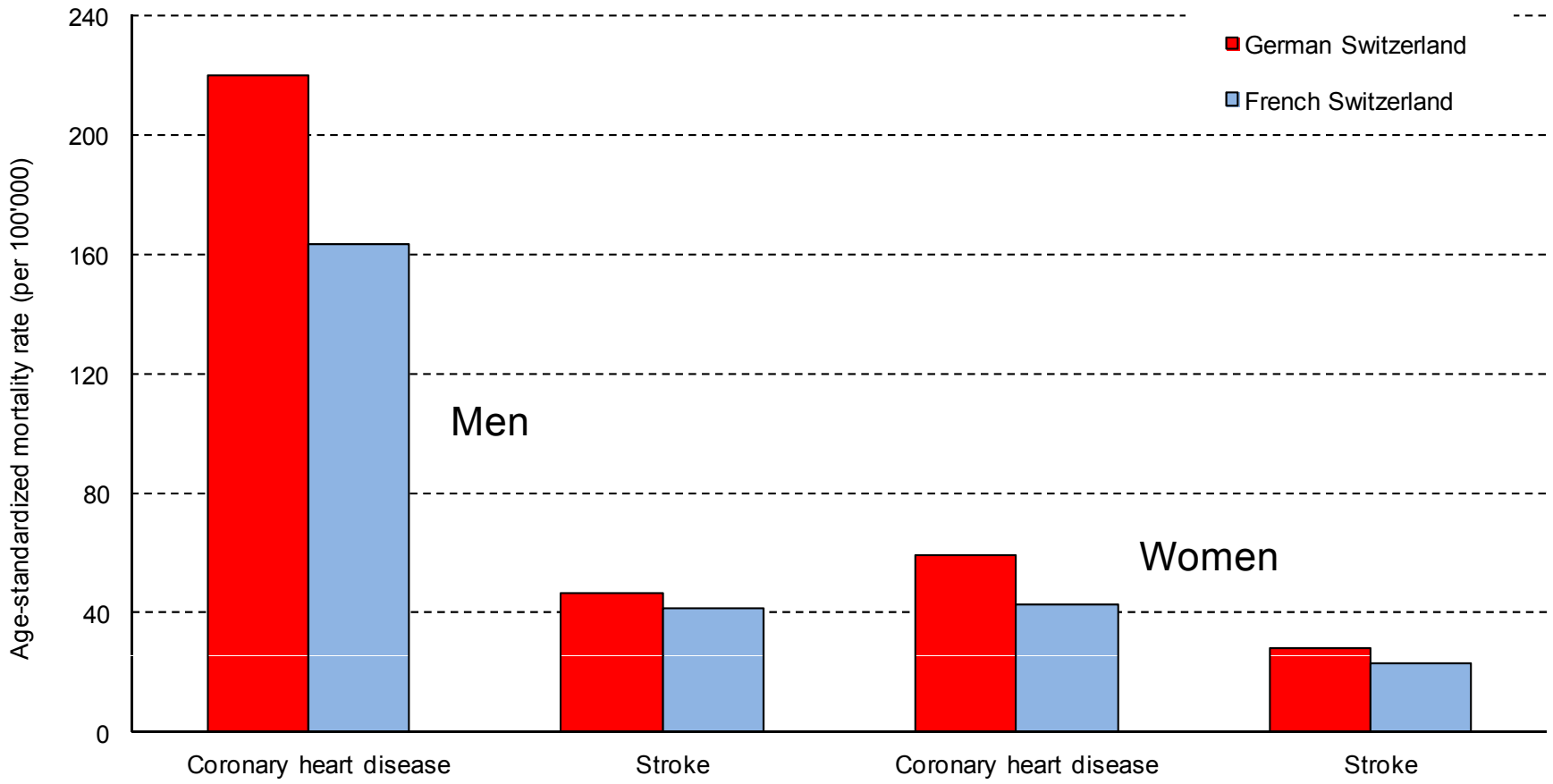

Faeh et al, JECH 2009 Aug;63(8):639-45

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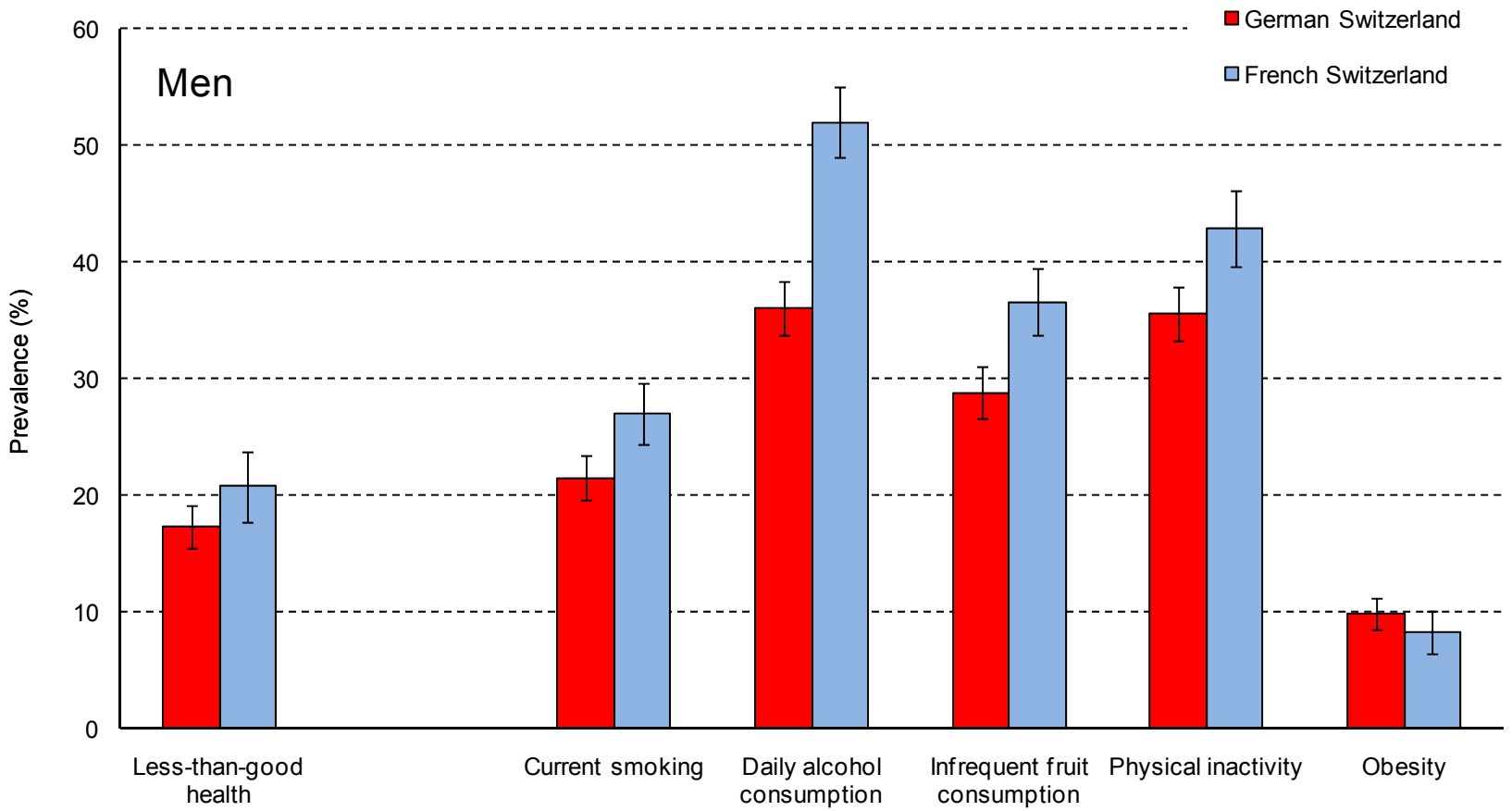

Data: Swiss Health Survey 1992/93

Faeh et al, JECH 2009 Aug;63(8):639-45

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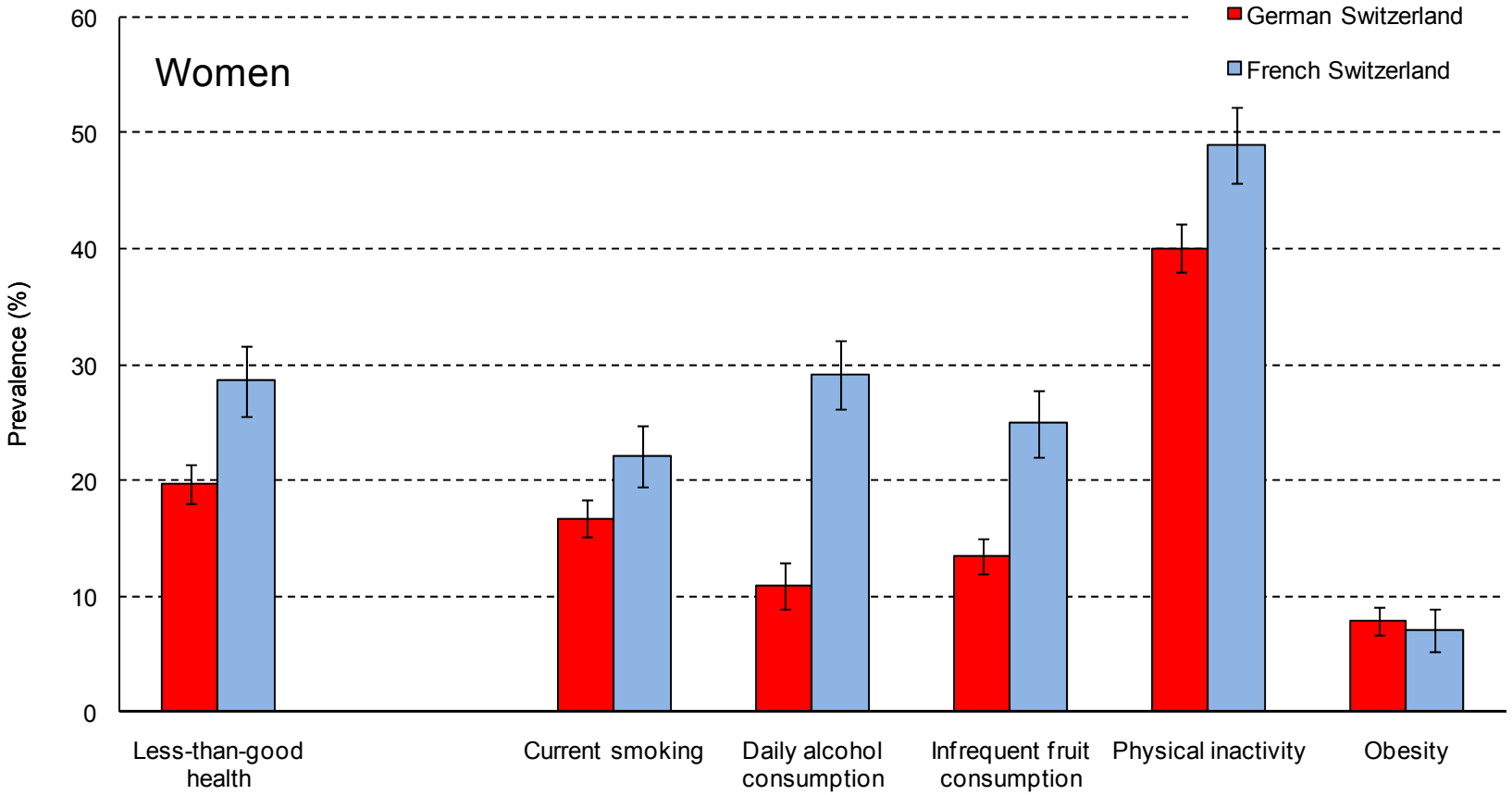

Data: Swiss Health Survey 1992/93

Faeh et al, JECH 2009 Aug;63(8):639-45

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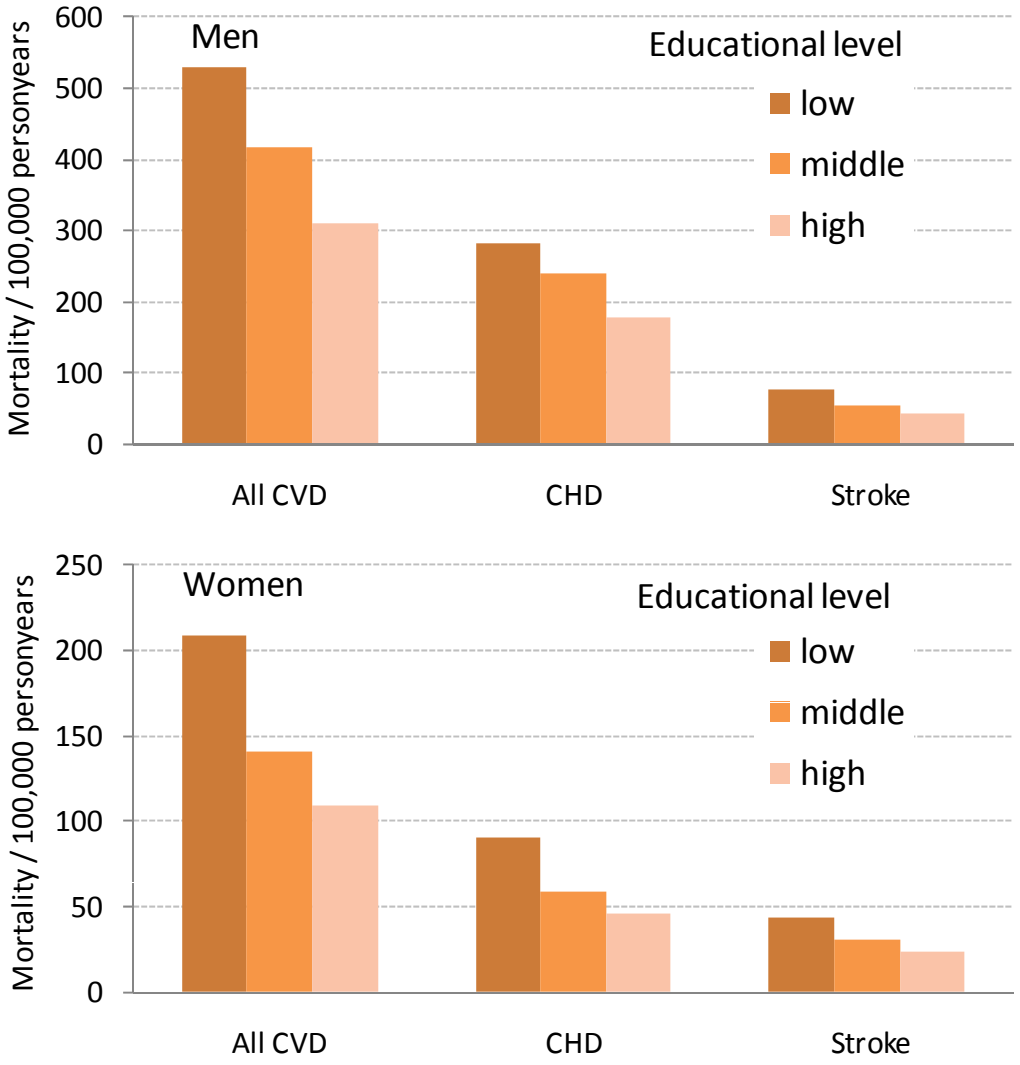
Educational inequality in German Switzerland



Data: Swiss National Cohort 2000

Faeh et al, BMC Public Health. 2010 Sep 22;10:567

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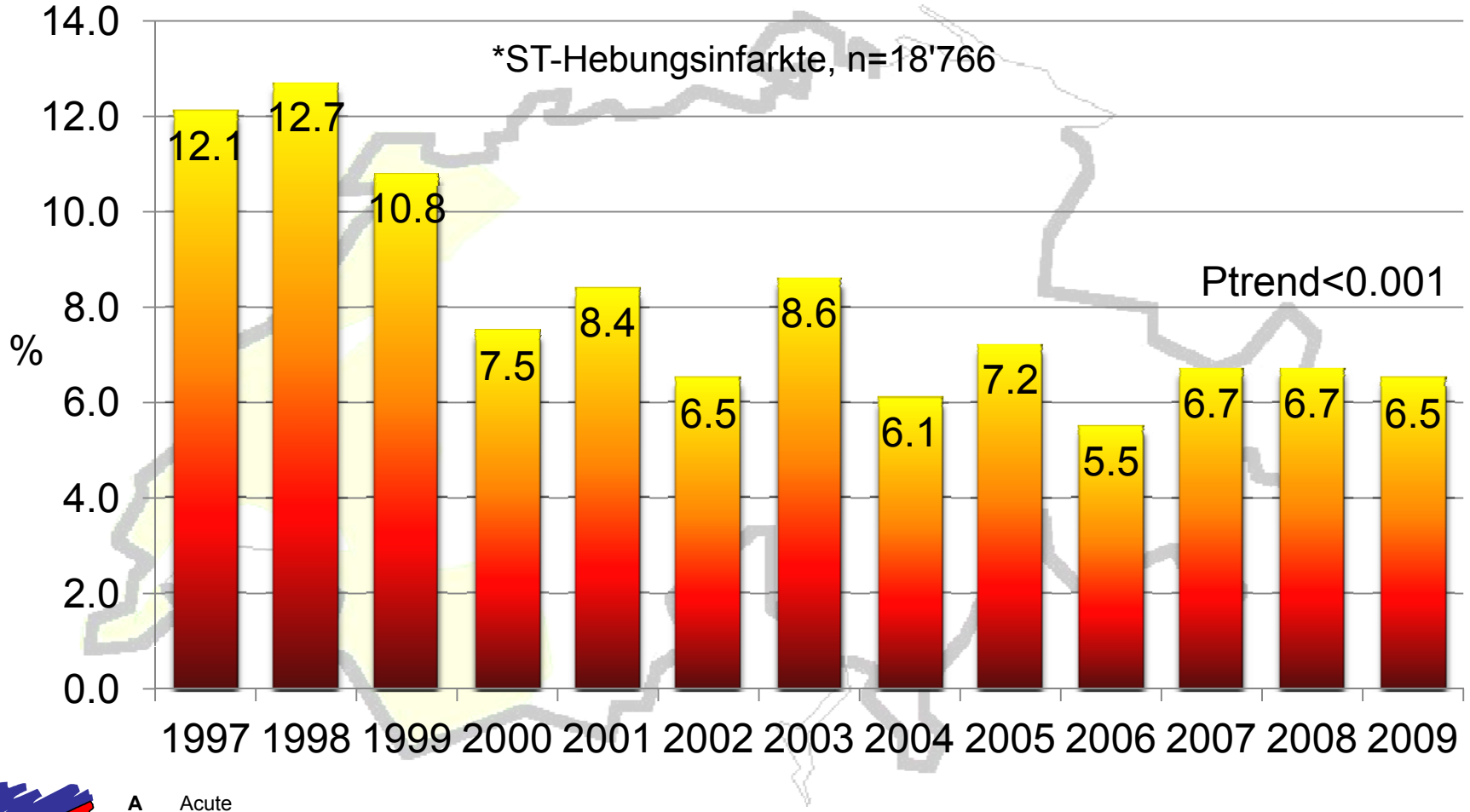
Lethality of myocardial infarction over the first 30 days after hospital admission*



A Acute
M Myocardial
I Infarction in
S Switzerland

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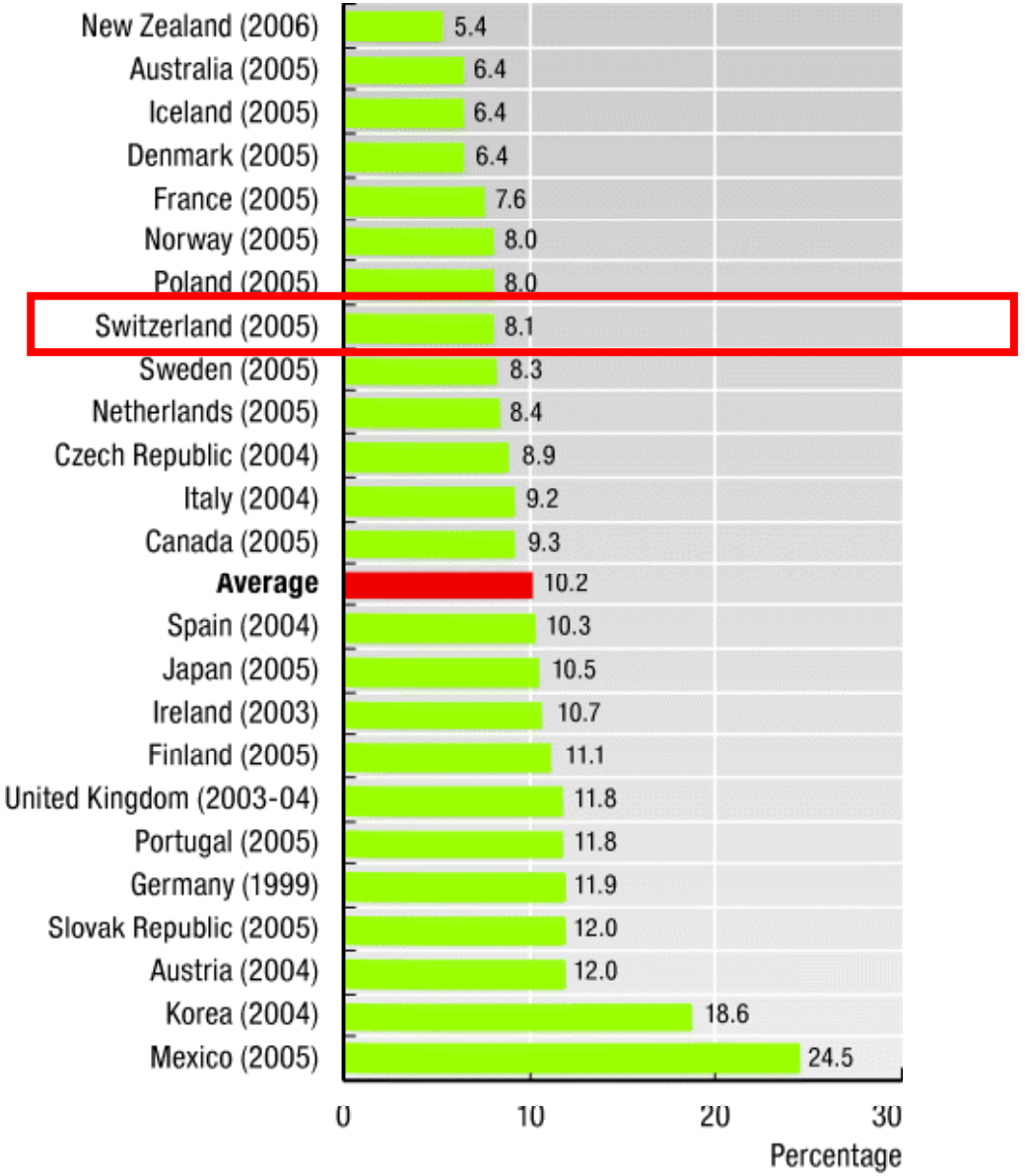
Hospital lethality of myocardial infarction over the first 30 days, 2005



OECD (http://lysander.Quelleoecd.org)

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Relationship morbidity, mortality, lethality

	Morbidity*	Mortality**	Lethality***
men	356	141	39.6%
Women	109	43	39.4%

*All myocardial infarction events (age standardized rates per 100´000)
**Mortal myocardial infarction events
***Mortality / Morbidity x 100

Source: MONICA/KORA-Herzinfarktregister, Augsburg 2001-2003

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Lethality of myocardial infarction (MI) & sudden cardiac death (SCD), 25-74 y

- **12%** die on the first day after hospitalisation
  (= 29% of all death cases)

- **5.5%** die on day 2 - 28 after hospitalisation
  (= 12% of all death cases)

- **24%** die, before they could be hospitalized
  (= 59% of all death cases)

Source: MONICA/KORA-Herzinfarktregister Augsburg 2001-2003

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Sudden cardiac deaths (SCD) vs. surviving (24h) myocardial infarction (MI)-patients (25–74y)

Known disease	SCD	MI
High blood pressure	65%	65%
High cholesterol levels	40%	60%
Diabetes	35%	30%
Coronary heart disease	65%	30%
None	25%	25%

