# Socioeconomic status and the 25x25 risk factors as determinants of premature mortality: a multicohort study of 1.7 million men and women

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#### Silvia STRINGHINI

Senior lecturer, Epidemiologist

**IUMSP** University Institute for Social and Preventive Medicine, Lausanne University Hospital, Lausanne, Switzerland





# **Background**

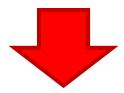
- In 2011, WHO put in place the 25x25 initiative, a plan to cut mortality due to non-communicable diseases by 25% by 2025 with actions on 7 major risk factors (25x25 risk factors):
  - √ harmful use of alcohol
  - ✓ insufficient physical activity
  - ✓ current tobacco use
  - √ raised blood pressure
  - ✓ intake of salt
  - √ diabetes
  - ✓ obesity
- Global Burden of Disease (GBD) Collaboration: annual risk assessment of the burden of disease and injury attributable to 67 risk factors in 21 world-regions





# **Background**

- Socioeconomic circumstances influence all these factors but are never included as targets in global health strategies
- However, they are modifiable by policies at the local, national, and international level as are risk factors targeted by existing global health strategies



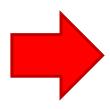
Objective: To compare the contribution of socioeconomic status to mortality and years-of-life-lost with that of the 25x25 conventional risk factors.





#### **Data**

- 48 independent prospective cohort studies (including Gazel) from Europe, the USA, and Australia with information on:
  - ✓ socioeconomic status (occupational position)
  - √25x25 risk factors (high alcohol intake, physical inactivity, current smoking, hypertension, diabetes and obesity)
  - ✓ Mortality



1 751 479 participants (54% women)





#### **Data**

- Socioeconomic status (last known occupational position in 3 categories)
- Smoking (current/ never/former)
- Alcohol consumption: abstainers (0 units per week) /moderate (1–21 units per week for men, 1–14 per week for women) /or heavy (>21 units per week for men, >14 per week for women) drinkers.
- Physical inactivity: differently for each cohort
- Body-mass index (BMI): normal (18-5–<25 kg/m²), overweight (25–<30 kg/m²), or obese (≥30 kg/m²).</p>
- Hypertension: SBP≥140 mm Hg or DBP ≥ 90 mm Hg or current intake of anti-hypertensive medication or self-reported hypertension
- Diabetes fasting glucose ≥ 7 mmol/L or 2 h post-load glucose ≥ 11·1 mmol/L or glycated haemoglobin A1c ≥ 6·5% or self-reported diabetes
- Data for salt intake only available from a few cohort studies so it was omitted from our analysis





# Statistical analysis

- Analyses first performed separately in each study; estimates subsequently combined in a meta-analytical framework
- HR and 95% Cls generated using flexible parametric survival models on the cumulative hazards scale
- Separate models fitted for men and women and included marital status and race or ethnicity (minimally adjusted models)
- Models then mutually adjusted for all risk factors simultaneously (mutually adjusted)
- Population attributable fraction (PAF) calculated based on the HR and the proportion of participants exposed
- Years of life lost calculated as difference of the areas under the survival curves (from age 40 years to 85 years) comparing population exposed to a given risk factor with the reference population with no exposure





#### Results

- Over 26.6 million person-years at risk (mean follow-up 13.3 years), 310,277 participants died
- In men, 43 765 (15·2% of total) with low occupational position died and 17 160 (11·5%) with high occupational position died
- In women, 11 835 (9·4% of total) with low occupational position died and 8292 (6·8%) with high occupational position died
- Participants with low occupational position had higher mortality risk than did those with high occupational position, HR 1-42, 95% CI 1-38–1-45 for men HR 1-34, 1-28–1-39 for women



