

Socio-economic inequalities in mortality and the contribution of life styles in the Italian Longitudinal Study.

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Background

- In Italy there is significant differences in mortality according to Socioeconomic position for both men and women.

- Marinacci C, Grippo F, Pappagallo M et al. Social inequalities in total and cause-specific mortality of a sample of the Italian population, from 1999 to 2007. *European Journal of Public Health*, Vol. 23, No. 4, 582–587)

Background

- In most European countries, about 90% of total deaths is due to chronic diseases.
- Many chronic diseases share common behavioural risk factors such as tobacco smoking, unhealthy diet, lack of physical activity and alcohol use.

- World Health Organization. Noncommunicable Diseases (NCD) Country Profiles, 2014. Ita-ly. Disponibile all'indirizzo: http://www.who.int/nmh/countries/ita_en.pdf?ua=1
- Institute for Health Metrics and Evaluation. Global Burden of Disease (GBD). Washington 2014. Disponibile all'indirizzo: www.healthdata.org/gbd

Background

- Several studies have investigated the role of **behavioural factors as mediators of socio-economic differences** in overall and cause-specific mortality.

(Lantz PM, et al. 1998; Schrijvers CT, et al. 2003; Woodward M, et al. 2003; Strand BH, et al. 2004; Harald K, et al. 2006)

Background

- Most of these studies shows that the lifestyles explain **about 30-50%** of the socioeconomic **differences in mortality**
- **Tobacco smoke** and **sedentary behavior** seems to be the most important factors explaining these differences.

- Laaksonen M, Talala K, Martelin T, et al. Health behaviours as explanations for educational level differences in cardiovascular and all-cause mortality: a follow-up of 60 000 men and women over 23 years *European Journal of Public Health*, 2008 Vol. 18, No. 1, 38–43

Aims

- measure **socioeconomic inequalities in mortality** from natural causes
- estimate the **contribution of behavioral risk factors** (smoking, low physical activity and overweight) to these inequalities

in a large Italian cohort.

Methods: data collection

- **Study population** composed of subjects who participated in the **1999 Italian National Health Survey** (carried out by the **Italian National Institute of Statistics (ISTAT)** **every five years**, at each occasion on independent samples of the Italian population)
- For the 1999 survey, ISTAT collected information on **140,011 subjects**, belonging to about 52,000 different households, distributed over 1,449 Italian municipalities, with a **non-response rate of 14.3%**
- **Mortality Follow-up**: from January 1st **2000** to December 31st **2012**, **restricted to 128,818 subjects** with complete demographic information (about 92% of the sample) to perform linkage with the National Archive of Mortality (ISTAT).
- Only subjects **25-74 years old were included** in the study
- **Final study population: 85,308 subjects** (49% males) corresponding to 1,092,010 person-years and 8,082 death during follow-up

Methods: data analysis

- Relative risks of mortality by **educational level** (4 categories: university degree, high school diploma, low secondary, elementary or less) estimated through **Poisson robust regression models**, stratifying by gender
- Stepwise regression models performed to assess the mortality and the **Explained fraction (EF)** by behavioral factors ($EF = (RR1 - RR2) / (RR1 - 1) \times 100$):
 - **Model I:** adjusted for **age class** (5-years), **area of residence** (North, Center, South)
 - **Model II:** model I + quartiles of the **Physical Component Summary (PCS)** score (SF-12) + quartiles of a **Chronic Morbidity Index**
 - **Model III:** model II + **behavioral risk factors**
 - physical activity level** (4 classes: no physical activity, light, moderate, intense activity)
 - body mass index (BMI)** (4 classes: normal weight: BMI 18.5-24.9; underweight: BMI <18.5; overweight: BMI 25-29.9; obese: BMI ≥30)
 - smoking history** during lifetime (pack-years smoked in quartiles among current or former smokers, with non-smokers as the reference category)

Outcomes Investigated

- **mortality from natural causes**
- mortality from major groups of causes (not presented now):
 - cancer mortality,
 - cardiovascular mortality,
 - respiratory mortality,
 - mortality of the digestive system