Source: Dtsch Med Wochenschr 127(44): 2311-6

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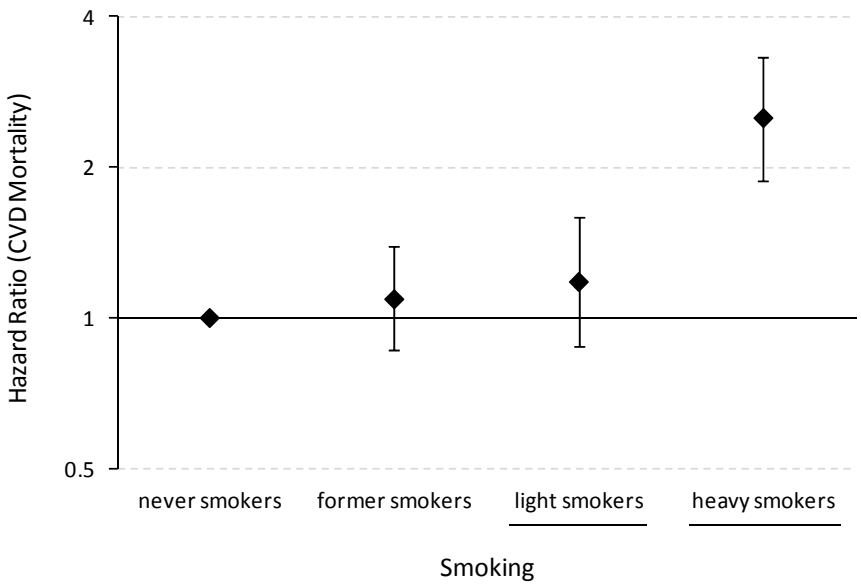

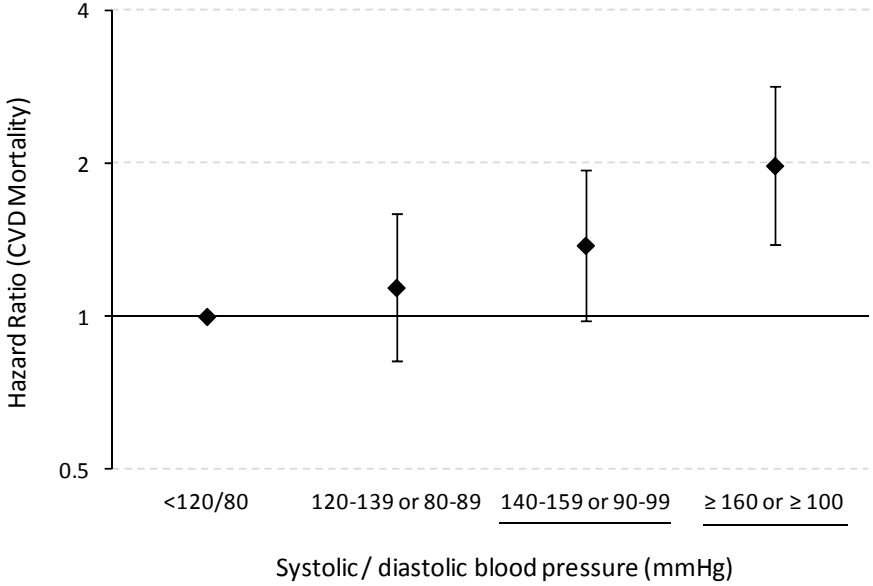

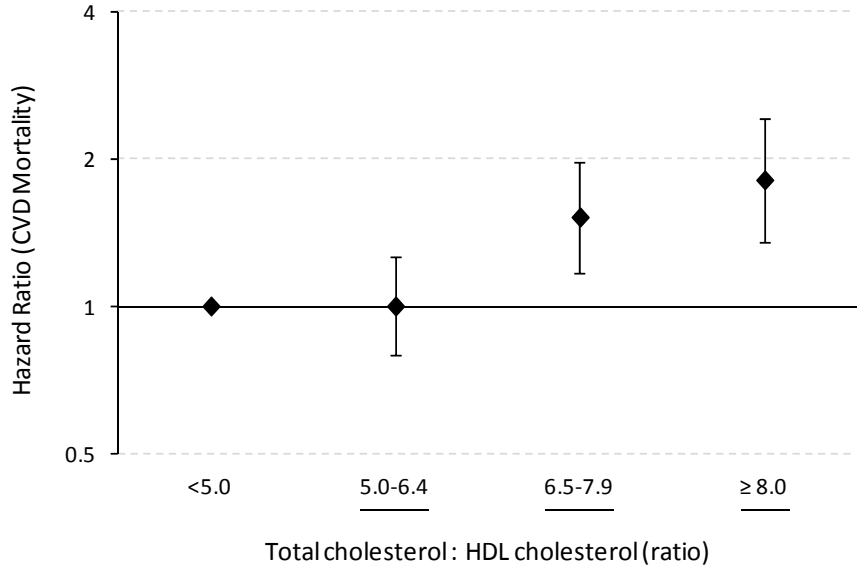

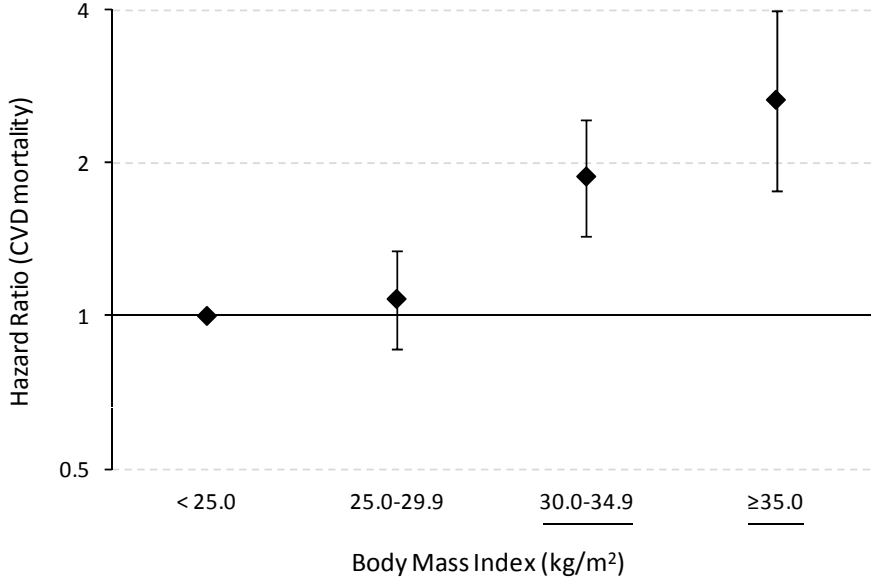

Faeh, Eur J Cardiovasc Prev Rehabil. 2011 Nov 11.

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Risk factors

- Smoking
- Obesity
- Hypertension
- Dyslipidemia
- Diabetes
- Combination of risk factors

World Health Organization WHO, http://www.who.int

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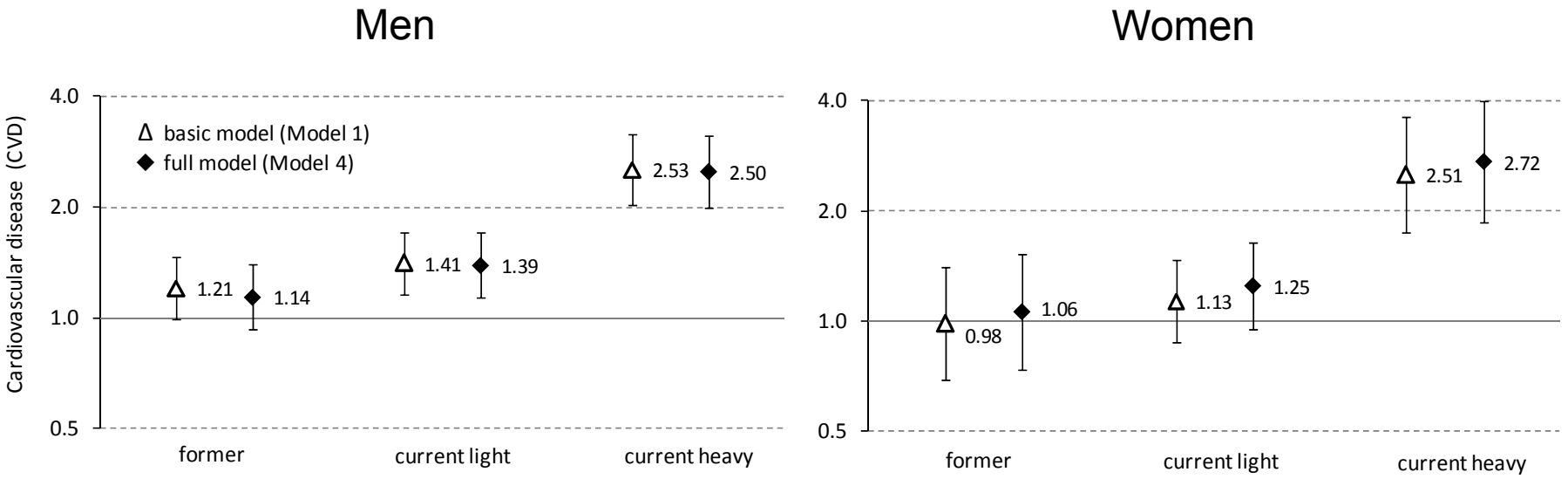
Risk of (former) smokers vs. neversmokers, Switzerland



Maag, J. et al, Nicotine Tob Res. 2013 Sep;15(9):1588-97

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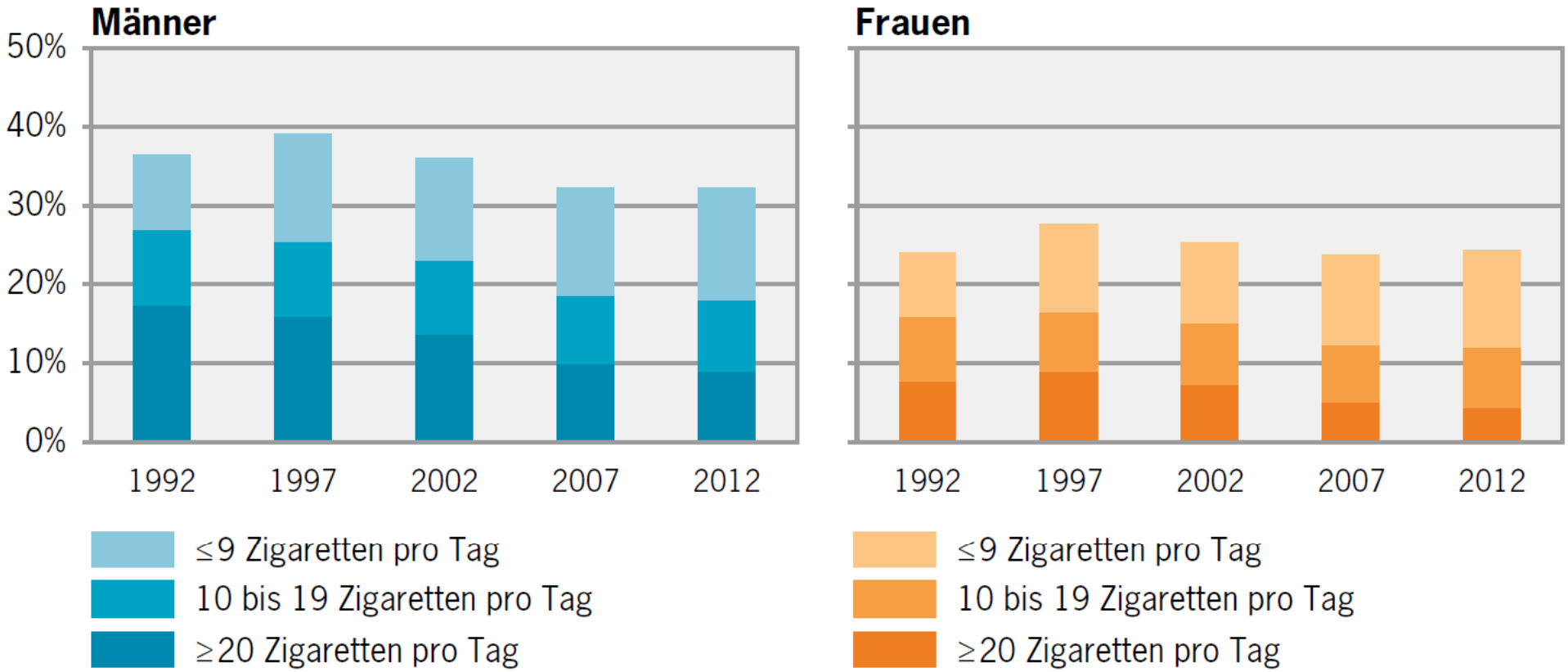
Anzahl gerauchter Zigaretten pro Tag, 1992–2012 G 20



Quelle: SGB

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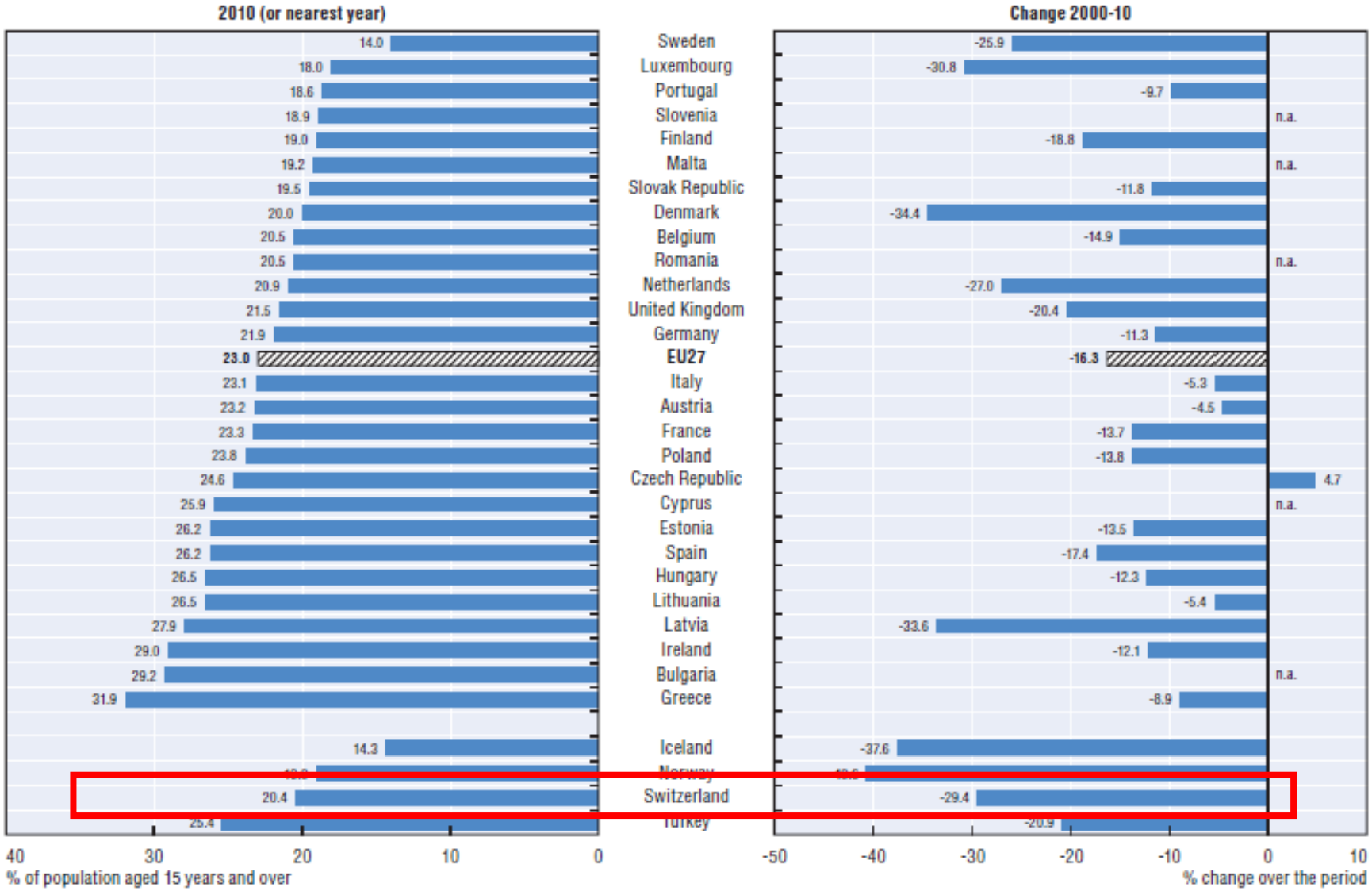
2.5.1. Adult population smoking daily, 2010 and change in smoking rates, 2000-10 (or nearest year)



Source: OECD Health Data 2012; Eurostat Statistics Database; WHO Global Infobase.

OECD Health Data 2010; Eurostat Statistics Database

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Risk factors

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- Diabetes
- Combination of risk factors

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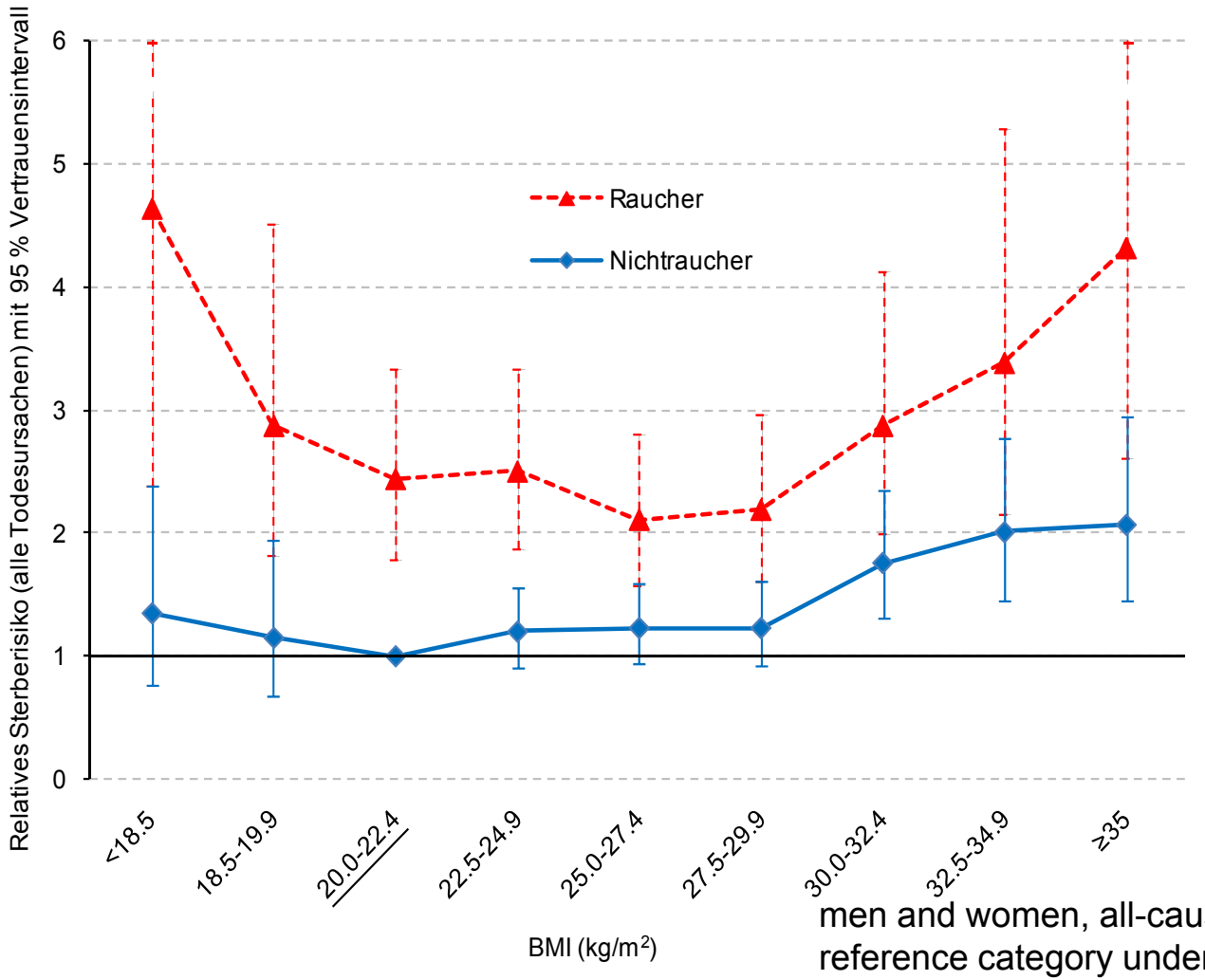
Body mass index, risk, Switzerland



MONICA: Multinational MONItoring of trends and determinants in CArdiovascular disease, Switzerland, 1983-1992

men and women, all-cause mortality, reference category underlined

Faeh, et al, Eur J Epidemiol. 2011 Aug;26(8):647-55

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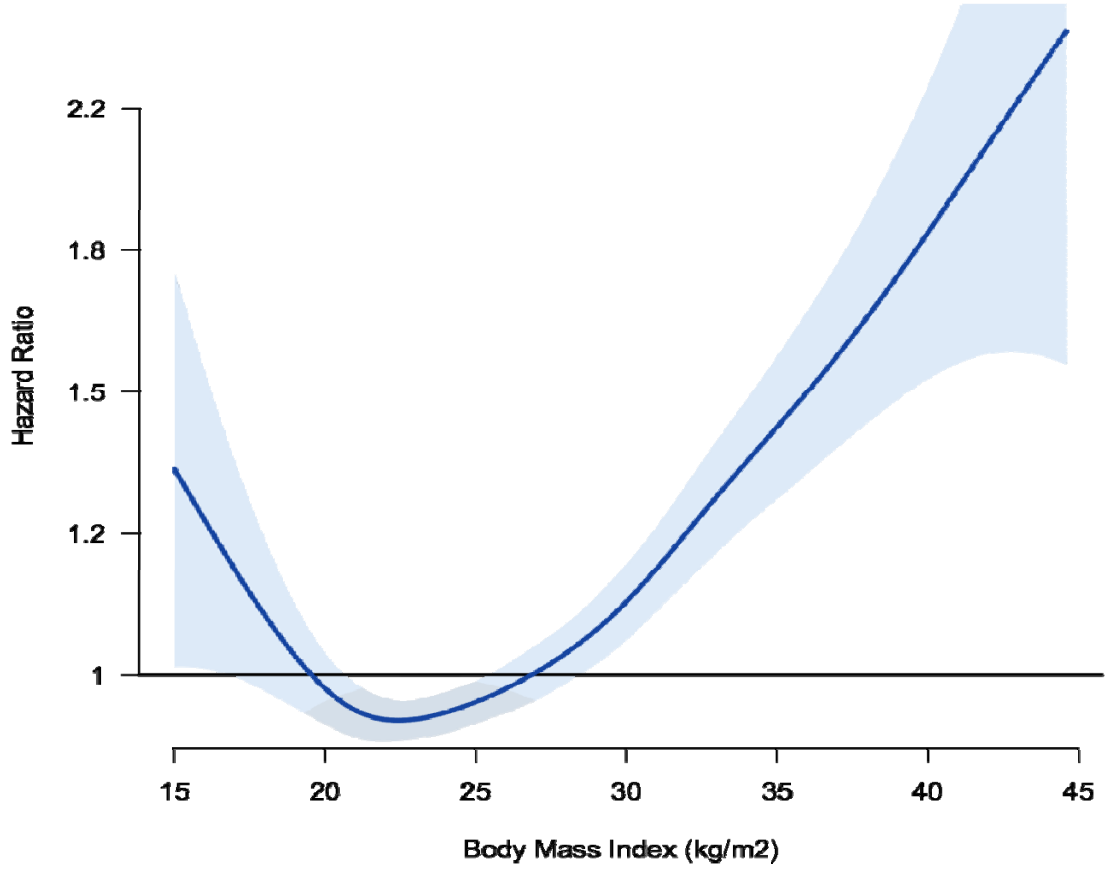
Body mass index and all-cause mortality in 40‘000 study participants, Switzerland