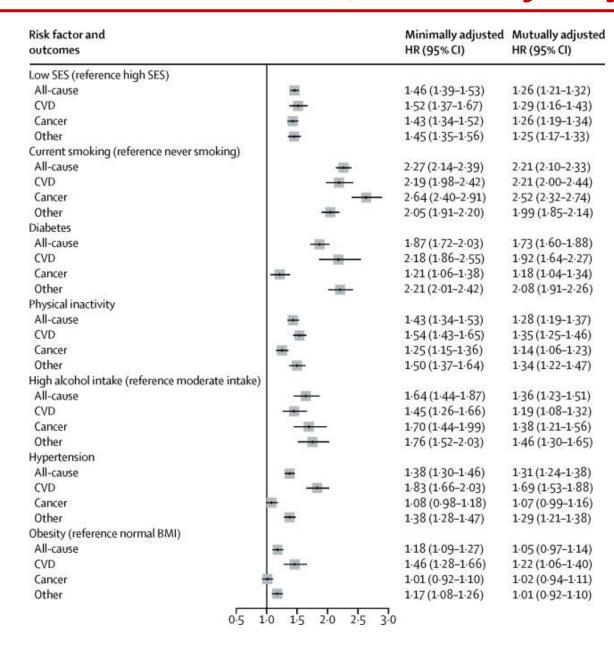


#### Results – HR SES and 25x25 risk factors

Risk factor	Deaths	Participants	Time at risk (years)		HR (95% CI)
Low SES (referer	ce high SES)	**************			100 mm m
Men	87716	619402	9835775	+	1.42 (1.38-1.45)
Women	48791	592157	9538159	100	1.34 (1.28-1.39)
Current smoking	(reference neve	er smoking)			
Men	37238	276686	3150820		2.17 (2.06-2.29)
Women	46 447	423861	5271704	-	2.02 (1.91-2.14)
Diabetes					
Men	39655	262745	3089811	-	1.69 (1.56-1.83)
Women	38162	325540	3749 493	-	1.88 (1.73-2.03)
Physical inactivit	y			1	
Men	39794	259265	3029468	100	1.60 (1.50-1.70)
Women	45353	398992	4941600	-	1.58 (1.48-1.67)
High alcohol inta	ake (reference m	oderate alcohol i	ntake)		
Men	33151	235245	2808575	-	1.50 (1.38-1.64)
Women	37864	363666	4649162	-	1.69 (1.49-1.92)
Hypertension				Marie San	
Men	41034	273190	3184326	=	1.30 (1.24-1.36)
Women	44340	391681	4752337	-	1.28 (1.21-1.36)
Obesity (referen	ce normal BMI)				and the second of the transportation of
Men	131882	636779	17632210	-	1.04 (0.98-1.11)
Women	136680	815005	22310188		1.17 (1.10-1.24)

Association of low SES with mortality comparable to that of the other major risk factors

# Results – HRs, mutually adjusted models



**Association** between low socioeconomic status and mortality consistent across causes of death and remained significant in mutually adjusted models

# **Et Gazel?**

Men	Deaths	Mean follow-up (years)		HR (95% CI)
COLAUS	55	6-16		2.08 (0.98-4.38)
NHIS 2009	86	3-22		1.23 (0.72-2.11)
NHIS 2008	111	4-18		1.25 (0.78-2.00)
MIDUS	133	11.61		1-21 (0-81-1-81)
EPIPORTO	144	6-88 -	<b>—</b>	1.64 (0.94-2.86)
NHIS 2007	148	5-13 —		1.30 (0.85-1.99)
NCDS	159	7-45	<b>_</b>	1.74 (1.15-2.64)
NHIS 2006	183	6-09		1.82 (1.29-2.58)
NHANES 2007	190	3.86	-	1.21 (0.85-1.73)
NHANES 2005	234	5:73 —	-	1-17 (0-85-1-60)
NHIS 2005	290	7.00		1.09 (0.80-1.48)
NHIS 2003	291	9-10 —		1.14 (0.86-1.50)
WLSS	360	12.72		1-31 (1-04-1-65)
NHIS 2002	372	10-05		1.90 (1.47-2.47)
NHANES 2003	381	7.39	-	1.19 (0.94-1.49)
NHIS 2001	463	11-01		1.89 (1.49-2.39)
NHANES 1999	479	10-51		1-33 (1-07-1-66)
NHANES 2001	483	9-12		1.46 (1.19-1.80)
WLSG	502	14-95		1-49 (1-23-1-82)
NHANES II	528	13.74		1.32 (1.05-1.64)
NHIS 2000	530	11-94		1.47 (1.19-1.81)
NHIS 1999	540	12-88		1.66 (1.34-2.04)
NHANES III	656	14-47		1.39 (1.14-1.69)
WHITEHALLII	708	20-40		1.57 (1.21-2.04)
NHIS 1998	719	13.78		1-47 (1-23-1-75)
EPIC Italy	758	16-04		1.40 (1.05-1.88)
NHIS 1997	829	14-73		1.45 (1.23-1.70)
ELSA	840	7-30		1.46 (1.22-1.74)
NHIS 2004	1115	8-15		1.53 (1.32-1.77)
NHANES I	1147	18-58		1.48 (1.27-1.72)
NHIS 1996	1247	15-45		1.55 (1.36-1.78)
HRS	1279	17-28	- 100	1.50 (1.31-1.71)
HALS	1359	20-23		1.45 (1.25-1.68)
Alamada County	1547	26.06		1 30 (113 147)
SAZEL	1935	25-34		1.68 (1.48-1.9))
NHIS 1995	2293	16-31		1.38 (1.25-1.52)
NHIS 1994	3029	17-18		1-46 (1-34-1-59)
NHIS 1993	3090	18-08	- <del>101</del> -	1-44 (1-32-1-57)
NHIS 1986	3331	23-69		1-41 (1-29-1-53)
NHIS 1992	3898	19-83	-	1-36 (1-26-1-47)
NHIS 1991	4152	19-75		1-32 (1-22-1-42)
NHIS 1990	4590	20-59	=	1-37 (1-28-1-48)
NHIS 1989	4848	21-41	<del></del>	1-40 (1-31-1-50)
NHIS 1988	5564	22-21	=	1-37 (1-29-1-46)
NHIS 1987	6018	22-93		1.38 (1.29-1.46)
WHIP	21049	11-60	-	1-47 (1-36-1-60)
Pooled HR				1-42 (1-38-1-45)
Prediction interval			<u> </u>	1.33-1.51
Prediction interval				