Results: behavioural risks by educational level and gender

Education level	High	Interm ediate 1	Interm ediate 2	Low	High	Interm ediate 1	Interm ediate 2	Low	Total	Total
	Men (%)				Women (%)				Men (%)	Women (%)
Body Mass Index										
Underweight (< 18.5)	0.8	1.0	0.6	0.6	6.5	5.7	3.2	1.2	0.7	3.4
Normal (18.5 - 24.9)	59.7	55.0	46.8	34.3	74.6	70.6	60.4	36.8	46.7	55.6
Overweight (25 - 29.9)	34.7	37.7	42.8	48.8	15.6	18.3	27.2	41.0	42.3	28.9
Obesity (>= 30)	4.8	6.4	9.8	16.3	3.3	5.5	9.3	20.9	10.2	12.0
Smoking status										
Never smoker	47.3	42.1	33.4	31.8	61.0	59.4	60.7	79.0	36.7	67.2
Former smoker	25.2	25.2	26.1	39.1	17.3	17.0	14.2	9.6	29.5	13.5
Current smoker	27.5	32.7	40.5	29.1	21.7	23.6	25.0	11.5	33.8	19.3
Physical activity status										
Intense	24.6	21.8	12.4	2.9	19.6	14.4	7.2	2.3	13.5	8.4
Regular	32.2	31.7	28.0	26.6	26.6	26.7	23.0	17.4	29.1	22.3
Light	26.3	26.7	30.3	35.5	32.1	34.5	38.0	38.7	30.4	36.8
Never	16.8	19.8	29.2	35.0	21.7	24.4	31.8	41.6	27.0	32.5

Results: overall mortality and behaviours

Model III: Age, Education, Health status and behaviours	Men			Women		
	RR	CI 95%		RR	CI 95%	
Body Mass Index						
Underweight (< 18.5)	1			1		
Normal (18.5 - 24.9)	1,39	0,84	2,31	1,34	1,01	1,77
Overweight (25 - 29.9)	0,87	0,8	0,94	0,84	0,75	0,94
Obesity (>= 30)	0,84	0,74	0,94	1,13	1	1,28
Pack-year	1			1		
1° quartile	0,99	0,77	1,26	1,03	0,81	1,31
2° quartile	1,08	0,93	1,26	1,24	1,05	1,48
3° quartile	1,3	1,16	1,46	1,32	1,12	1,56
4° quartile	1,59	1,45	1,75	1,66	1,36	2,02
Physical activity status						
Intense	1			1		
Regular	1,21	0,98	1,49	0,84	0,61	1,15
Light	1,49	1,21	1,83	1,21	0,9	1,63
Never	1,81	1,47	2,22	1,46	1,08	1,96

Results: overall mortality (men 25-74 anni)

Men 25-74	Model I (Age, geo area)			Model II (Age, geo area, health status)			Model III (Age, geo area, health status, behavioural factors)			Model III vs Model II
	RR	CI 95%		RR	CI 95%		RR	CI 95%		Explained fraction (%)
University degree	1,00			1,00			1,00			
High school diploma	1,04	0,92	1,18	0,99	0,87	1,12	0,96	0,85	1,09	-
Low secondary	1,23	1,10	1,38	1,11	0,99	1,25	1,07	0,96	1,20	36,6
Elementary or less	1,60	1,39	1,86	1,35	1,16	1,57	1,26	1,08	1,47	25,5

XP=26,7% without adjustment for health status

Results: overall mortality (women 25-74 anni)

Women 25-74	Modell I (Age)			Model II (health status)			Model III (Age, health status, behavioural factors)			Model III vs Model II
Educational level	RR	CI 95%		RR	CI 95%		RR	CI 95%		Explained fraction (%)
University degree	1,00			1,00			1,00			
High school diploma	1,08	0,89	1,32	1,05	0,86	1,29	1,07	0,87	1,30	0,0
Low secondary	1,36	1,14	1,62	1,27	1,06	1,51	1,31	1,09	1,56	0,0
Elementary or less	1,52	1,25	1,85	1,34	1,10	1,63	1,38	1,13	1,69	0,0

Discussion: behavioural factors

Study results confirm for both genders associations reported by other studies:

- **for tobacco smoking** (Woodward M et al. 2003; Strand BH, et al. 2004; Harald K, et al. 2006)

- **for low physical activity** (Lantz PM, et al. 1998; Schrijvers CT, 1999)

demonstrating a good predictive validity of self-reported information on these factors.

Discussion: body mass index

For the BMI, the **protective association** observed **in men is controversial** in the literature, although recent studies have also shown a similar effect.

(Veronese N, et al. 2015; De Schutter A, et al. 2011)

Discussion

- among **men lifestyles explain 25% of the differences** in overall mortality between the extreme classes of education
- in **women lifestyles do not explain** any difference by education
- the **consistency** of these results with those produced by other studies appears only partial.