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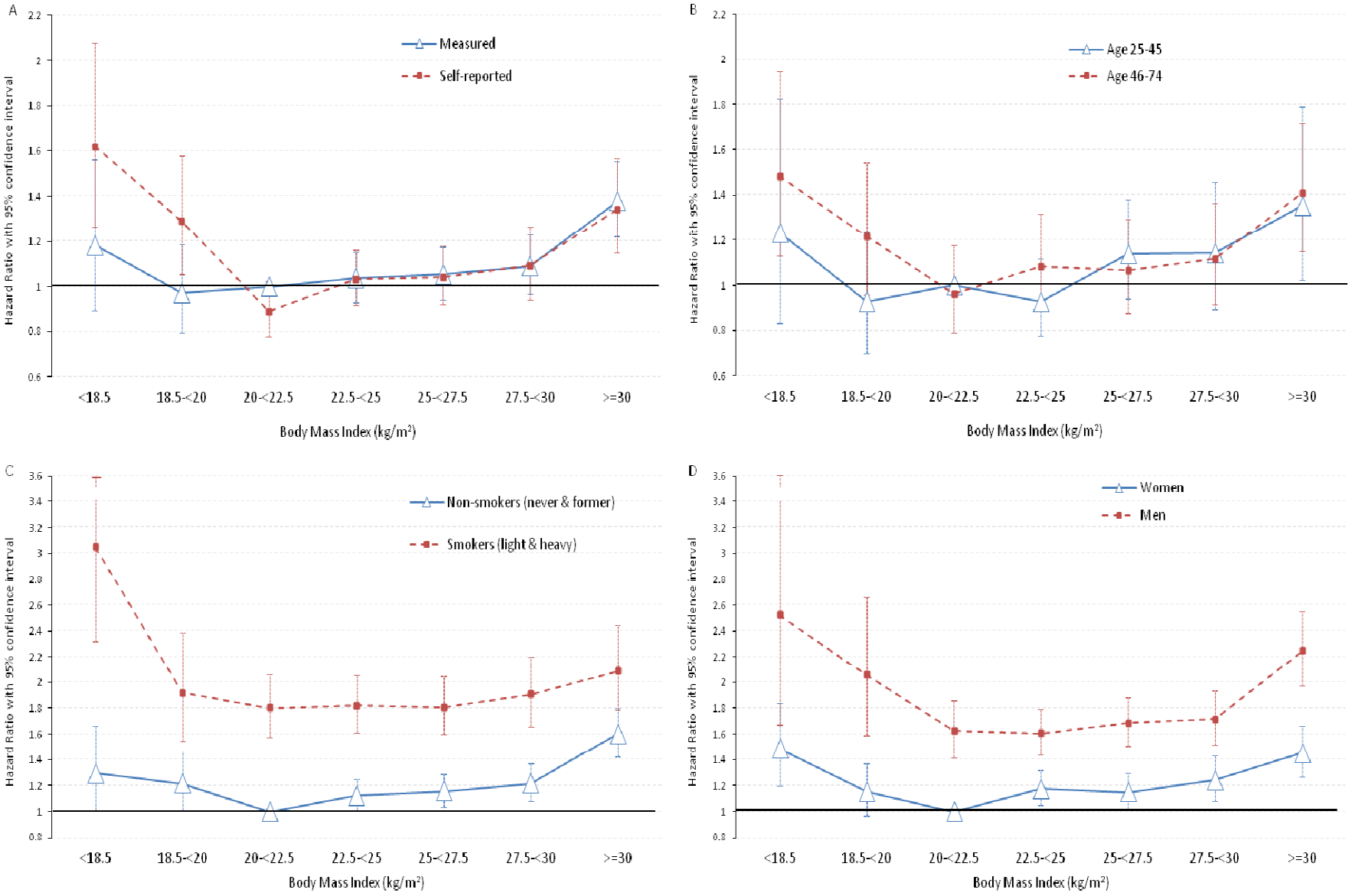
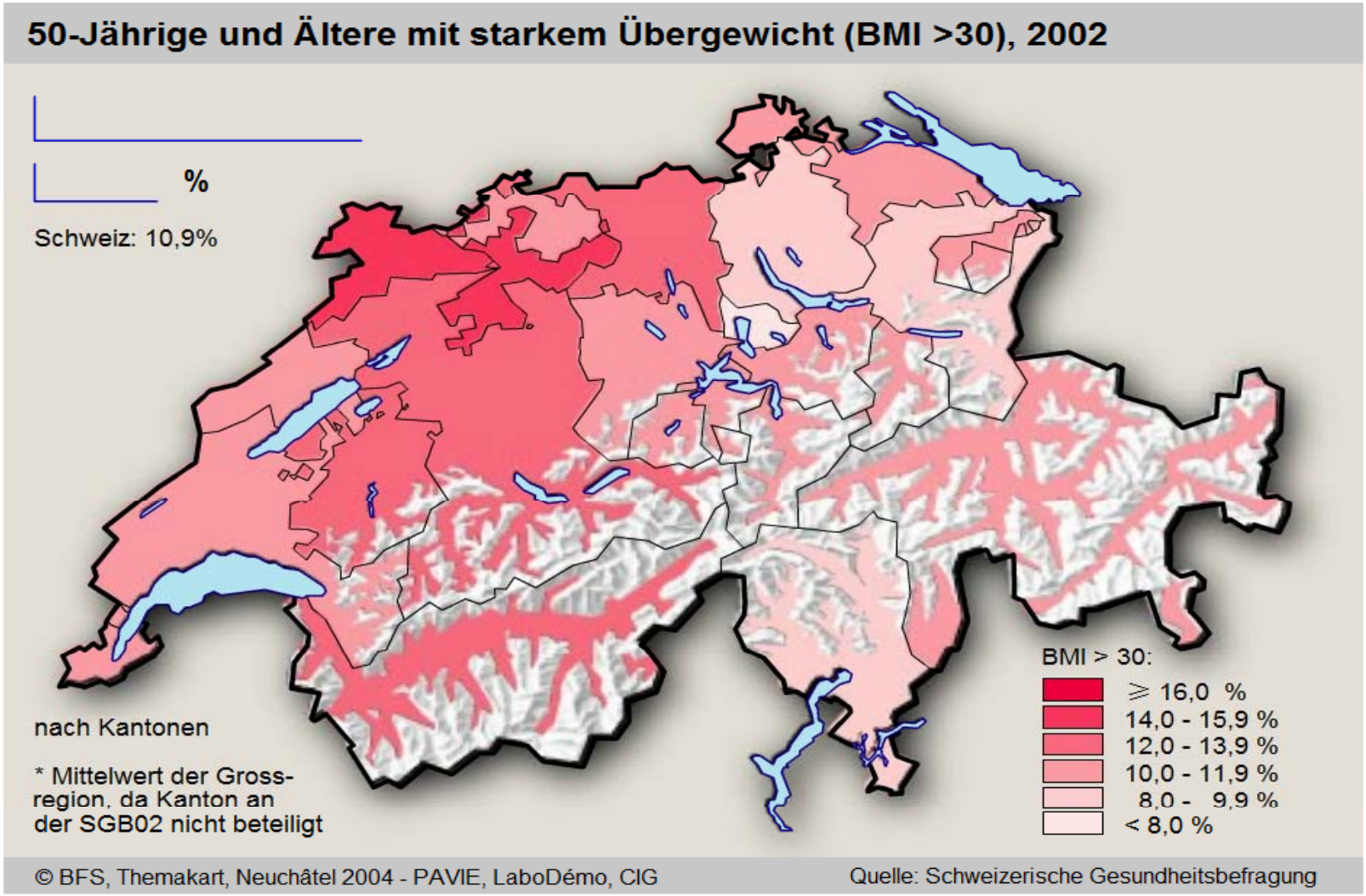
Body mass index and all-cause mortality stratified by other categories





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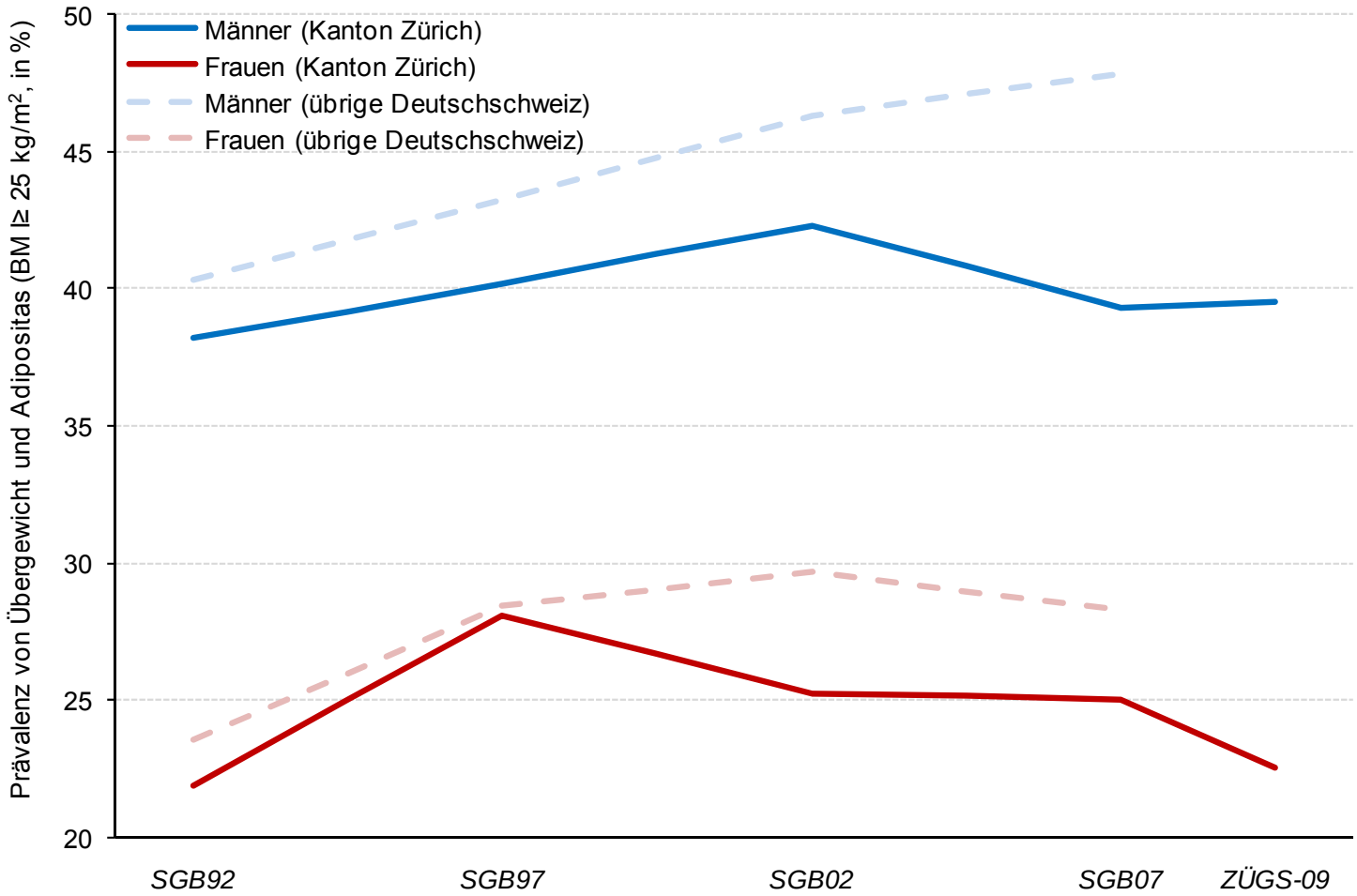
Prevalence of overweight + obesity, canton of Zurich vs. rest of German Switzerland



Self-reported height and weight, 1992-2009, 18-74 years

Faeh, et. al, SMW 2010;140:w13090

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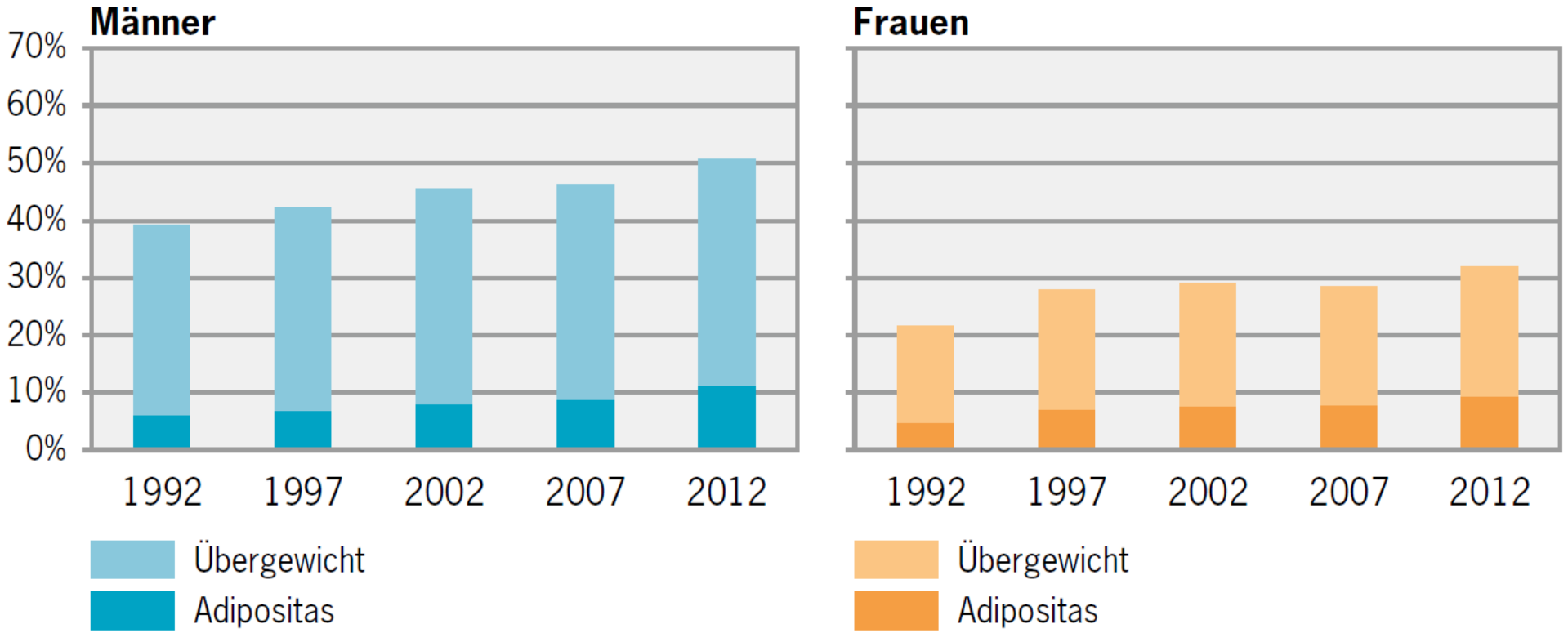
Übergewicht und Adipositas, 1992–2012 G 5



Quelle: SGB

© Bundesamt für Statistik (BFS)

Self-reported height and weight

BFS, Swiss Health Survey 2012

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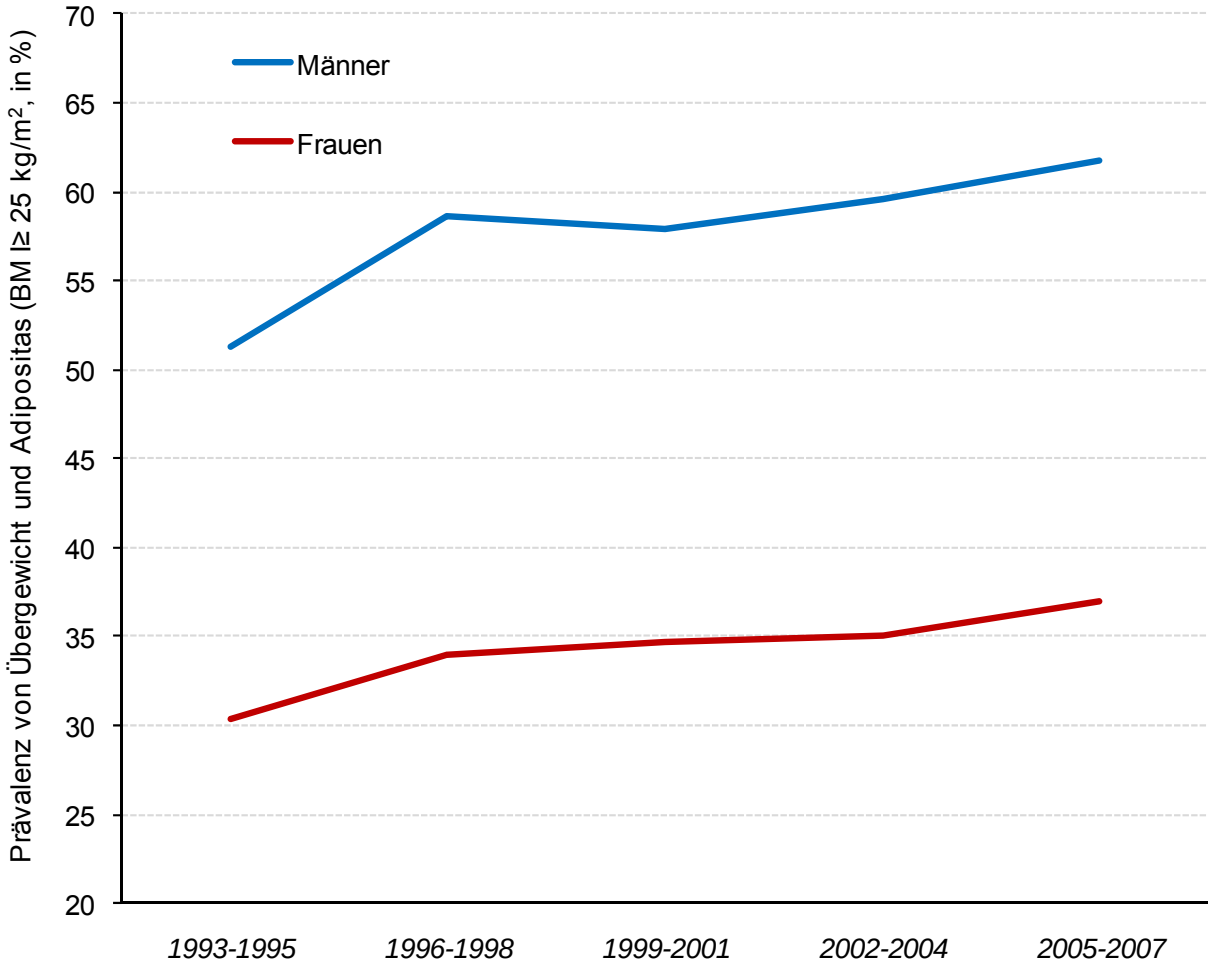
Prevalence of overweight + obesity, canton of Geneva



Height and weight measured, 1993-2007, 35-74 years

Gaspoz et al, BAG, 2009

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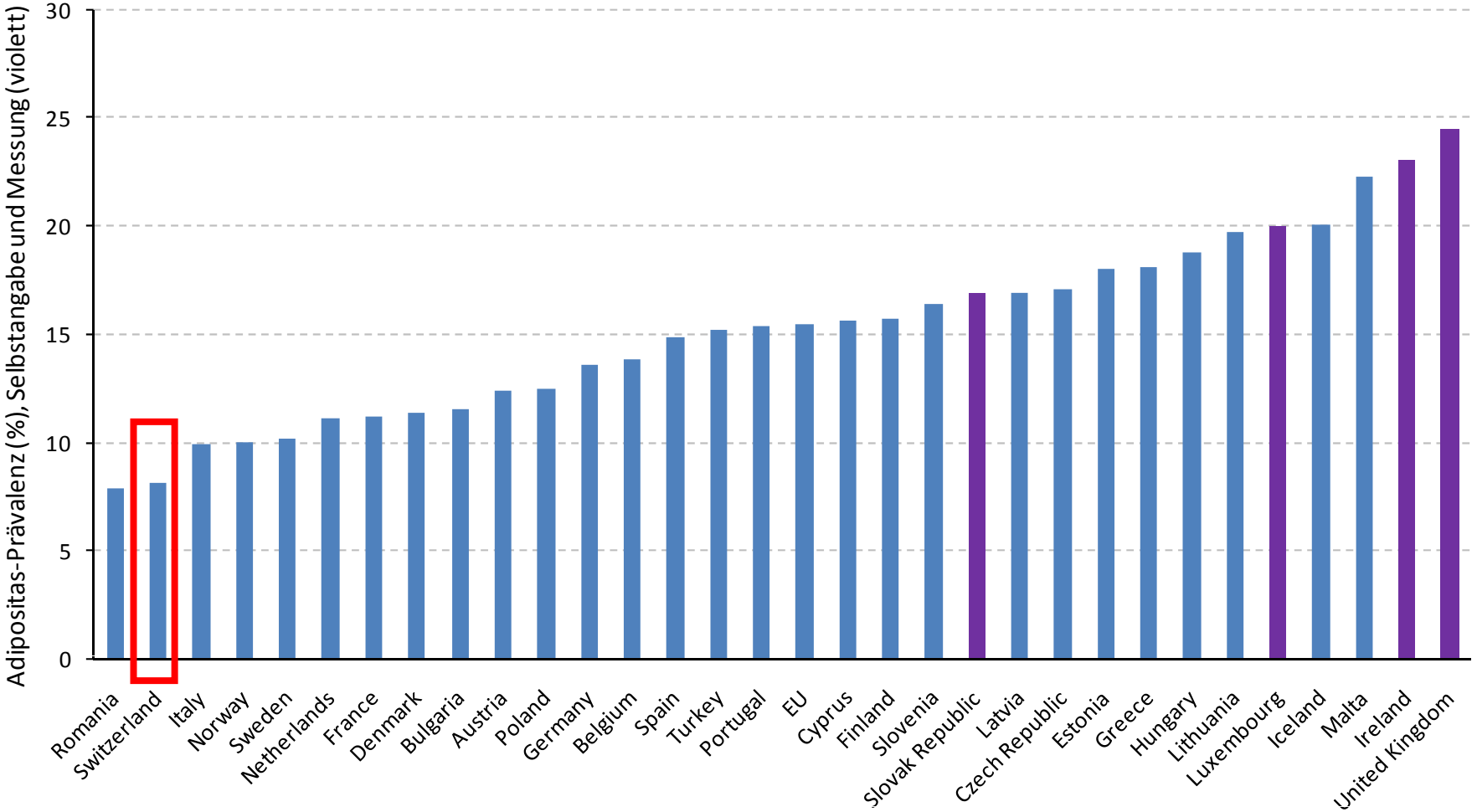
Prevalence of obesity, adults (>15J), 2008



OECD Gesundheitsbericht, 2010

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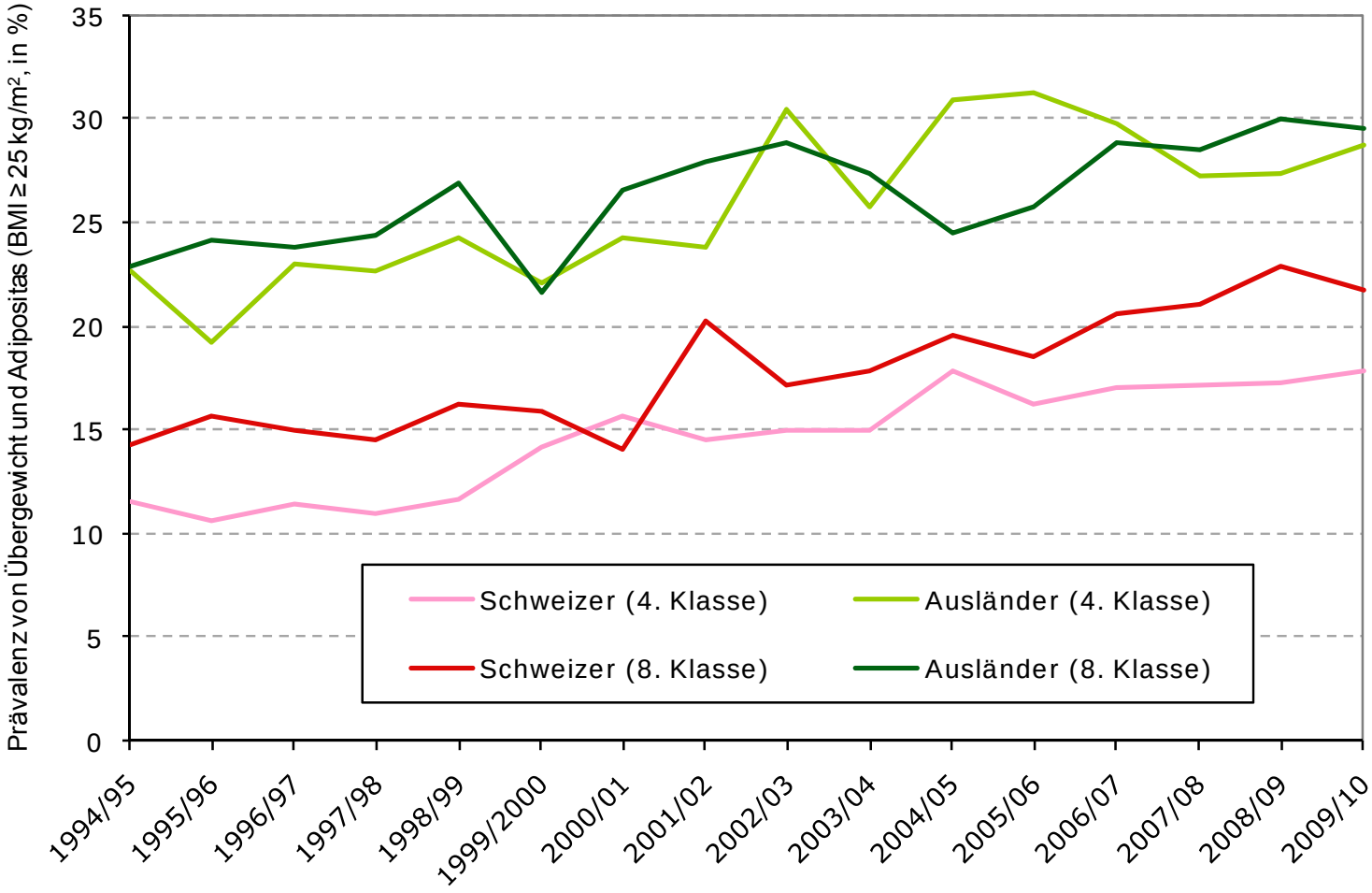
Prevalence of overweight + obesity, students, by nationality, city of Zurich