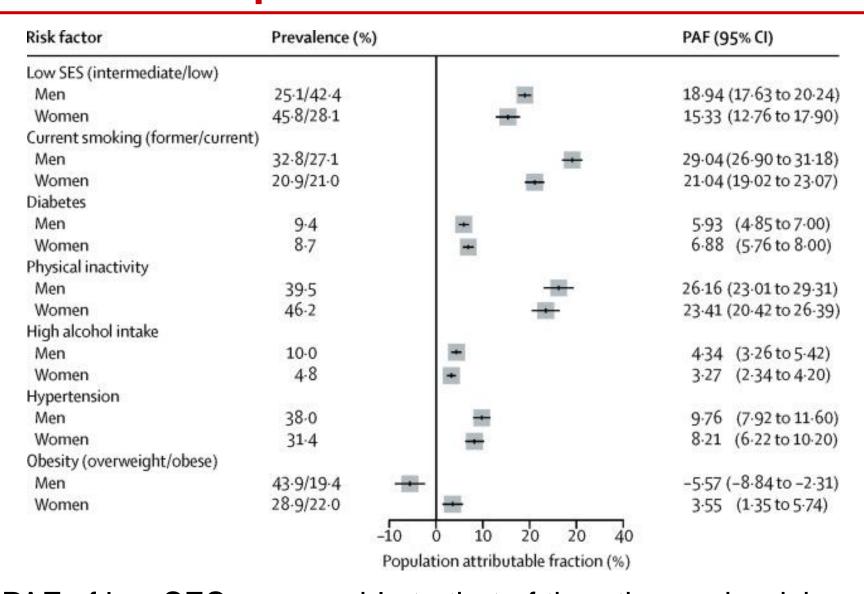


F=14-5%, t²=0-0008
0.5
1.0
2.5

Typer 1: Mortality for low versus high occupational position in men in 46 cohort studies
HRs are adjusted for age, marital status, and race or ethnicity. Pooled HR is represented with a grey diamo: Sociale et préventive, Lausanne

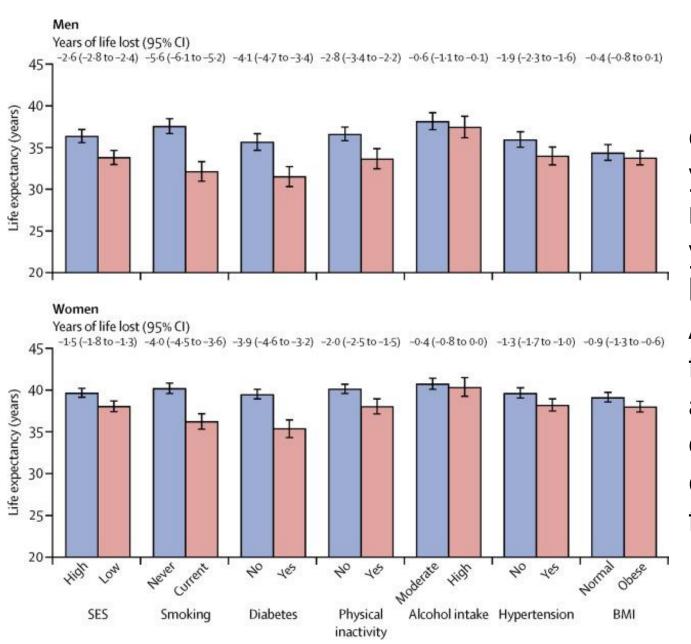
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# **Results- Population Attributable Fraction**



PAF of low SES comparable to that of the other major risk factors

# **Results: Years of Life Lost**



Partial life expectancy at 40 years reduced by more than 2 years because of low SES. All other 25x 25 factors were associated with decreased life expectancy, apart from BMI

# Interpretation

Comparable health impact of low socioeconomic status to that of major risk factors → socioeconomic circumstances, in addition to the 25x25 factors, should be treated as a target for local and global health strategies, health risk surveillance, interventions and policy

#### Limitations:

- ✓ Use of single indicator of SES
- ✓ Difficult to disentangle interconnected pathways
- ✓ PAF assume causal relationships
- ✓ Broad categorizations of risk factors and SES
- ✓ Heterogeneity across cohorts





# **Conclusions**

- Existing global strategies and actions defined in the 25 x 25 health plan and the Global Burden of Diseases surveillance programme potentially exclude a major determinant of health from the agenda
- Similar to the risk factors targeted by existing global health strategies, socioeconomic circumstances are modifiable by policies at the local, national, and international levels:
  - ✓ promotion of early childhood development
  - ✓ poverty reduction
  - ✓ improvements to access to high-quality education
  - ✓ enacting of compulsory schooling laws
  - ✓ creation of safe home, school, and work environments
    (some examples)





# Thank you for your attention