Discussion

- A Finnish study estimated that lifestyles explain **45% of the difference in mortality among men and 38% among women** (but the study considered a **greater number of behavioral factors**, including vegetables, fat, and alcohol use)

•Laaksonen M, et al. Health behaviours as explanations for educational level differences in cardiovascular and all-cause mortality: a follow-up of 60 000 men and women over 23 years *European Journal of Public Health*, Vol. 18, No. 1, 38–43

- A British study showed that **smoking and BMI** explained 37% among men and 19% among women of the difference in mortality .

•McFadden E, et al. Occupational social class, educational level, smoking and body mass index, and cause-specific mortality in men and women: a prospective study in the European Prospective Investigation of Cancer and Nutrition in Norfolk (EPIC-Norfolk) cohort. *Eur J Epidemiol.* 2008;23(8):511-22

- A Dutch study estimated an explained fraction of **53%** for: smoking, alcohol, physical activity and body mass index in a **cohort including men and women.**

•Schrijvers CT, et al. Explaining educational differences in mortality: the role of behavioral and material factors. *Am J Public Health.* 1999;89(4):535-40

Conclusions

This study shows the presence of **significant differences** in overall mortality (from natural causes) by **educational level** in both men and women.

Conclusions

The inclusion in the model of **smoking habit, physical inactivity and BMI** reduced the differences in mortality between extreme educational categories by **25% in men**, whereas it had **no effect in women**.

Conclusions

- The explained fraction observed in this study may have been underestimated, because of lack of information on **other behavioral factors** not considered in this study.
- Among these, **diet and alcohol** might be relevant, given the key role that these risk factors play in the development of several chronic diseases.

Conclusions: for prevention

- Important focus prevention intervention (plan, program) to reduce health inequalities
- Learn about effects of prevention intervention on socioeconomic inequalities (reduction, no effects, increase)

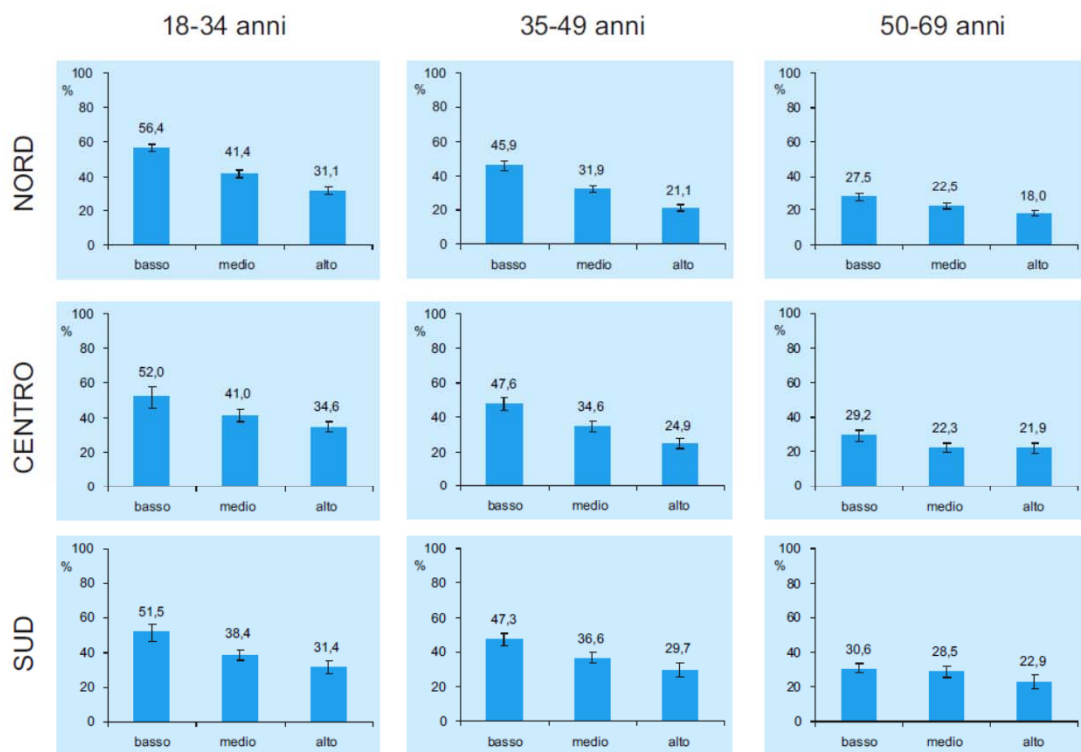
R. McGill et al. Are interventions to promote healthy eating equally effective for all? Systematic review of socio economic inequalities in impact. BMC Public Health, 2015.

Thank you
for your attention!

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Prevalenza di fumatori per livello socioeconomico², classe d'età e ripartizione geografica

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