Boys and girls, measured height and weight

Stronski-Huwiler, et. al. Übergewichtsbericht, Kanton Zürich, 2011

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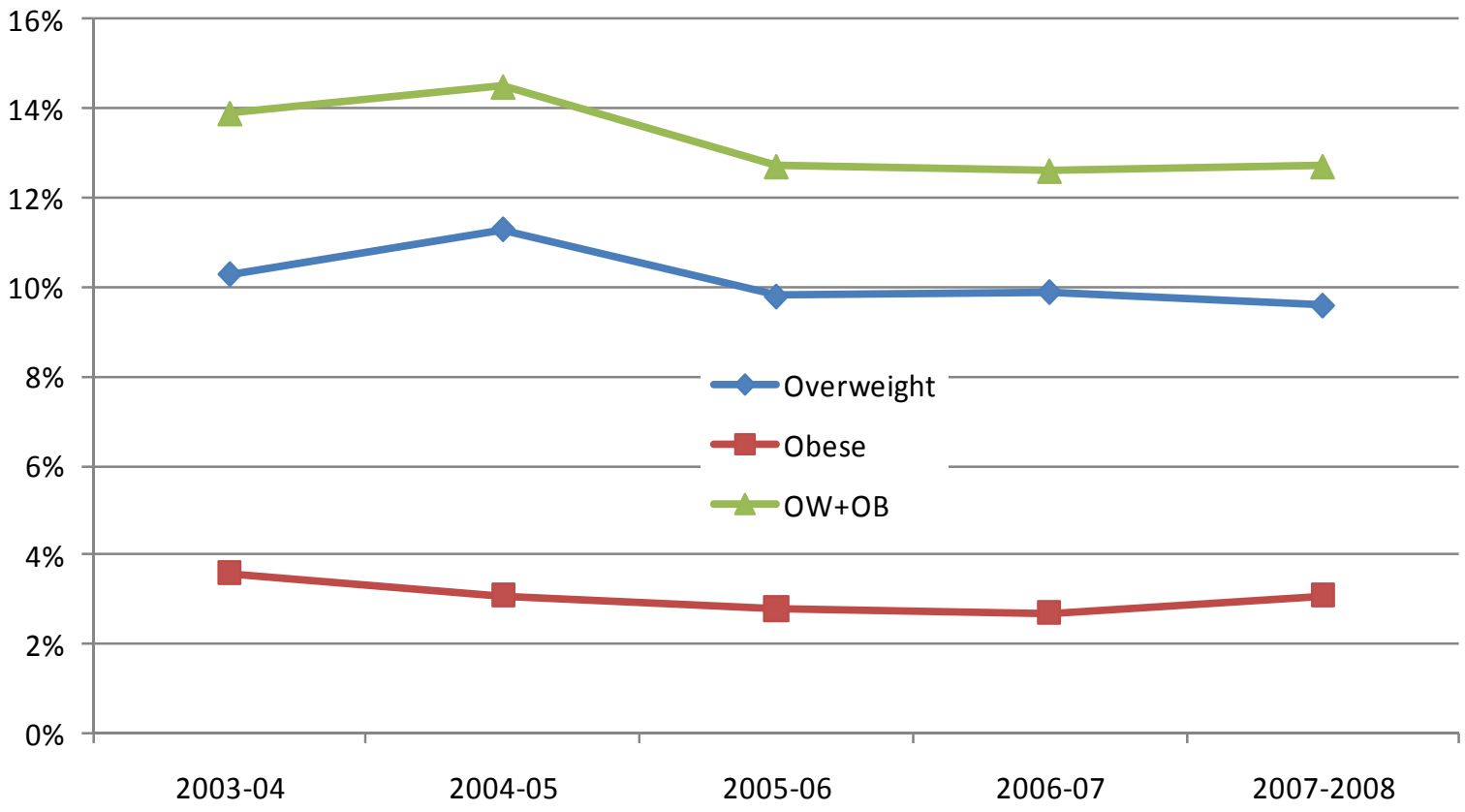
Prevalence of overweight + obesity, children, canton of Geneva



Boys and girls aged 5-6, measured height and weight, 2003-08

Jeannot et al, SMW. 2010 Jul 22;140:w13040

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risk factors

- Smoking
- Obesity
- Hypertension
- Dyslipidemia
- Diabetes
- Combination of risk factors

World Health Organization WHO, http://www.who.int

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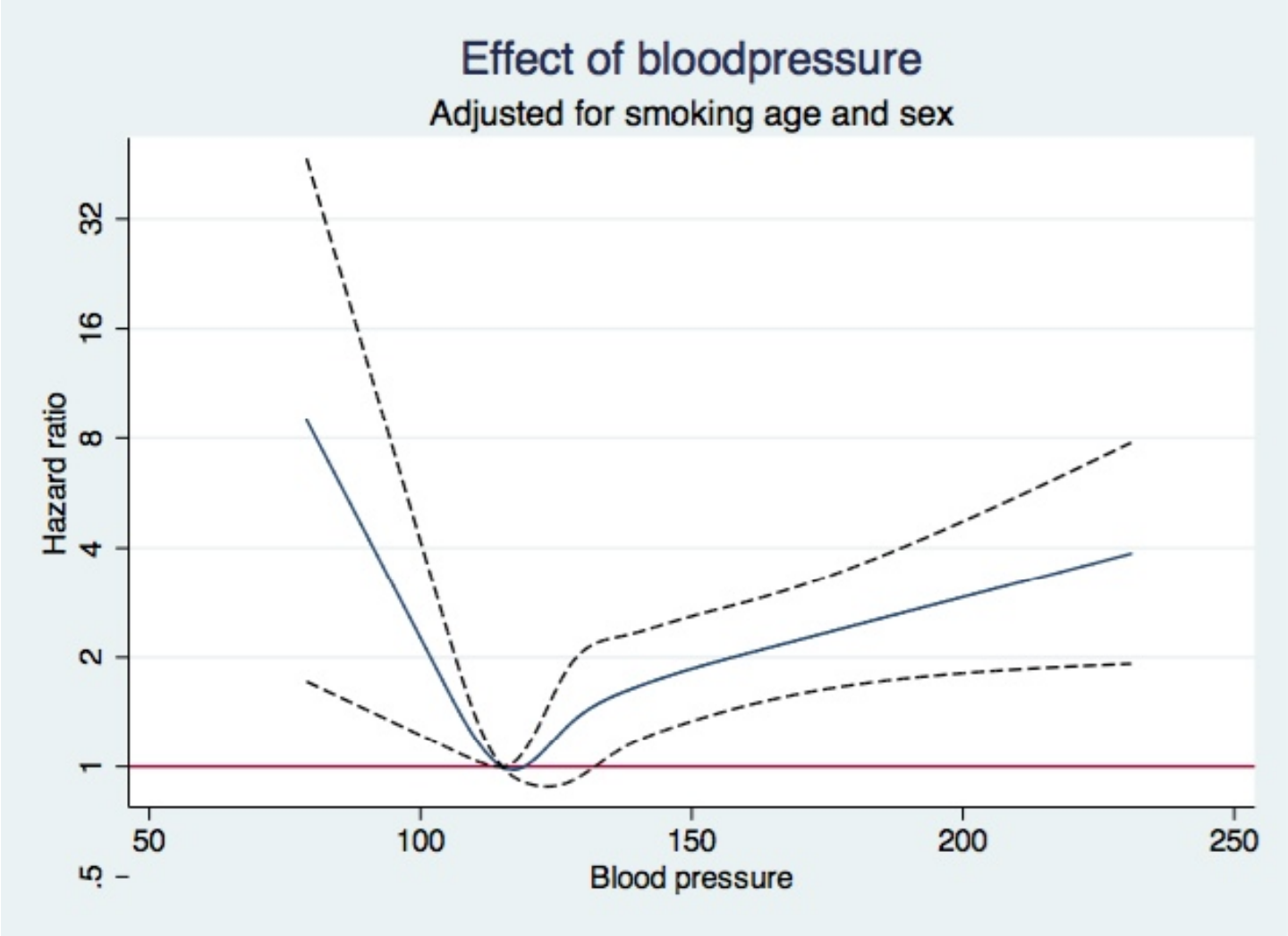
Systolic BP and CVD mortality based on 10‘000 participants of the Swiss MONICA



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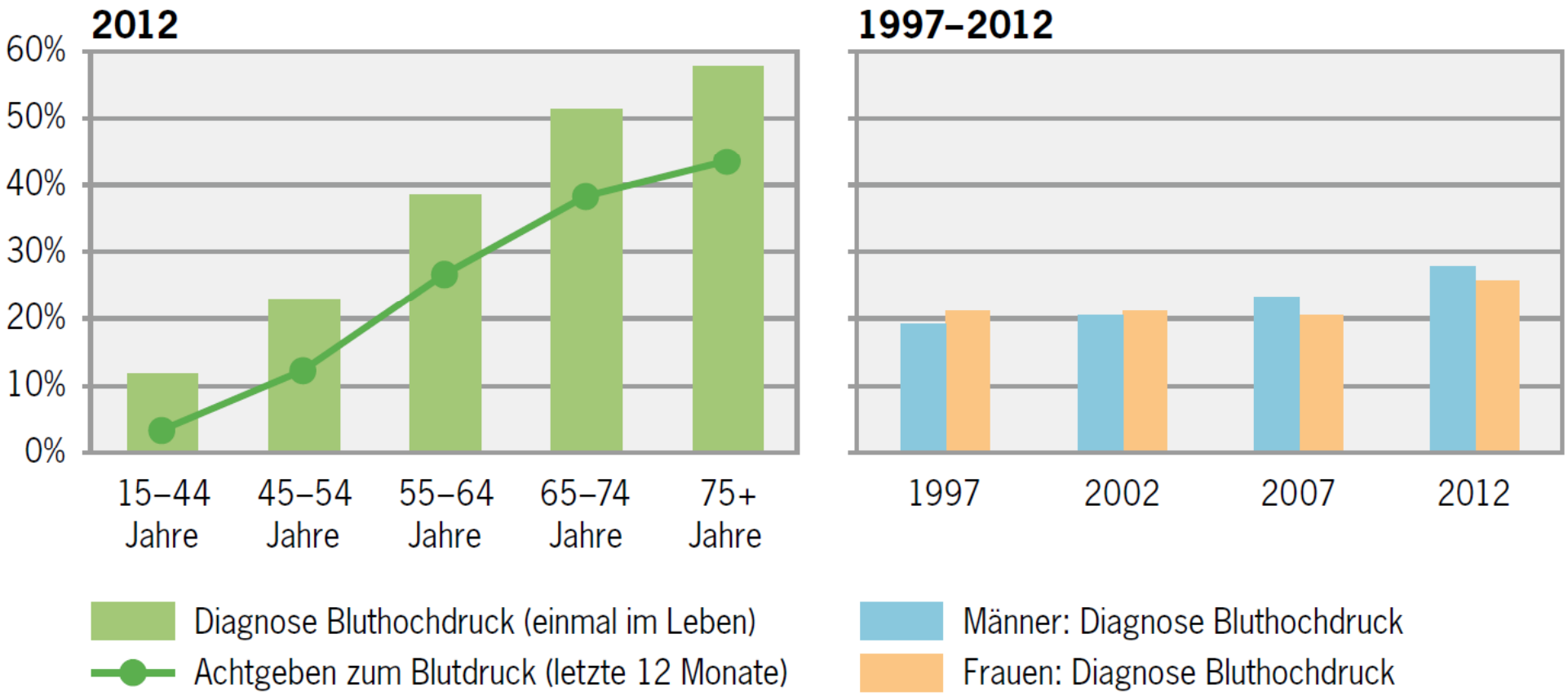
Bluthochdruck

G 6



Quelle: SGB

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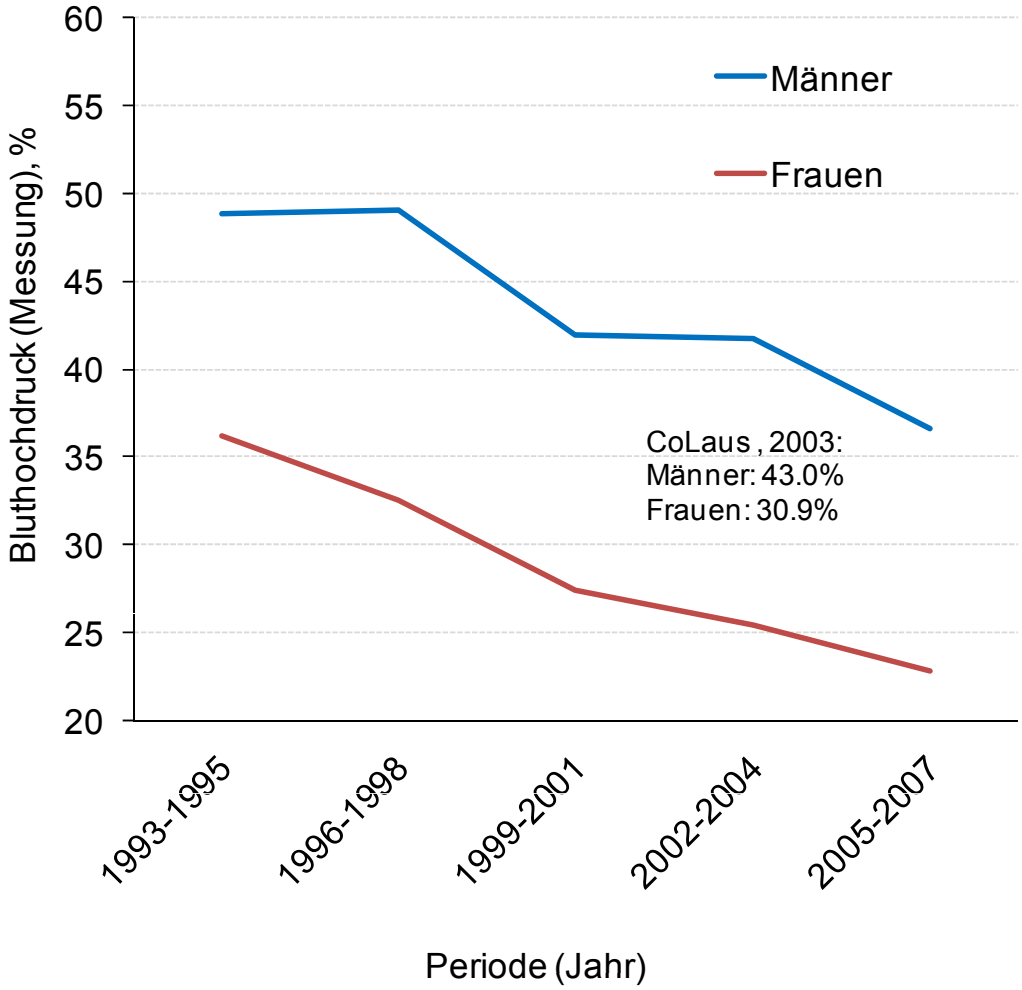
Prevalence of hypertension (measurement), trend, canton of Geneva



BusSanté, Gaspoz et al, BAG, 2009, 35-74J

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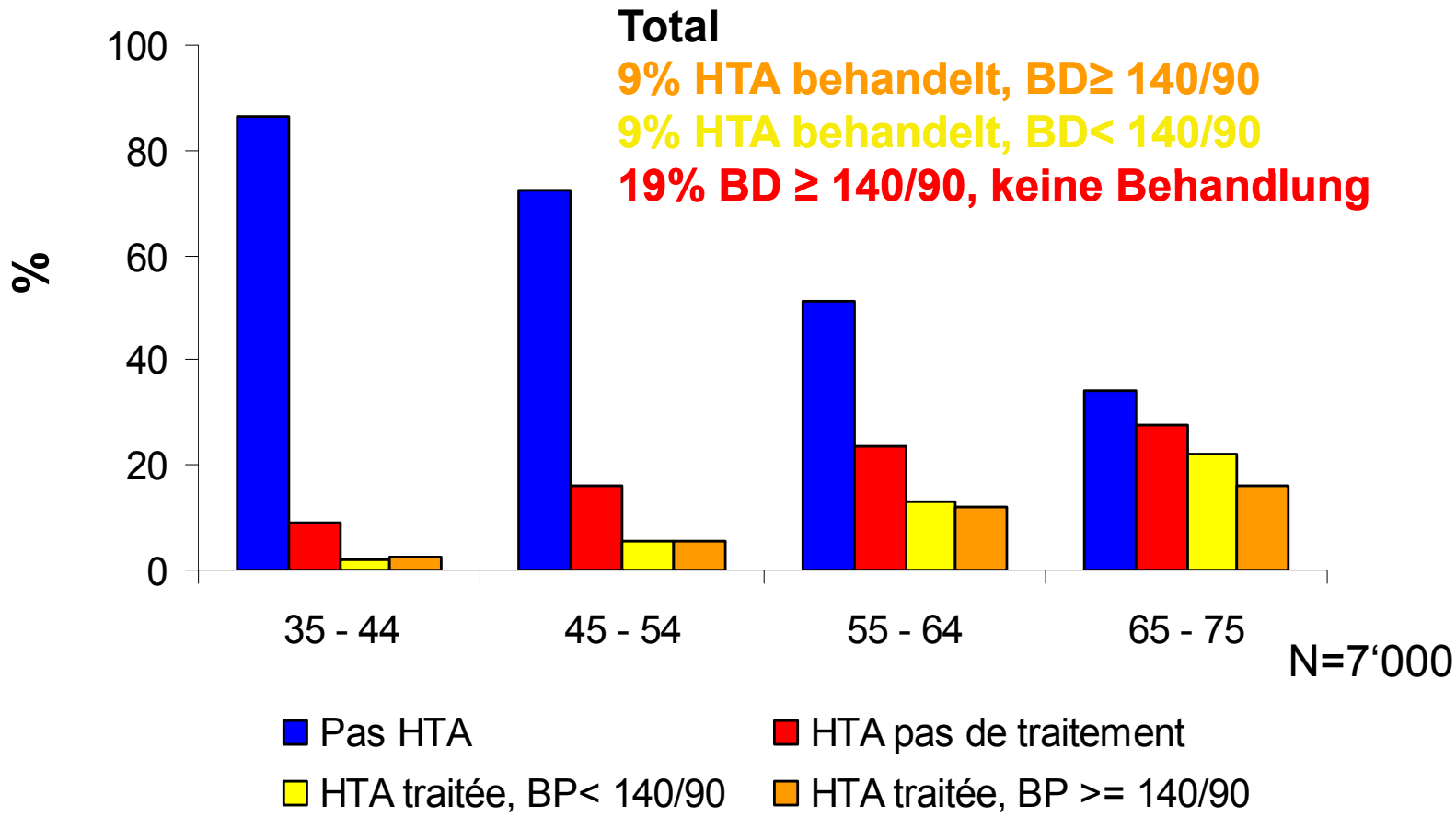
Prevalence of hypertension by age, Lausanne 2003



Vollenweider et al. Rev. Med. Suisse; 2: 2528-33

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Risk factors

- Smoking
- Obesity
- Hypertension
- Dyslipidemia
- Diabetes
- Combination of risk factors

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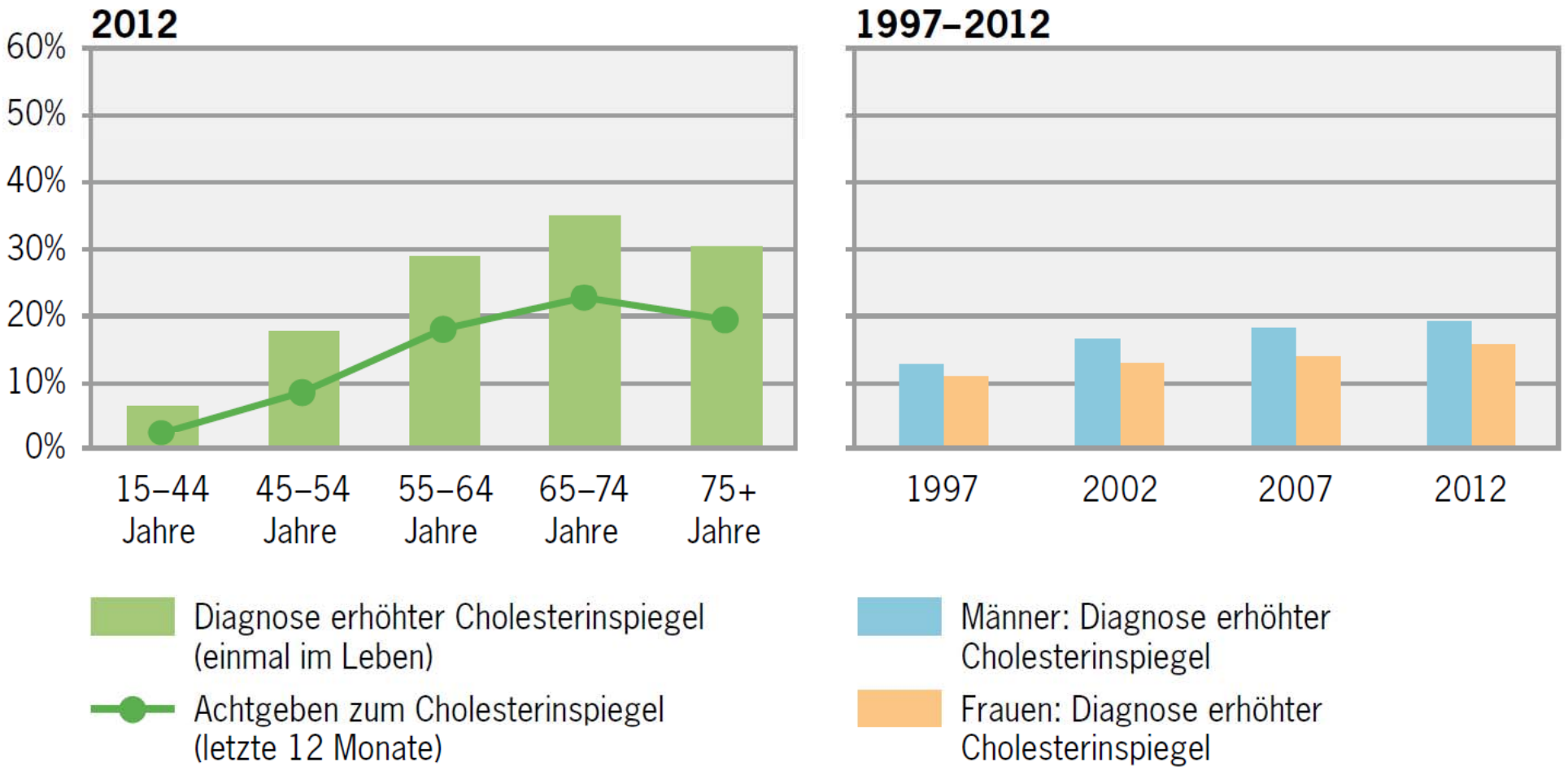
Erhöhter Cholesterinspiegel

G 7



Quelle: SGB

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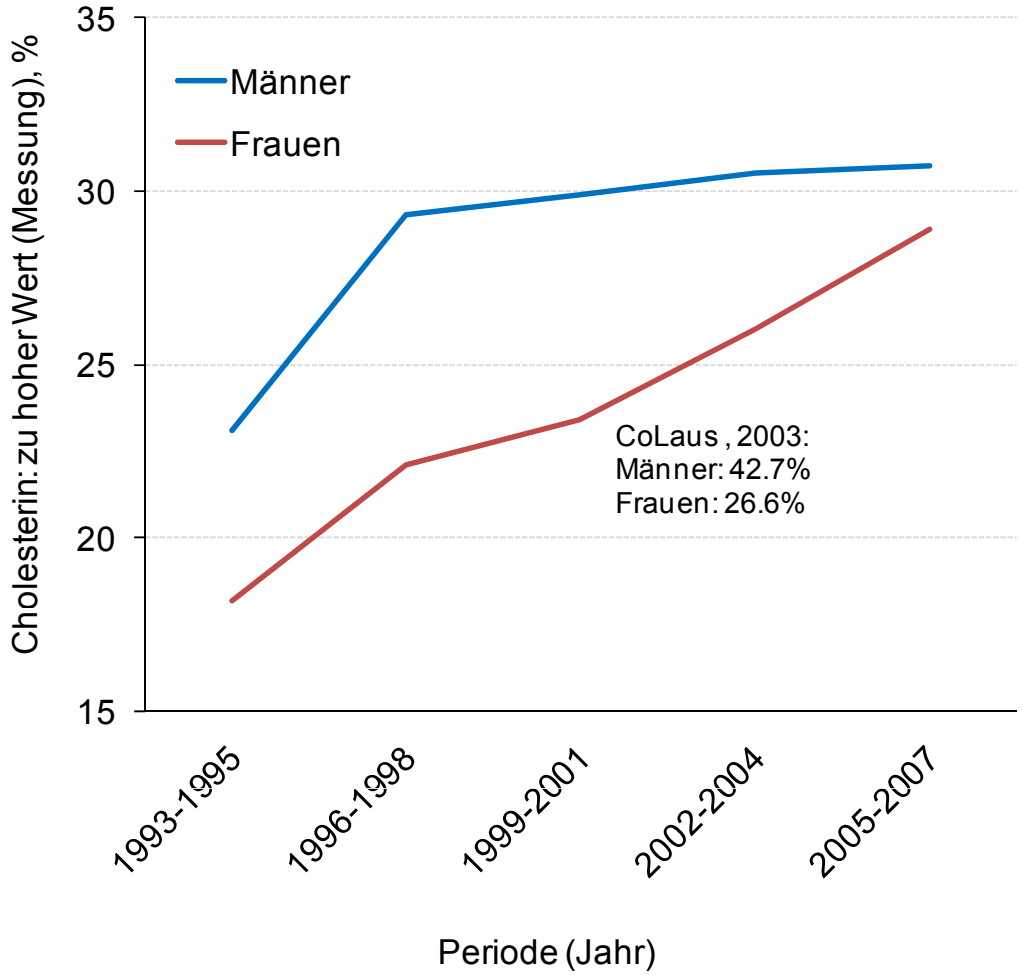
Prevalence of hypercholesterolemia (measurement), trend, canton of Geneva



BusSanté, Gaspoz et al, BAG, 2009, 35-74 J

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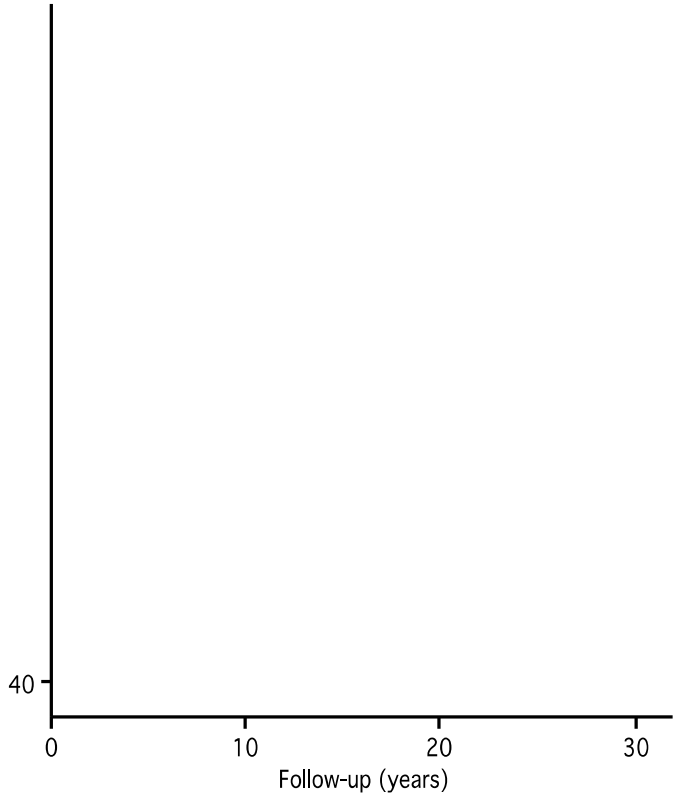
Glycemia and survival, Switzerland



Von Gunten et al, Prev Med. 2013 Aug 28. doi:pii: S0091-7435(13)00308-3

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Prevalence (%) of diabetes, canton of Geneva; city of Lausanne

Study	Year	n	All	Women	Men
Bus Santé	2004-2009	8'014	5.2	2.9	7.5
CoLaus	2003	6'188	6.6	4.0	9.5

age: 35-75 years

BusSanté, Gaspoz et al, BAG, 2009; CoLaus, Firmann M, et. al. BMC Cardiovasc Disord 2008;8:6.

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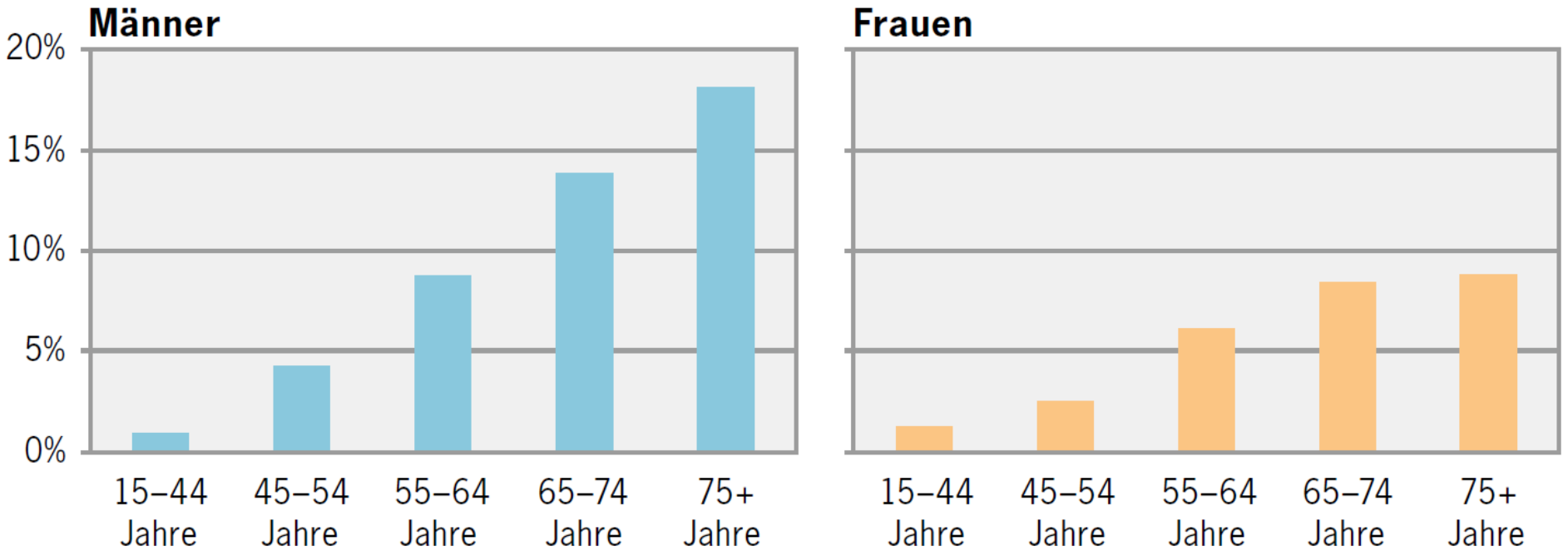
Diabetes, 2012

G 8



Quelle: SGB

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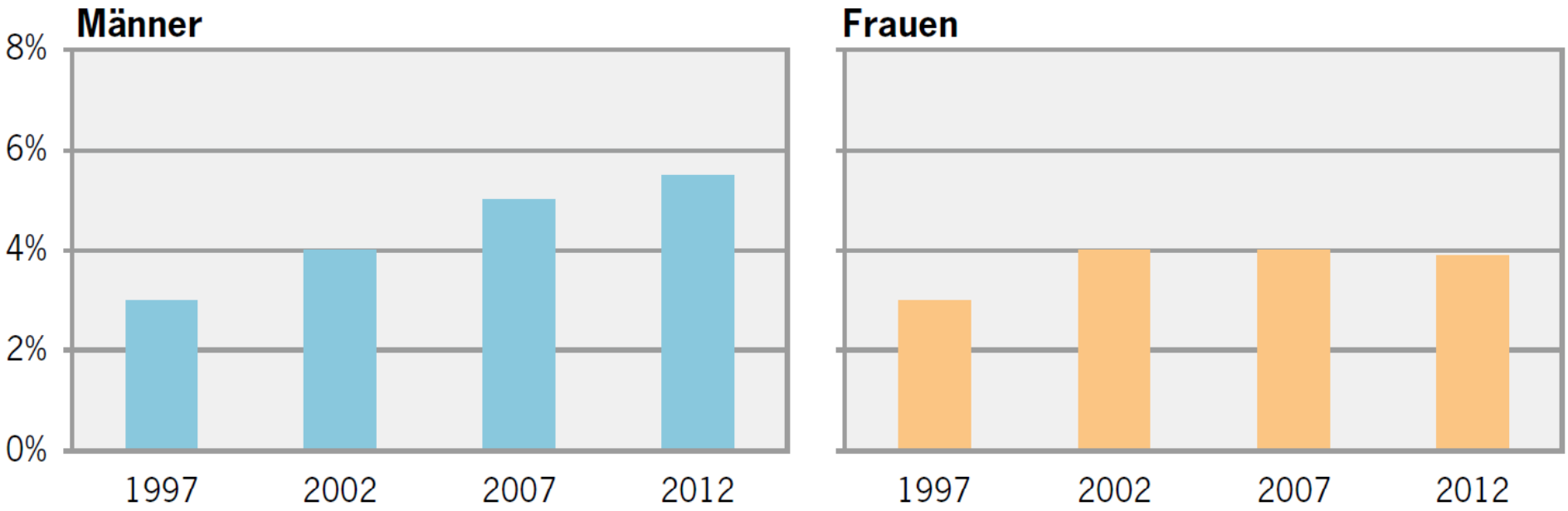
Diabetes, 1997–2012 G 9



Quelle: SGB

© Bundesamt für Statistik (BFS)

- Unknown diabetes: about 25-35%

BFS; Bopp, et al, Diabetes Care. 2011 Nov;34(11):2387-9;
Vollenweider et al. Rev. Med. Suisse; 2: 2528-33

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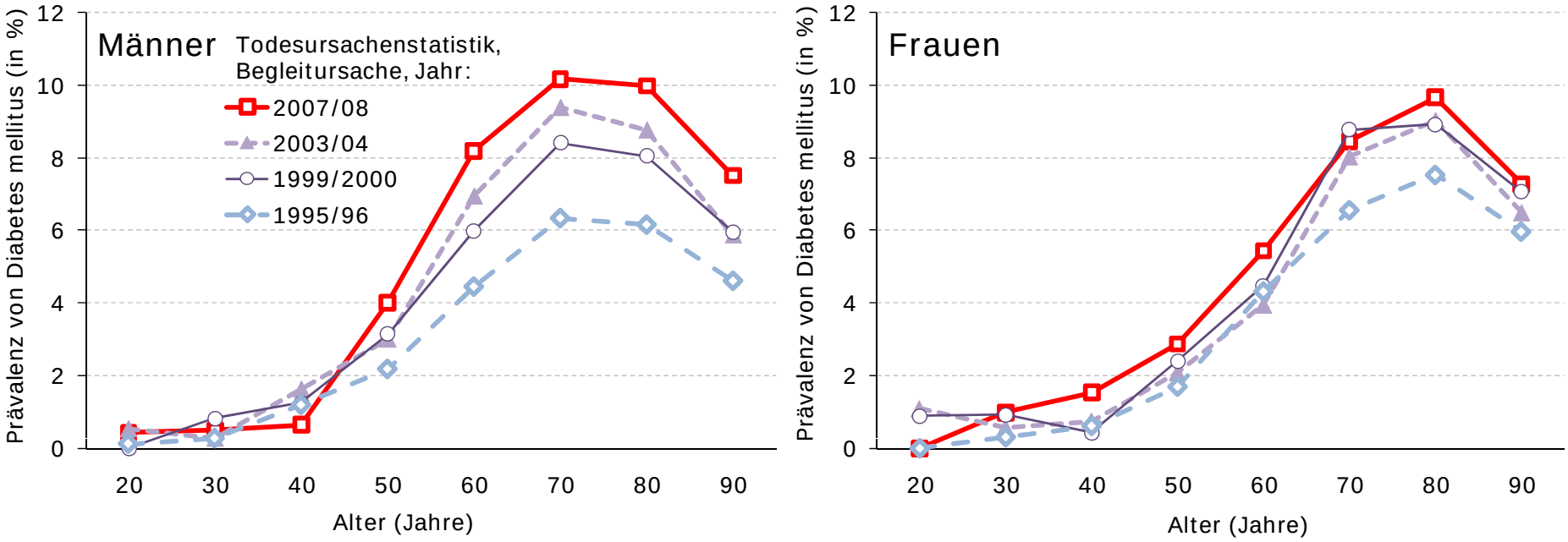
Diabetes, prevalence, by age & sex Switzerland



Bopp, et al, Diabetes Care. 2011 Nov;34(11):2387-9

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Diabetes: prevalence & population at risk, Switzerland

- Prevalence of „prediabetes“ (IFG, IGT)
  - Probably 5-7%

- Persons at increased risk of diabetes
  - 13-25% in men
  - 6-16% in women

IFG: Impaired Fasting Glucose, 6.2-6.9 mmol/l
IGT: Impaired Glucose Tolerance, 2h Glucose 7.8 -11.0 mmol/l

Vollenweider et al. Rev. Med. Suisse; 2: 2528-33, Diabetes Care, 34, 18630 (2011)

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Risk factors

- Smoking
- Obesity
- Hypertension
- Dyslipidemia
- Diabetes
- Combination of risk factors

World Health Organization WHO, http://www.who.int

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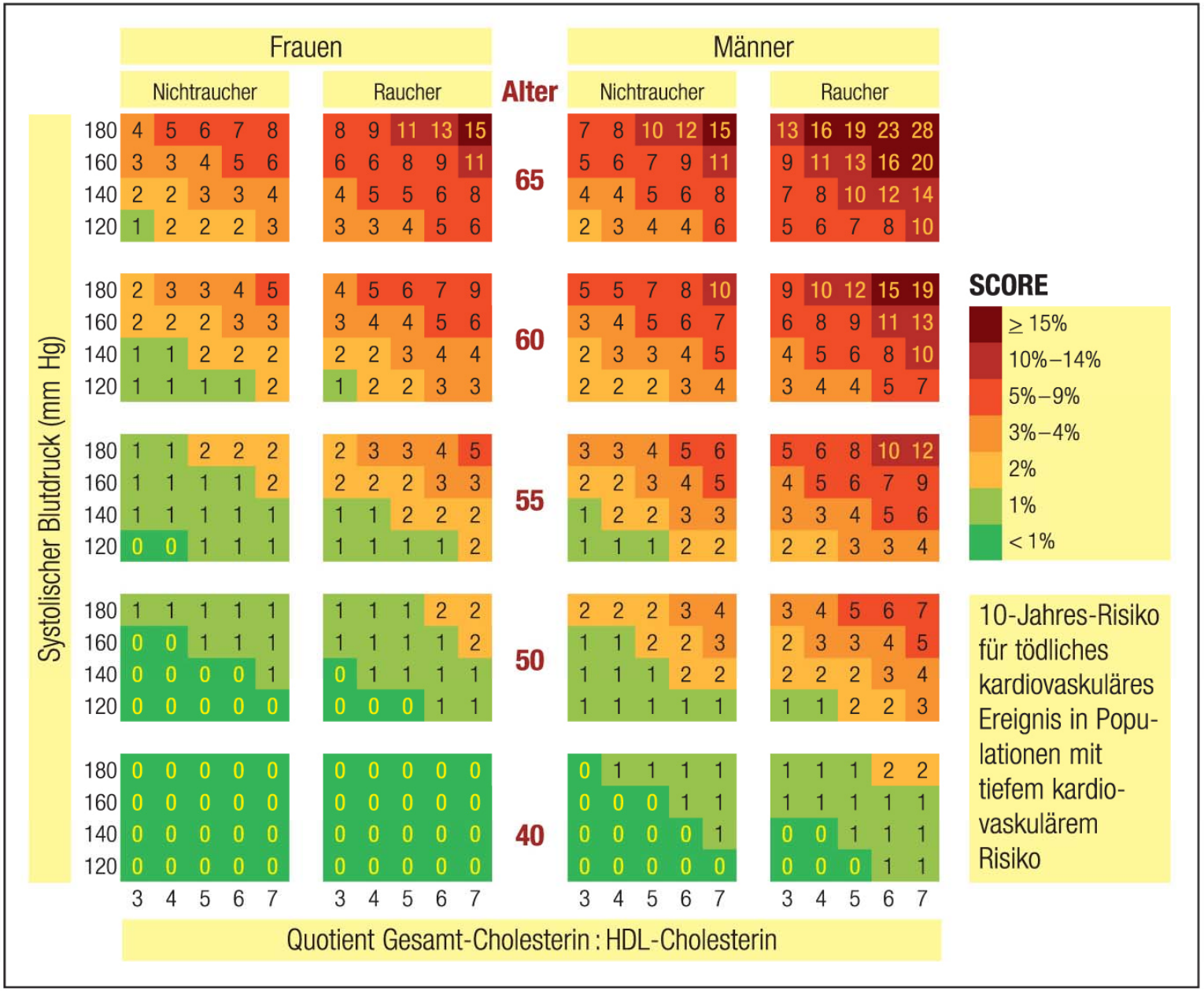

Riesen et al, Schweizerische Aerztezeitung 2005;86:Nr 22

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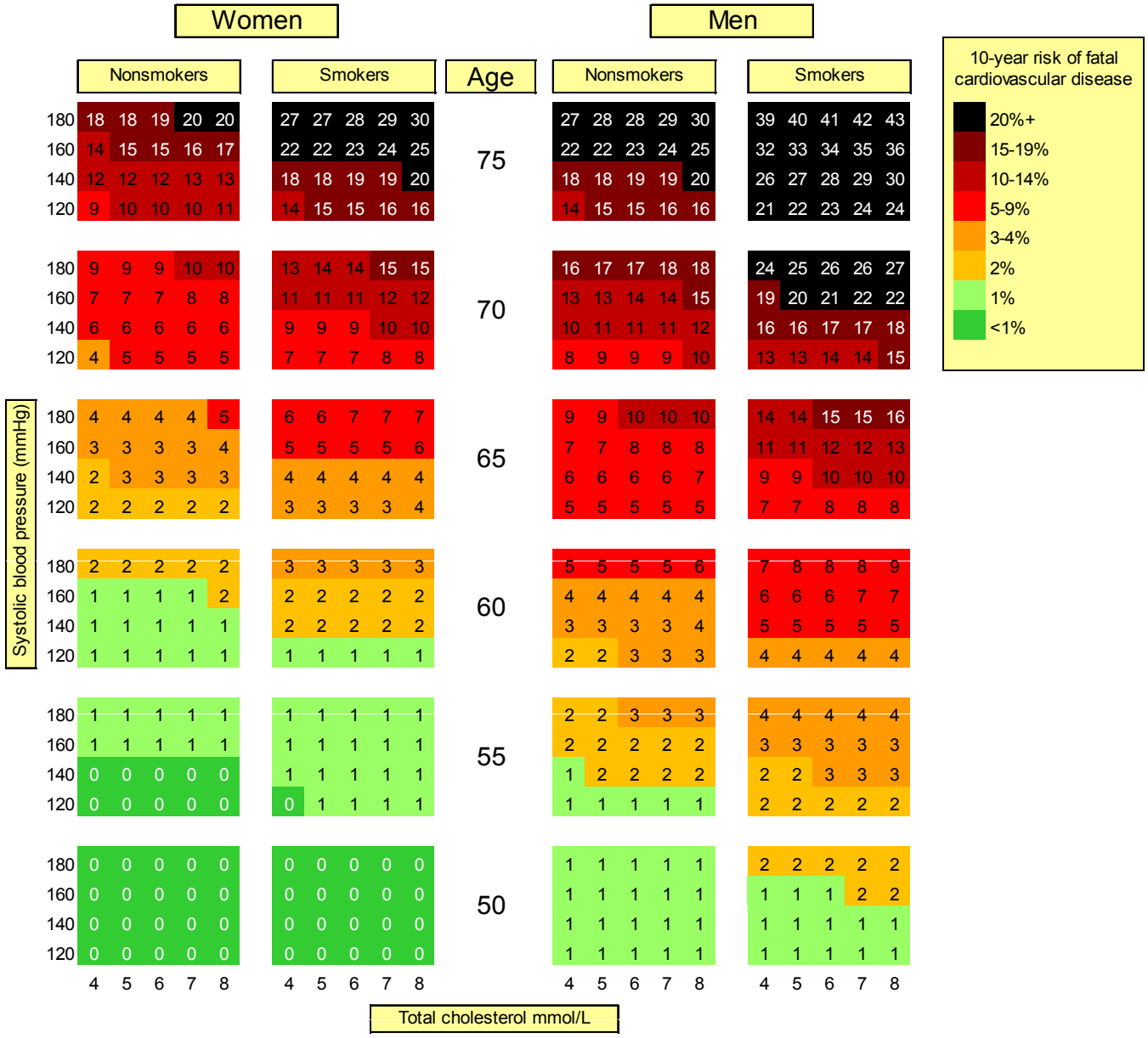

Faeh et al, PLoS One. 2013;8(2):e56149

David Fäh, Klinisch-chemisches Kolloquium, 22.10.2013

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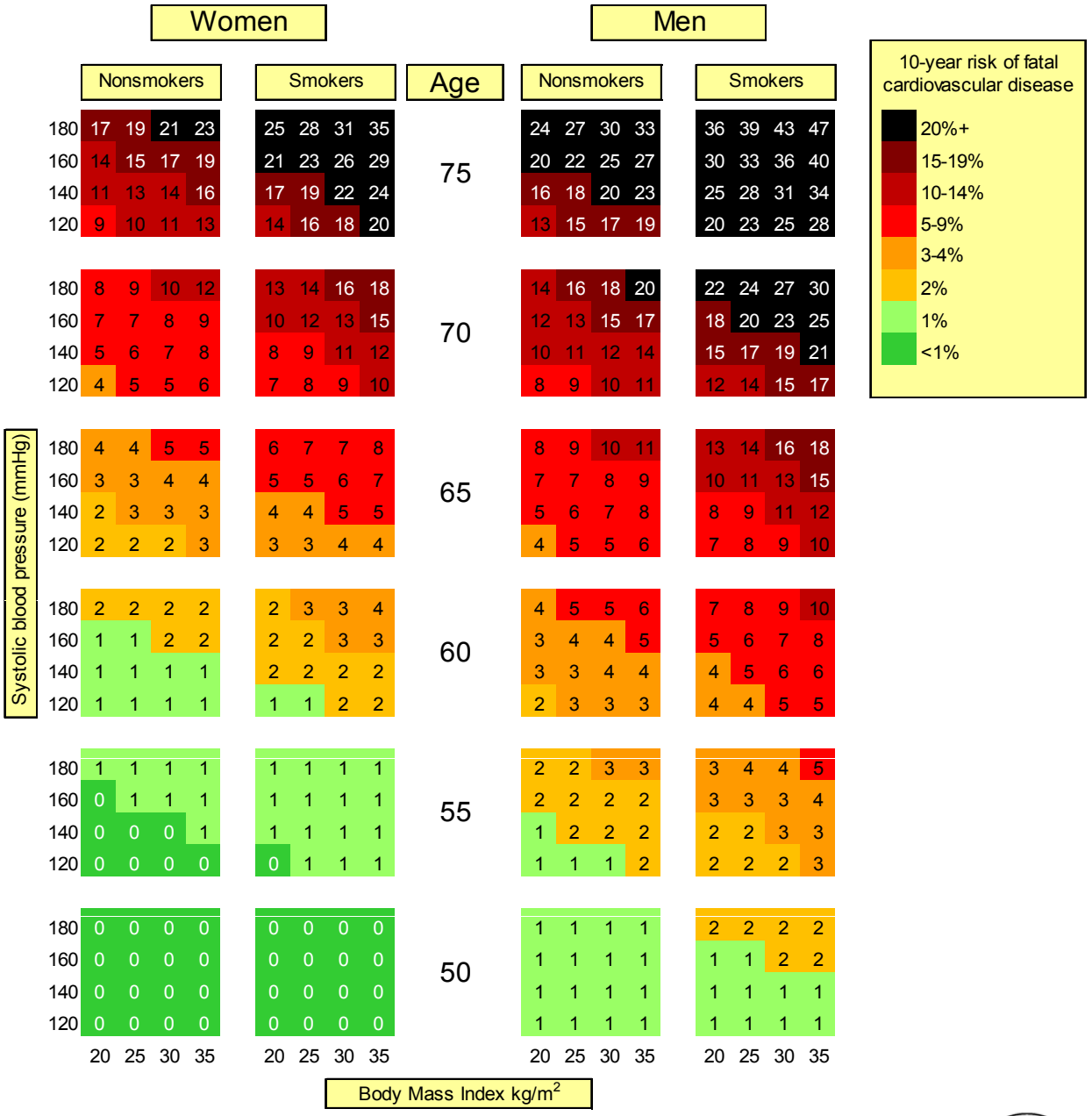

Faeh et al, Arch Intern Med. 2012 Dec 10;172(22):1766-8

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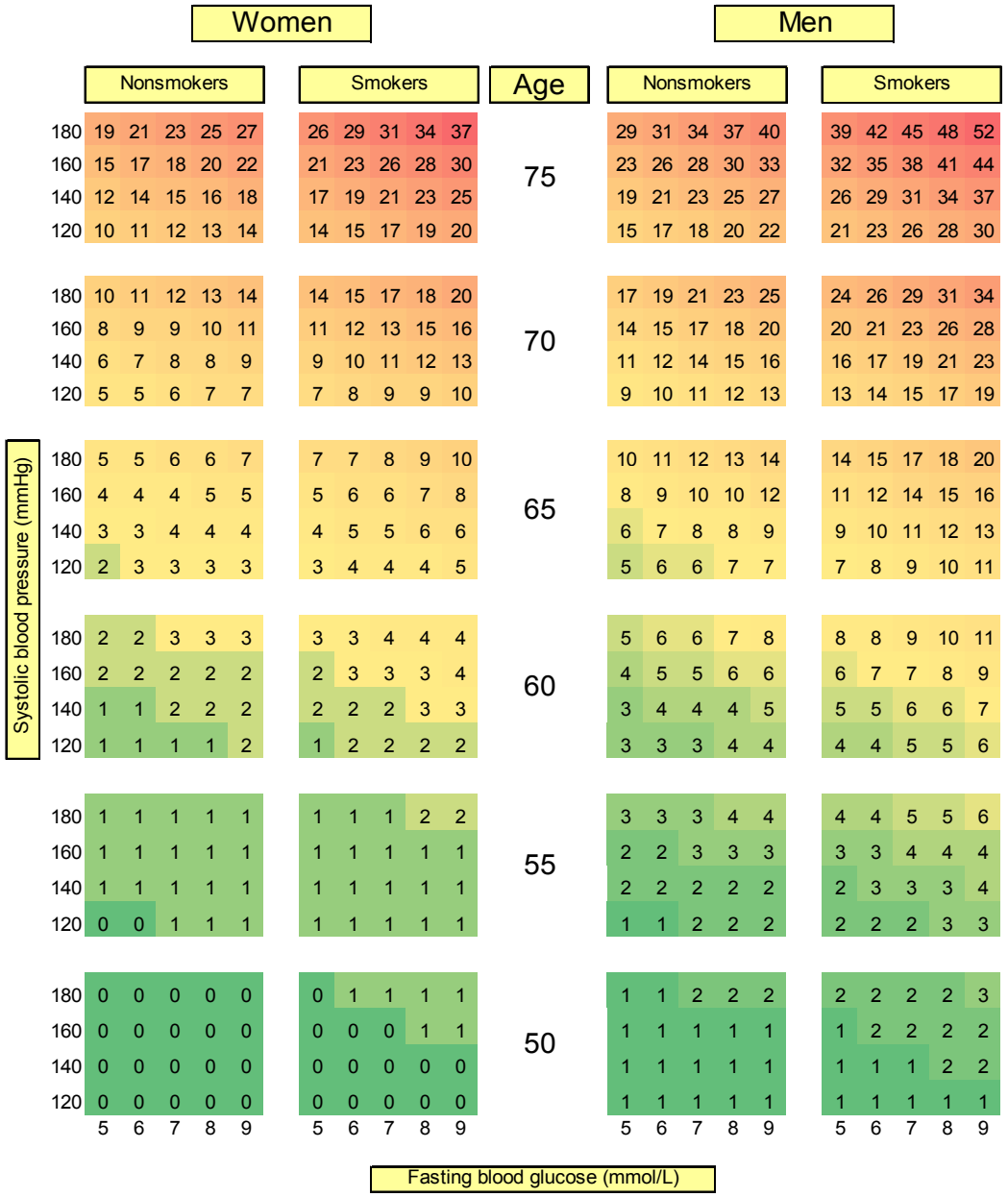

Faeh et al, Cardiovasc Diabetol. 2013 Jan 25;12:24

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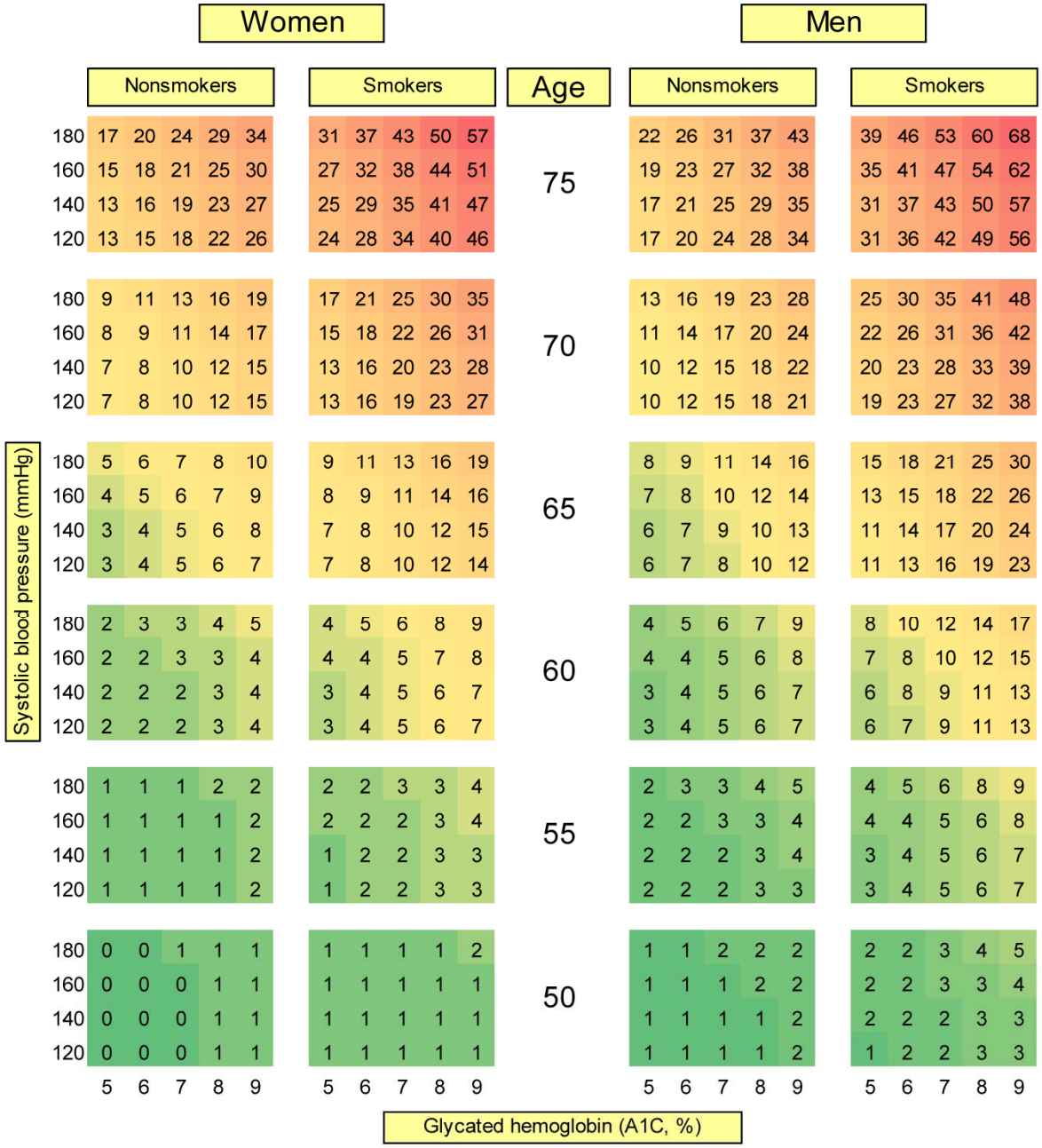

Faeh et al, Eur J Epidemiol. 2013 Jul;28(7):551-5

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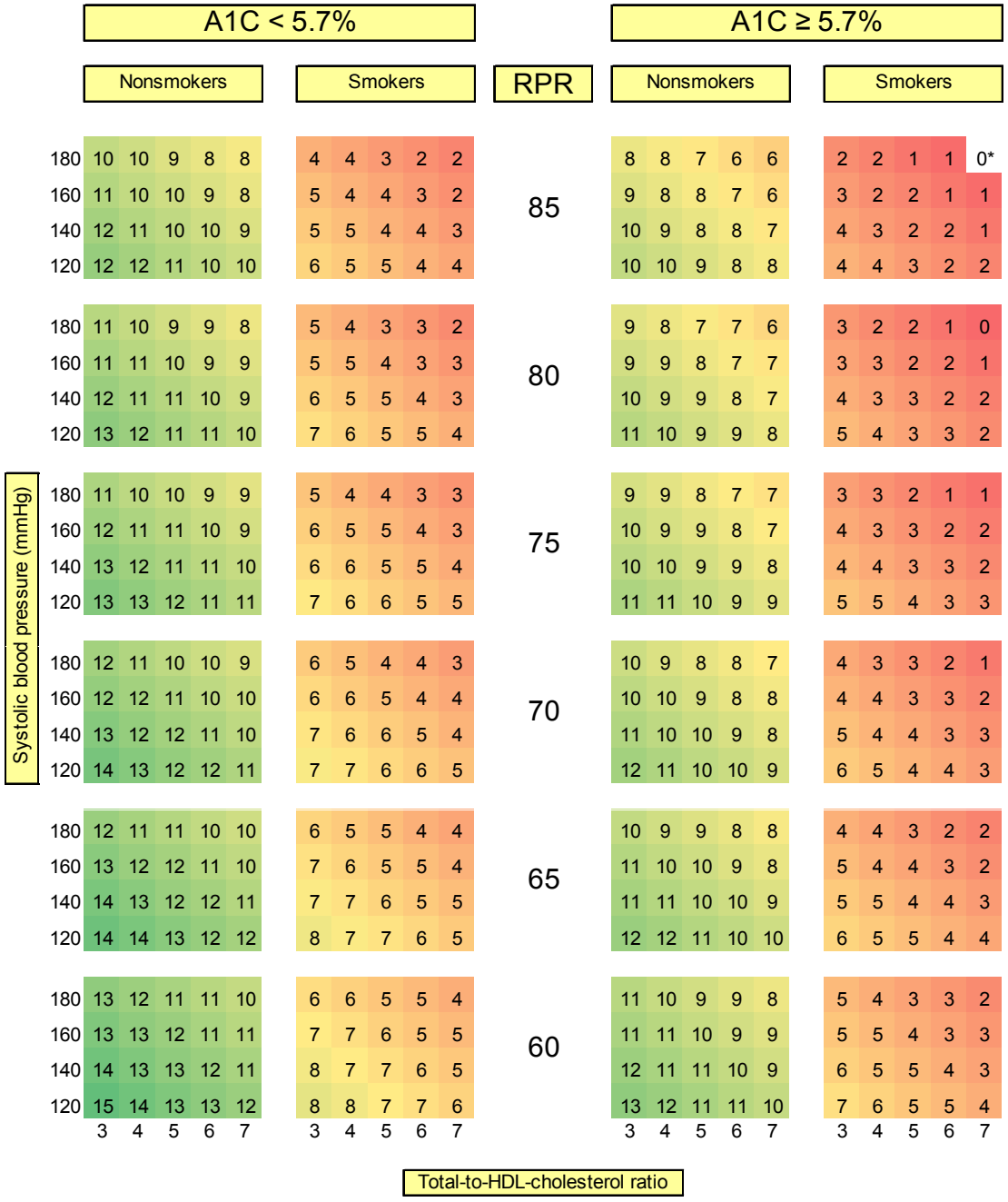
	Chart Models (5 variables)				Separate Model (6 variables)
	Total Cholesterol	Total-to-HDL-cholesterol	Glucose	A1C	A1C + total cholesterol
Current smoking (yes/no)	1.994 (1.760; 2.260)	1.990 (1.756; 2.255)	2.046 (1.806; 2.318)	2.011 (1.775; 2.279)	2.010 (1.774; 2.278)
Total Cholesterol (mmol/L)	1.058 (1.013; 1.104)				1.045 (1.001; 1.090)
Total-to-HDL-cholesterol (ratio)		1.073 (1.045; 1.102)			
Glucose (mmol/L)			1.087 (1.070; 1.105)		
Glycated hemoglobin (A1C, %)				1.226 (1.186; 1.267)	1.223 (1.184; 1.264)
Model comparison					
Scaled mean Brier Score	9.75%	9.97%	11.16%	11.62%	11.65%
Nagelkerke's R^2	0.0484	0.0547	0.0734	0.0865	0.0879
AIC	2075	2057	2003	1965	1963
BIC	2152	2133	2079	2041	2047
Integrated discrimination improvemen t (IDI)	0 (reference)	0.0010 (0.16)	0.0067 (<0.001)	0.0091 (<0.001)	0.0089 (<0.001)



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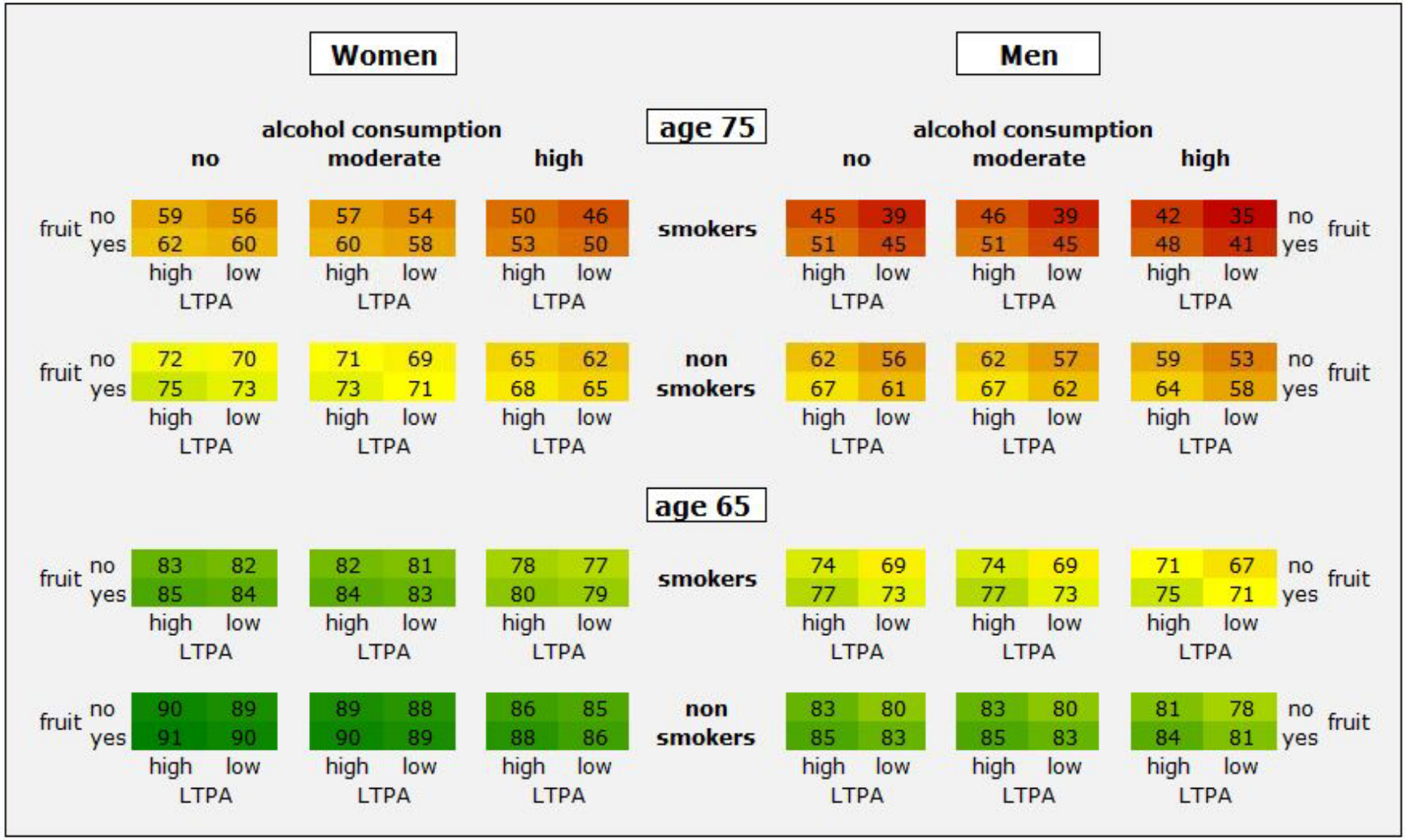
Impact of lifestyle factors on survival probability by age class & sex in Switzerland



LTPA: Leisure Time Physical Activity

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Environment and risk factors

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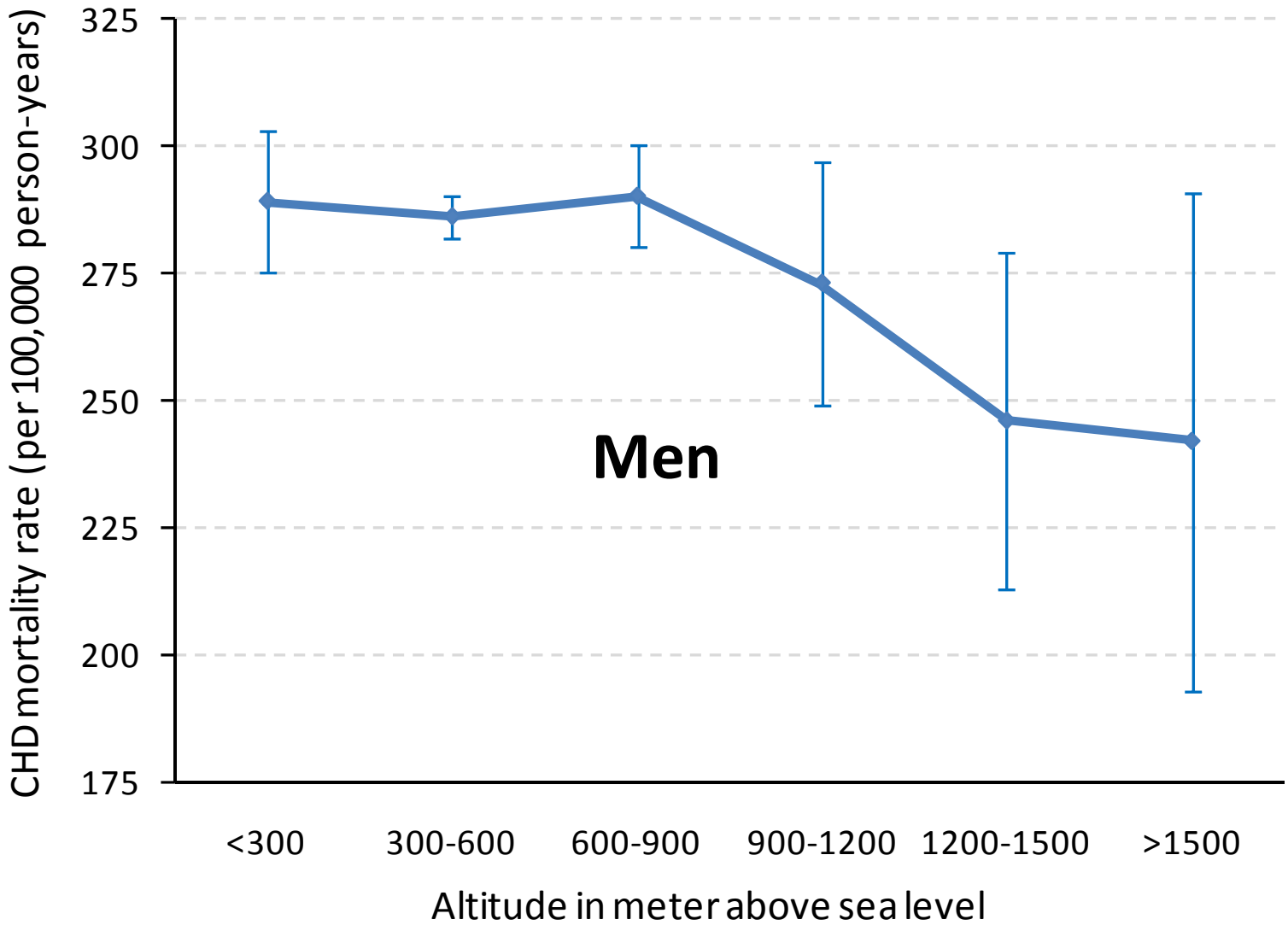

Circulation. 2009 Aug 11;120(6):495-501.

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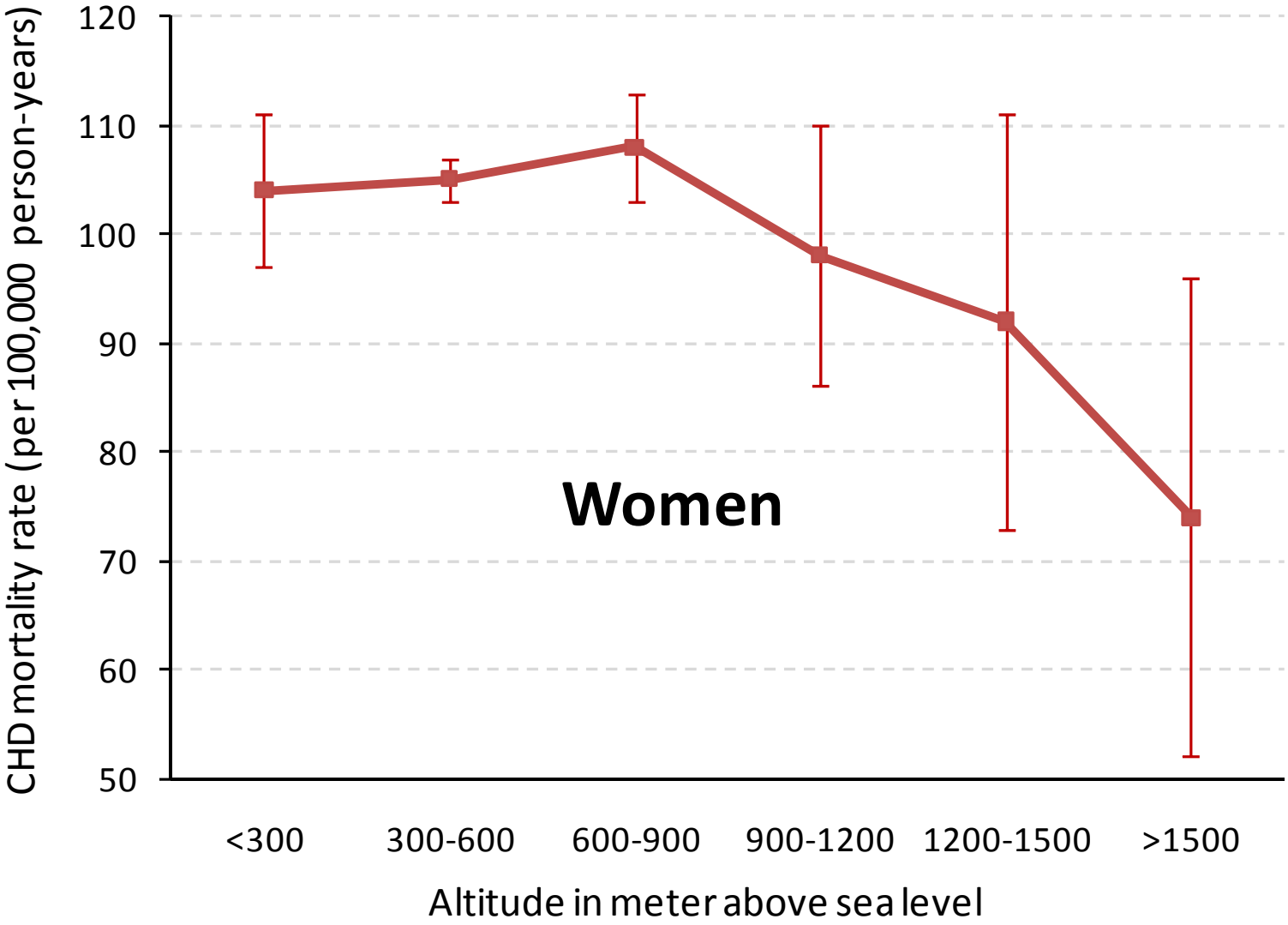

Circulation. 2009 Aug 11;120(6):495-501.

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CHD and Stroke

- Per 1000m of increase in altitude (259-1960m, men and women 40-84y)
  - CHD mortality decreased by 22%
  - Stroke mortality decreased by 12%
  - Place of birth had an independent effect

Circulation. 2009 Aug 11;120(6):495-501.

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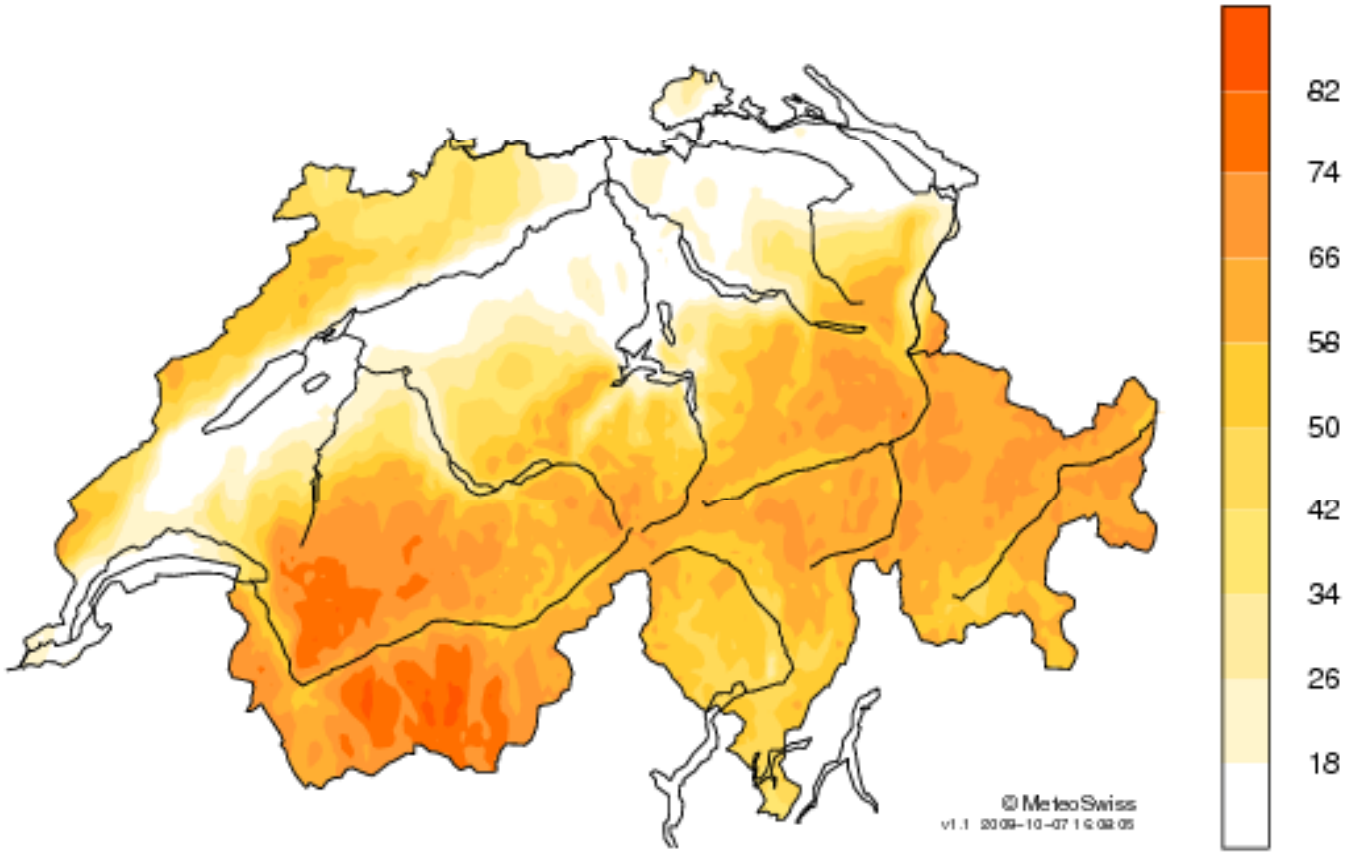

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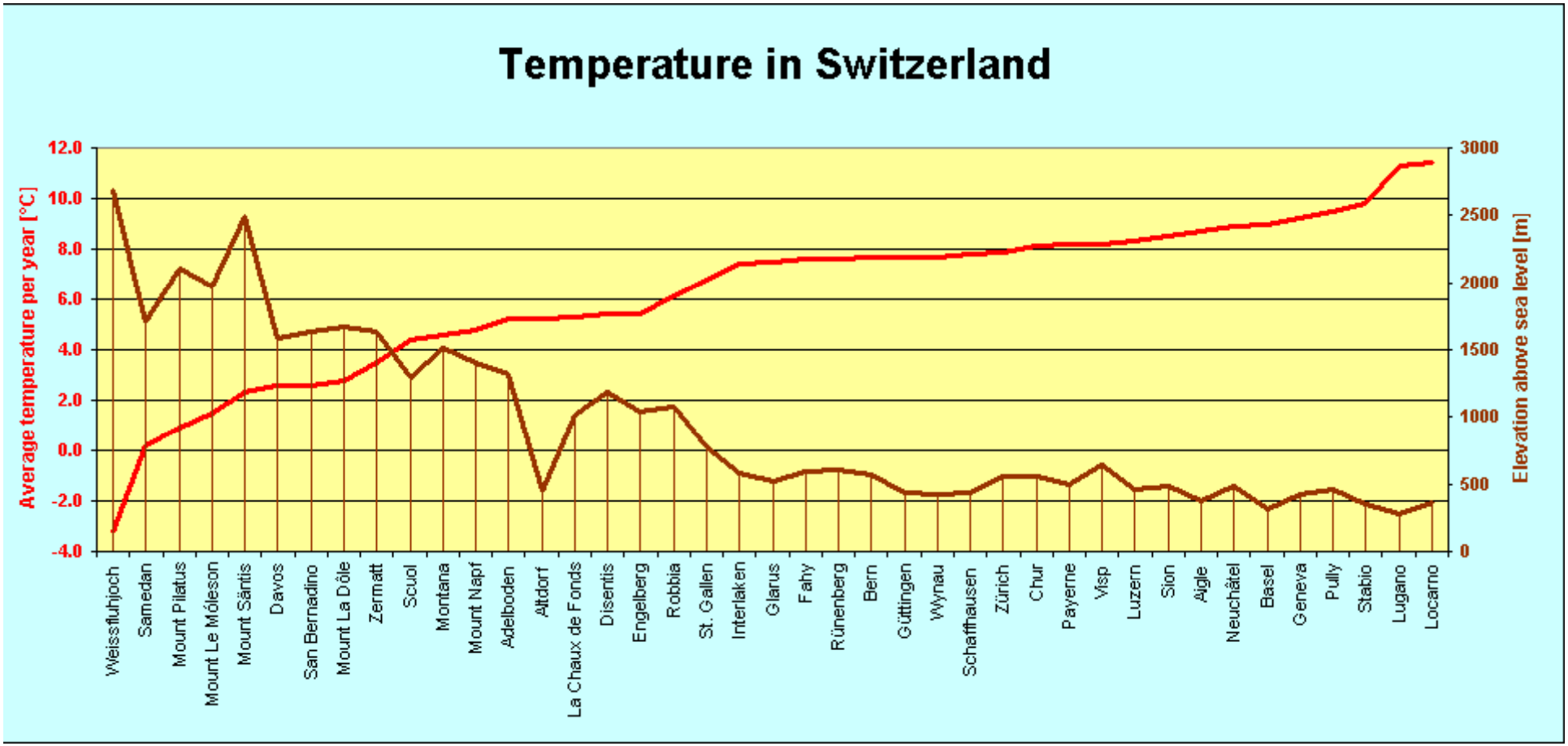

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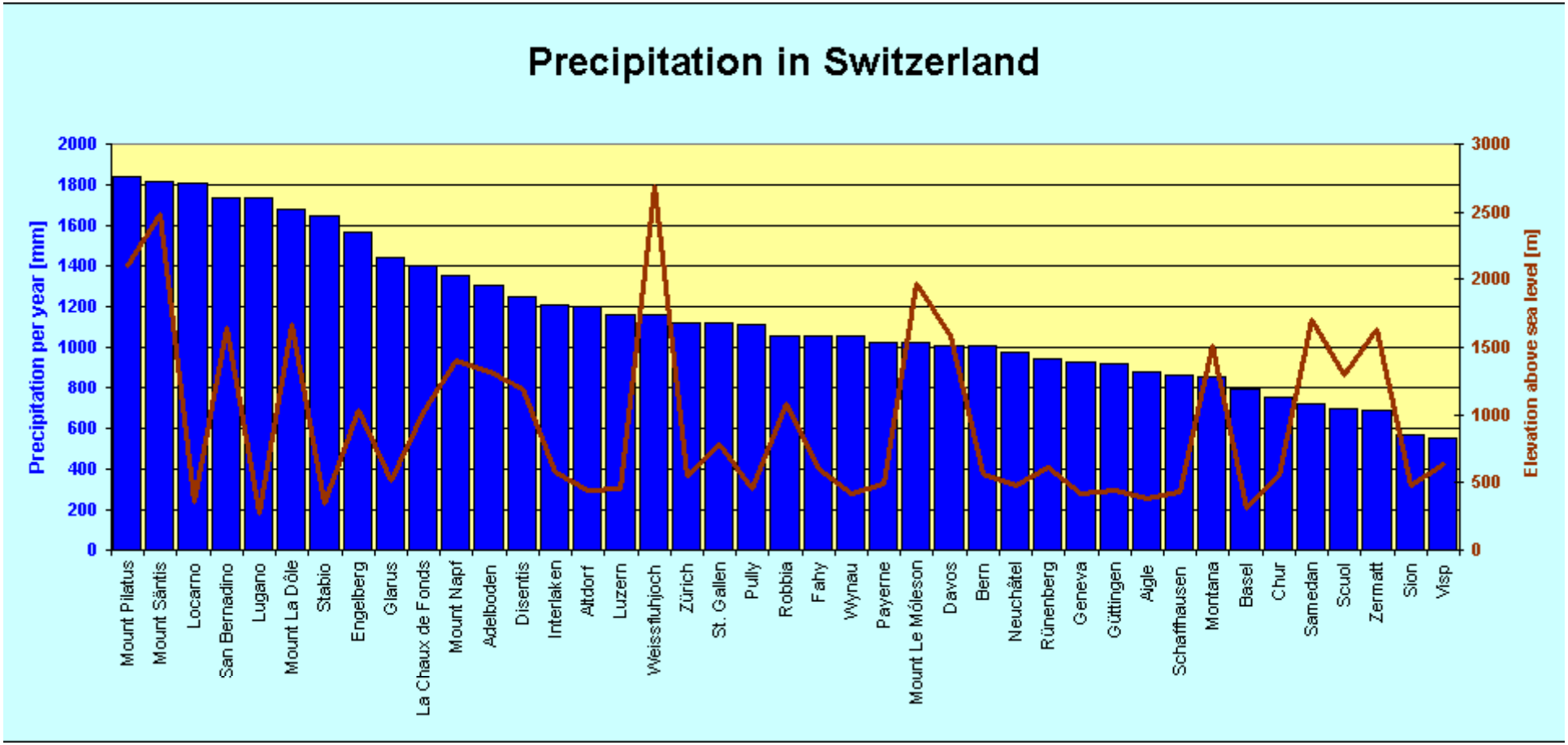

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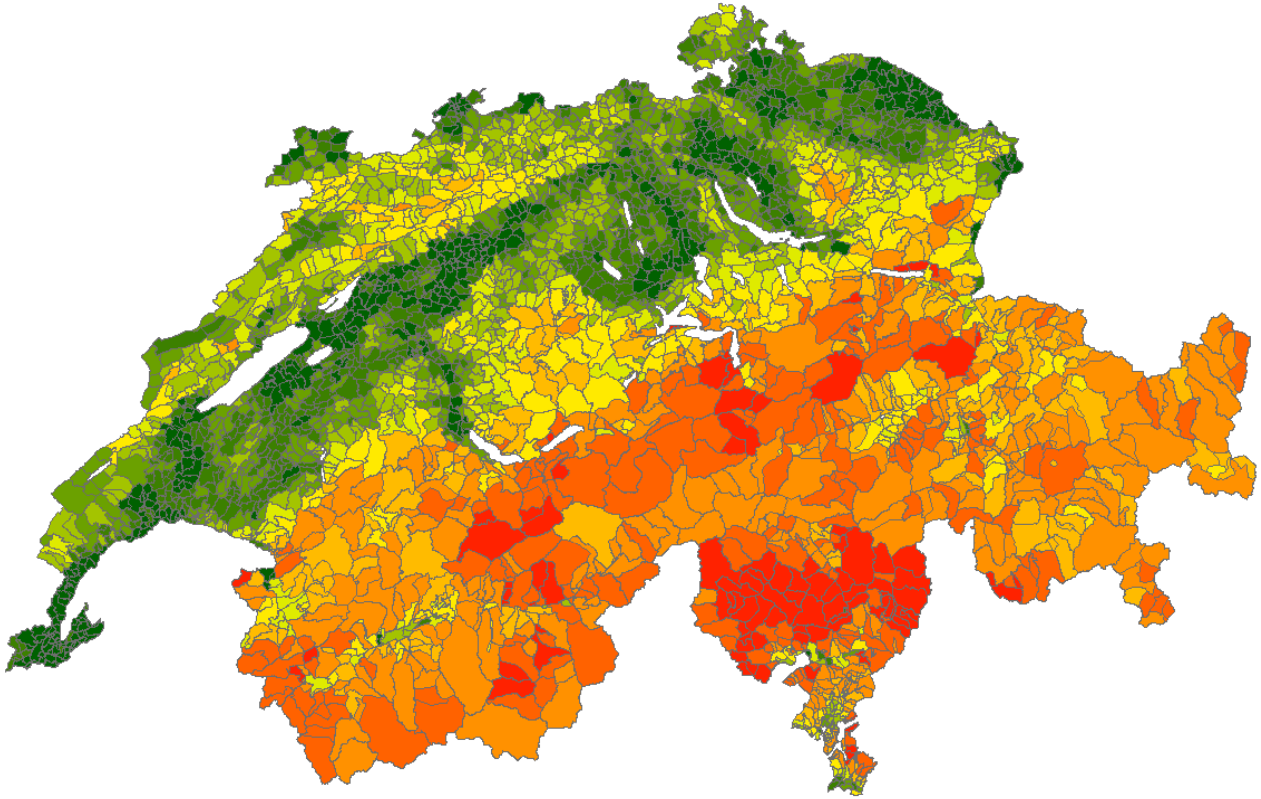
Slope



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Altitude and IHD…

- …remained significantly inversely associated after adjustment for
  1. language, nationality, education, household, marital status, urbanization
  2. Sunshine, rain, temperature
  3. Slope, aspect
  4. Distance to main roads

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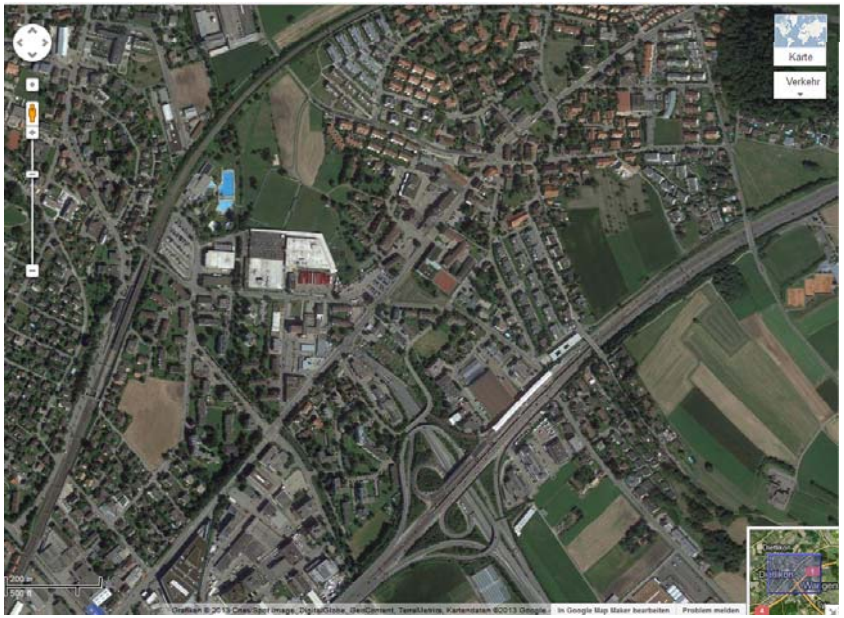
Can we identify characteristics of the natural and built neighborhood environments which determine active lifestyles, in particular levels of walking and cycling in Switzerland?

- Urban

- Suburban



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Lifestyle and risk factors

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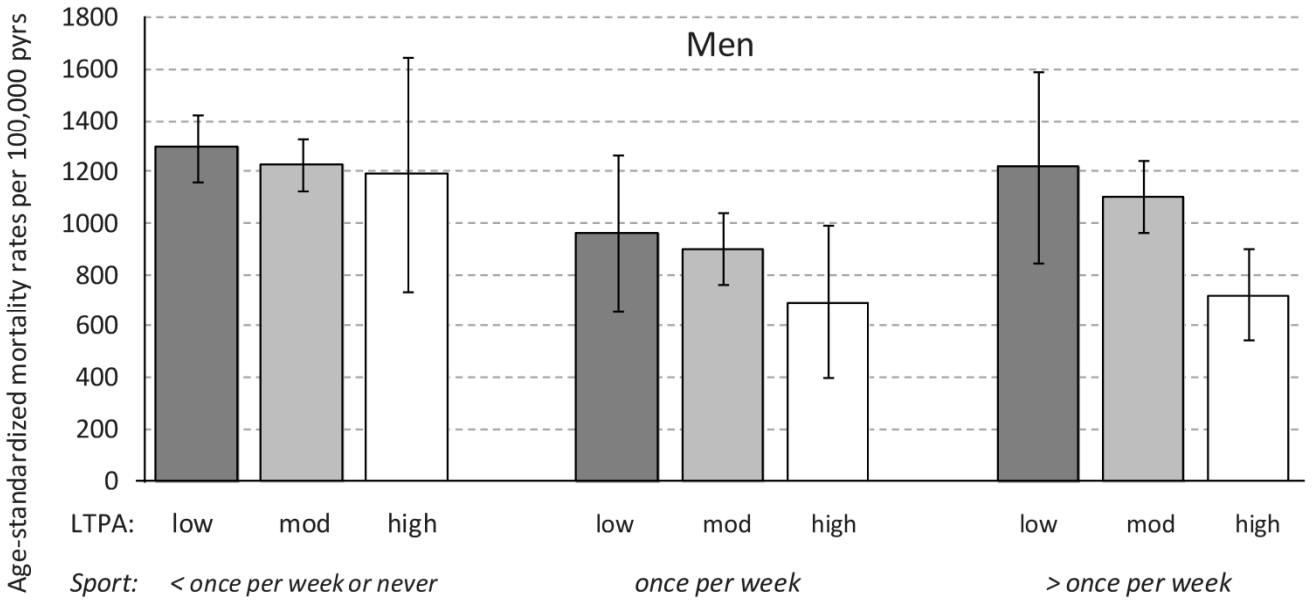

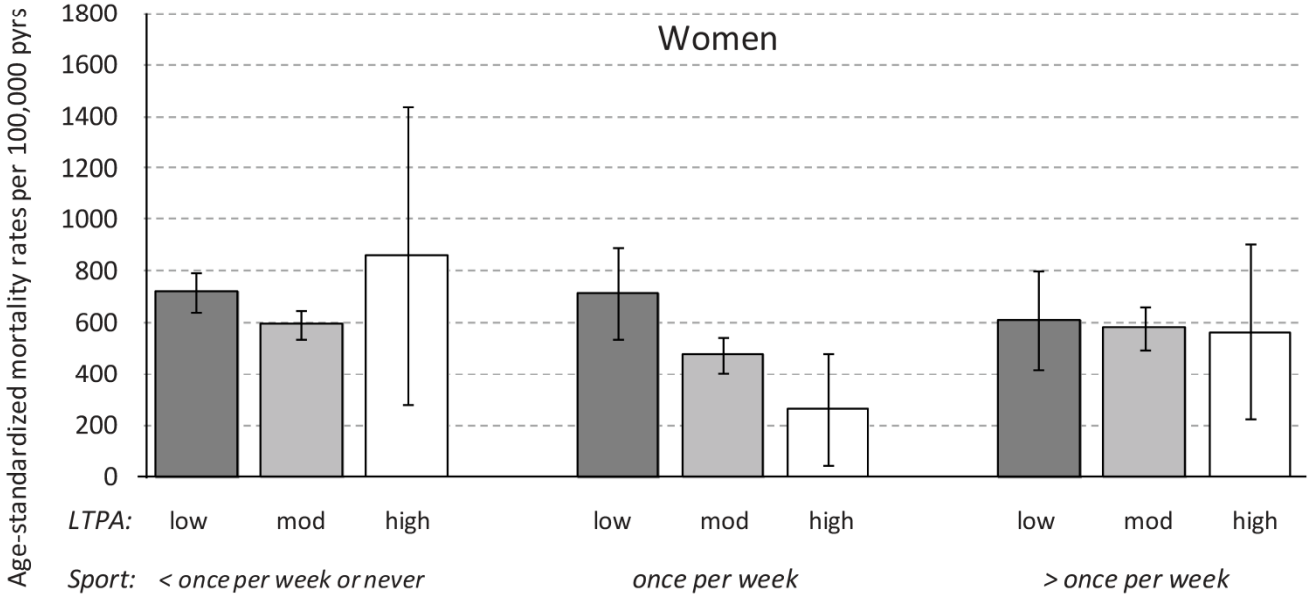

LTPA: Leisure Time Physical Activity

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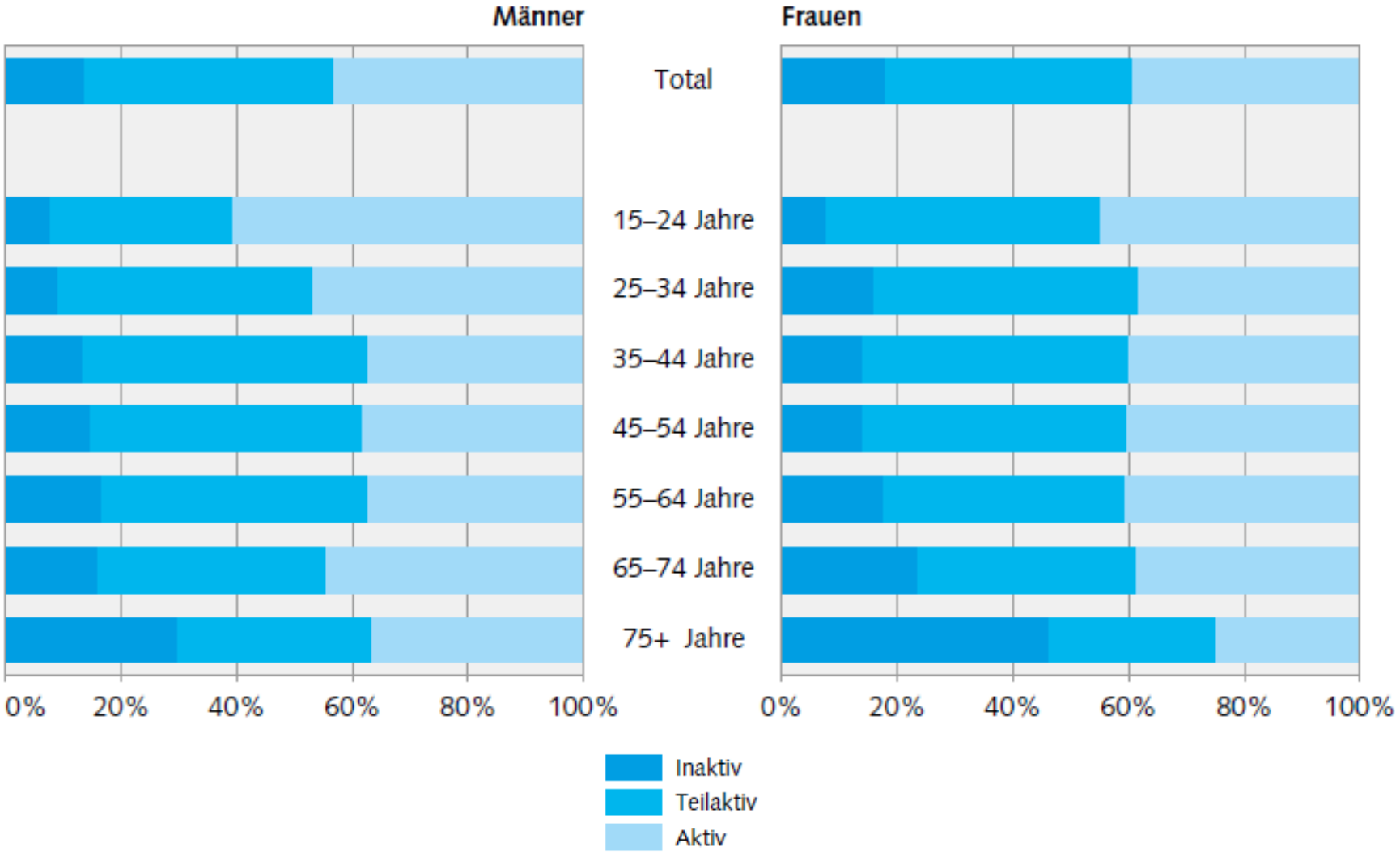
Prevalence of physical activity, 2007 (≥ 15 years)



BFS, Swiss Health Survey 2007

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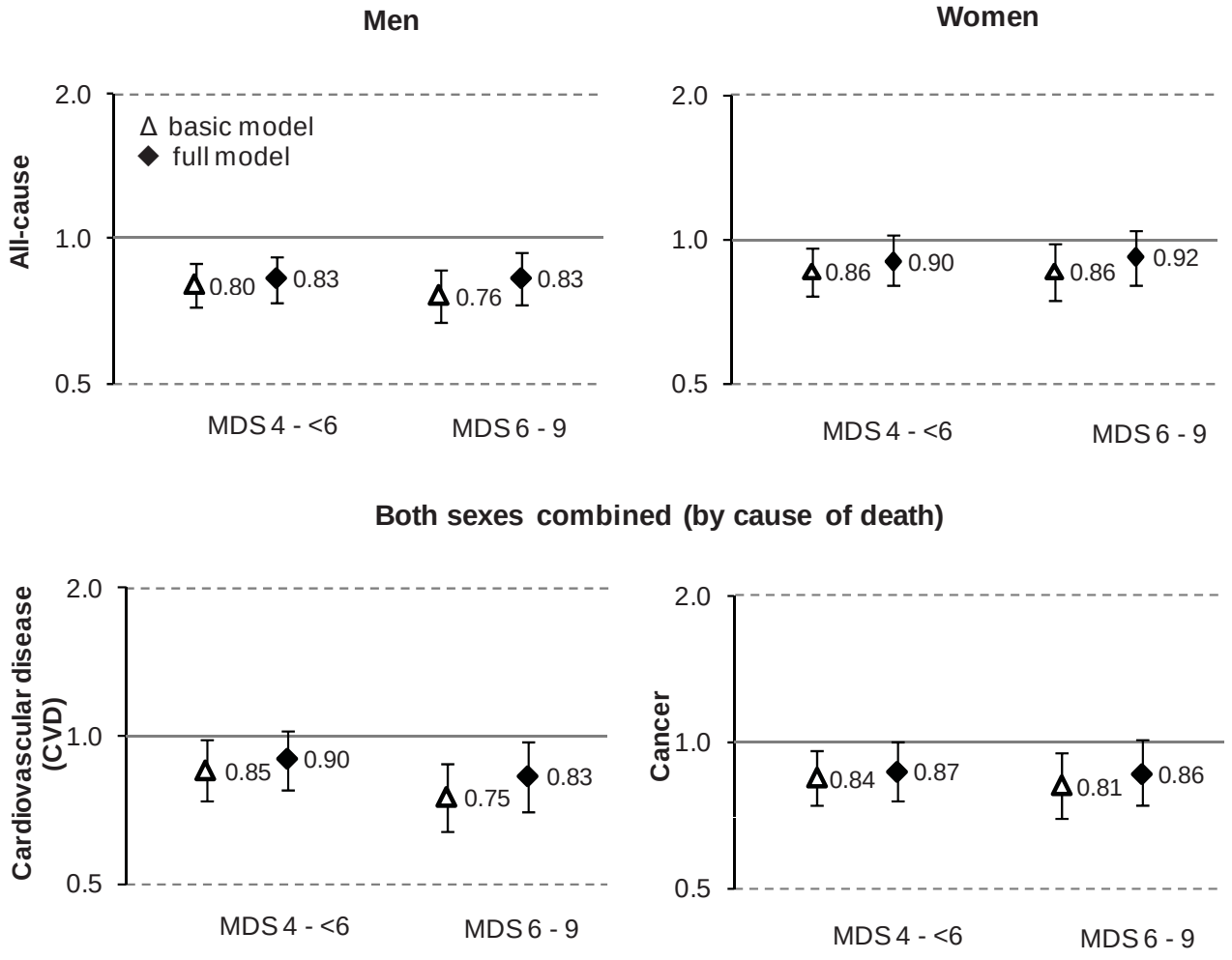
Adherence to Mediterranean Diet (MD) in Switzerland and CVD, cancer and all-cause mortality



MDS: Mediterranean Diet Score from 0 (no adherence) to 9 (perfect adherence)

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Mortality ratios associated with two unit incremen t in Mediterranean diet score (MDS) and after alternate subtraction of each of its dietary components

Dietary variable	Mortality ratio (95% CI)	P value	Reduction in apparent effect (%)
MDS overall	0.864 (0.802 to 0.932)	<0.001	0
MDS minus vegetables	0.886 (0.822 to 0.955)	0.002	16.2
MDS minus legumes	0.877 (0.815 to 0.944)	<0.001	9.7
MDS minus fruit and nuts	0.879 (0.818 to 0.946)	0.001	11.2
MDS minus cereals	0.872 (0.814 to 0.935)	<0.001	6.1
MDS minus monounsaturated/saturated lipids (ratio)	0.878 (0.806 to 0.957)	0.003	10.6
MDS minus dairy products	0.870 (0.806 to 0.939)	<0.001	4.5
MDS minus meat and meat products	0.887 (0.825 to 0.953)	0.001	16.6
MDS minus ethanol	0.896 (0.835 to 0.962)	0.002	23.5

BMJ. 2009 Jun 23;338:b2337.

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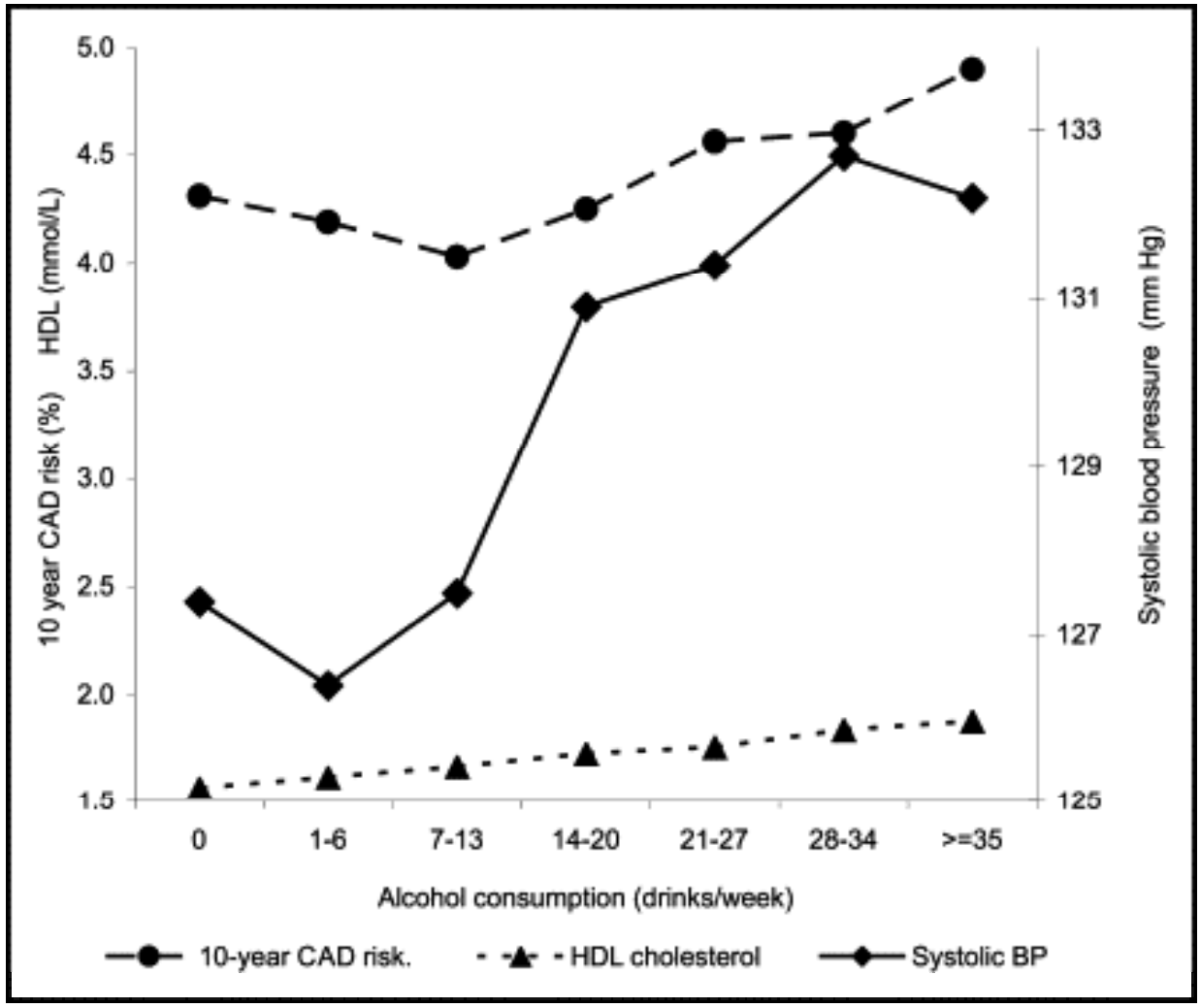
Association between alcohol consumption, cardiovascular risk factors, and 10-year CAD risk.



HDL cholesterol, systolic blood pressure (BP), and 10-year coronary artery disease (CAD) risk according to last week alcohol consumption.

Am J Cardiol. 2009 Feb 1;103(3):361-8

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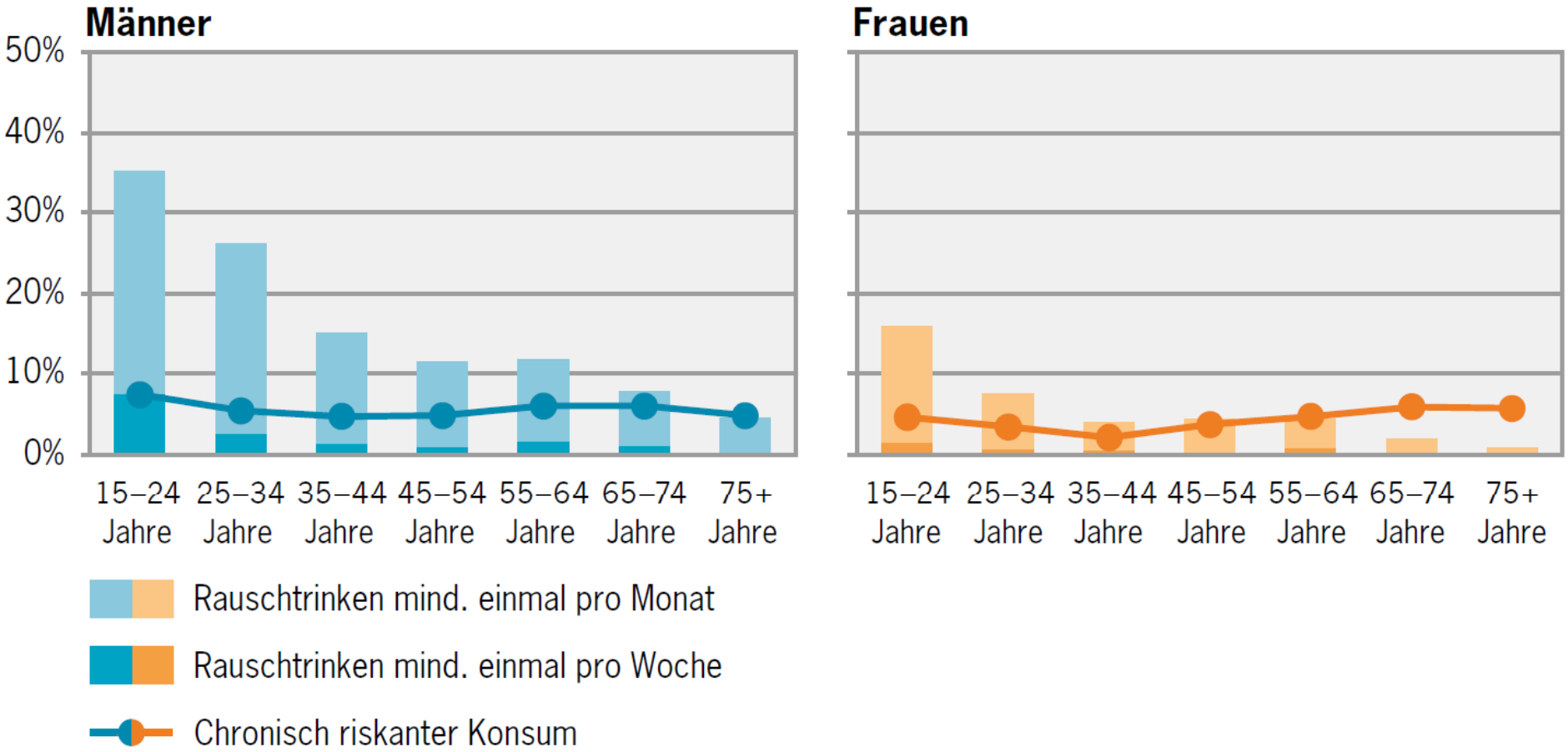
Riskanter Alkoholkonsum, 2012

G 18



Rauschtrinken: 6 oder mehr Gläser eines alkoholischen Standardgetränks bei einer Gelegenheit (unabhängig vom Geschlecht).
Chronisch riskanter Konsum: bei Männern im Durchschnitt mehr als 4 Gläser eines alkoholischen Standardgetränks (z.B. eine Stange Bier) pro Tag, bei Frauen mehr als 2 Gläser pro Tag.

Quelle: SGB

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BFS, Swiss Health Survey 2012

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Thanks!

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www.davidfaeh.ch/lehre

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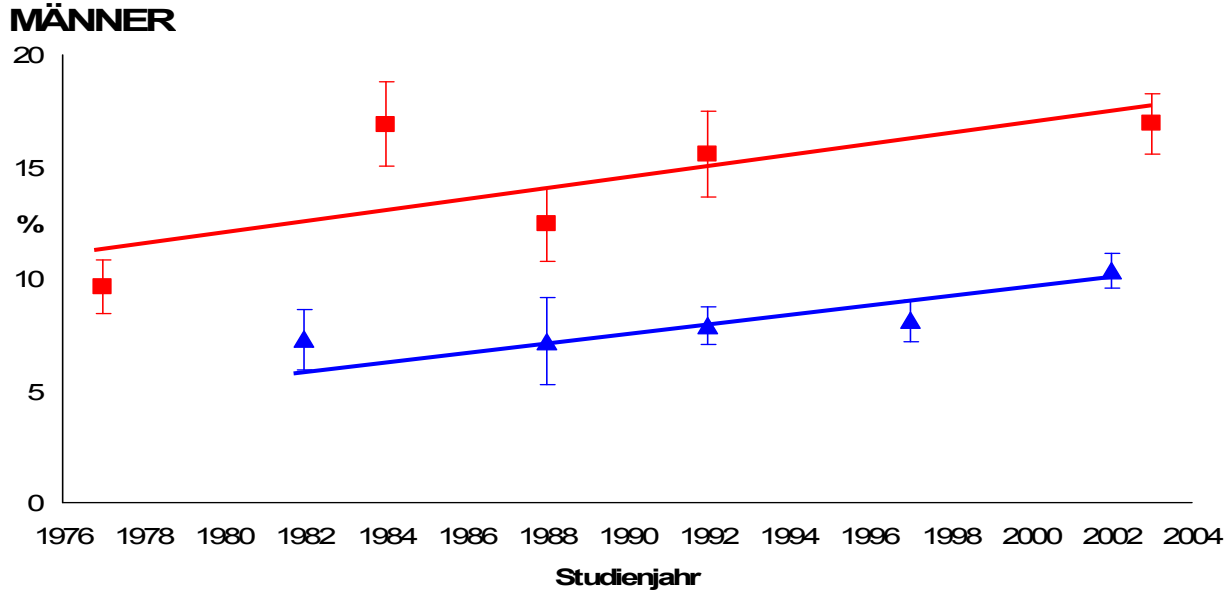
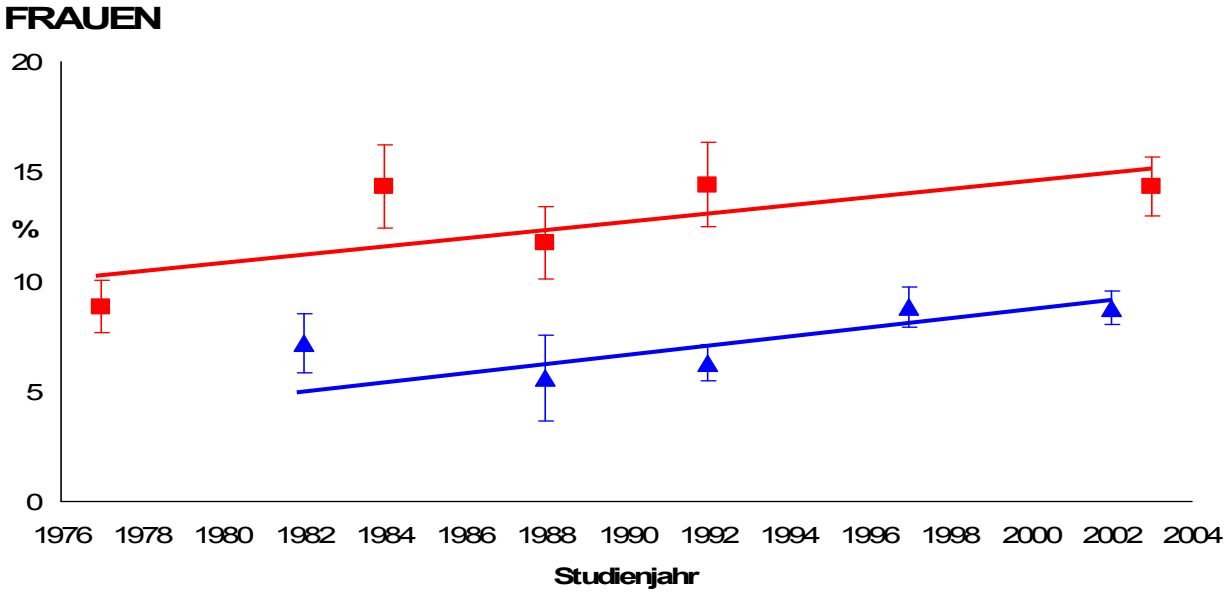
Prevalence
Obesity
Switzerland



Gemessen
self-report
(befragt)



Faeh et al, SMW 2008 Apr 5;138(13-14):204-10

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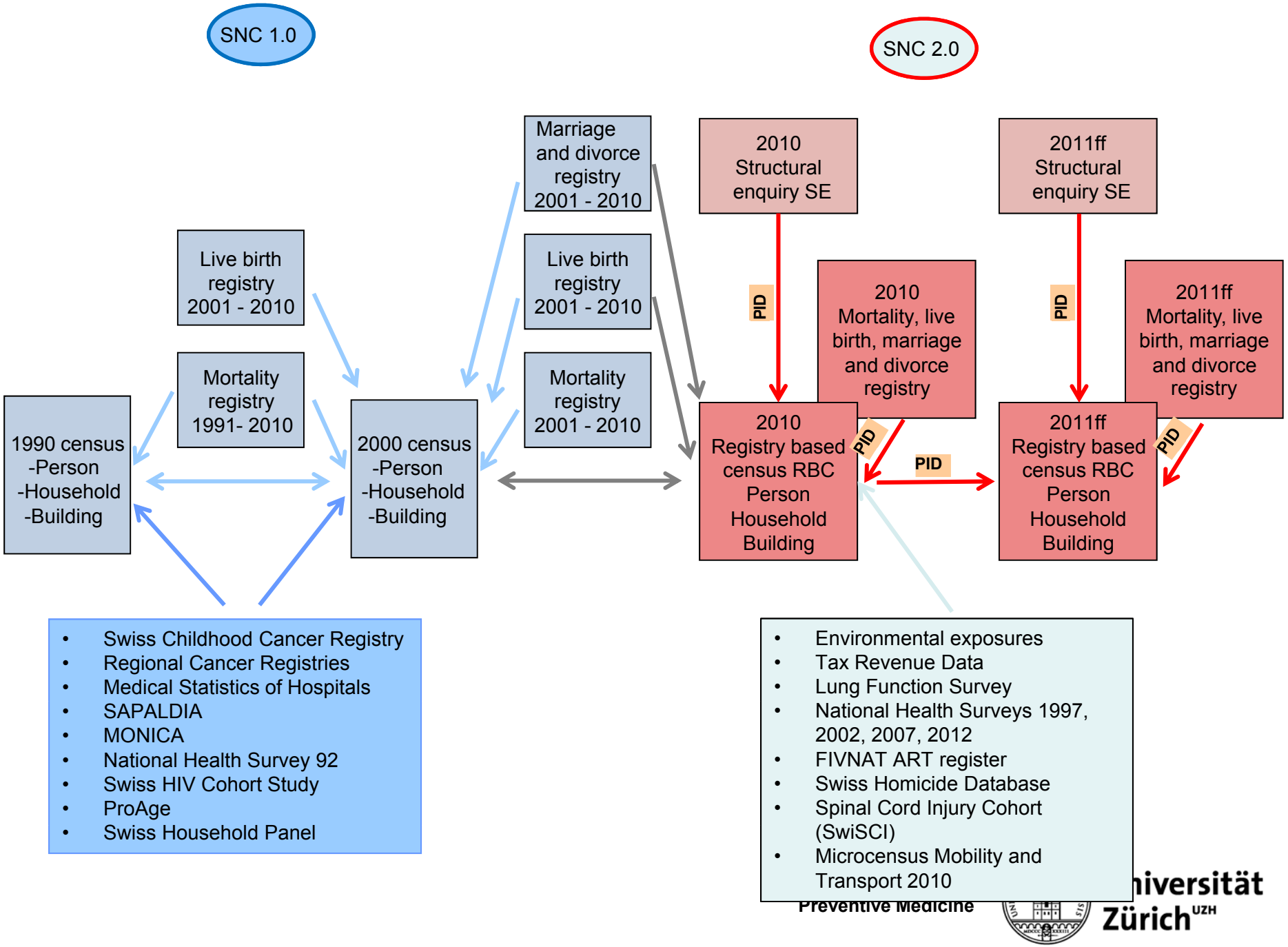
Confounders

- Probably no differences by altitude:
  - Obesity
  - Cigarette smoking
  - Physical inactivity
  - Eating pattern (e.g., fruit consumption)
  - Alcohol consumption
  - Diabetes
  - Genetic background


SNC 1.0
SNC 2.0
Marriage and divorce registry 2001 - 2010
2010 Structural enquiry SE
2011ff Structural enquiry SE
Live birth registry 2001 - 2010
Live birth registry 2001 - 2010
PID
2010 Mortality, live birth, marriage and divorce registry
PID
2011ff Mortality, live birth, marriage and divorce registry
Mortality registry 1991- 2010
Mortality registry 2001 - 2010
1990 census -Person -Household -Building
2000 census -Person -Household -Building
2010 Registry based census RBC Person Household Building
PID
PID
2011ff Registry based census RBC Person Household Building
PID
• Swiss Childhood Cancer Registry
• Regional Cancer Registries
• Medical Statistics of Hospitals
• SAPALDIA
• MONICA
• National Health Survey 92
• Swiss HIV Cohort Study
• ProAge
• Swiss Household Panel
• Environmental exposures
• Tax Revenue Data
• Lung Function Survey
• National Health Surveys 1997, 2002, 2007, 2012
• FIVNAT ART register
• Swiss Homicide Database
• Spinal Cord Injury Cohort (SwiSCI)
• Microcensus Mobility and Transport 2010