Sistema Socio Sanitario
Regione Lombardia
ASST Spedali Civili

UNIVERSITA' DEGLI STUDI DI BRESCIA
DIPARTIMENTO DI SCIENZE CLINICHE E SPERIMENTALI

Le Malattie Croniche Non Trasmissibili (MCNT): fattori di rischio, fattori protettivi, stili di vita

Maria Lorenza Muiesan

Definizione

Malattie croniche non trasmissibili (Non-communicable diseases, NCDs): 4 principali gruppi

- **Malattie cardiovascolari** (ictus, infarto)
- **Tumori**
- **Malattie respiratorie croniche** (BPCO, asma)
- **Diabete mellito**

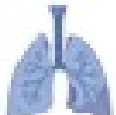
Sono il risultato di una combinazione di fattori genetici, fisiologici, ambientali e comportamentali

Non-Communicable Diseases (NCDs)

The four main types

Cardiovascular diseases (CVDs)

Cancer



Chronic respiratory diseases

Diabetes

Other types

- Hypertension
- Dyslipidemia
- Obesity
- Metabolic syndrome
- Rheumatoid arthritis (RA)
- Cerebrovascular disease
- Osteopenia/osteoporosis
- Degenerative disc disease
- Sarcopenia and frailty
- Depression
- Cognitive impairment
- Neurodegenerative disease

Impatto delle MCNT

- 41 milioni di persone ogni anno muoiono di NCDs (71% di tutti i decessi a livello globale)
  - Malattie cardiovascolari 17,9 milioni di morti/aa,
  - Neoplasie 9,3 milioni/aa
  - Malattie respiratory 4,1 milioni/aa
  - Diabete mellito 1,5 milioni/aa

- Questi 4 gruppi di patologie determinano l'80% di tutte le morti per MCNT

- Nella fascia di età 30-69 anni muoiono ogni anno 15 milioni di persone per una MCNT e oltre l'85% di questi decessi si verifica in paesi a basso e medio reddito

Fonte: WHO, aprile 2021

World Health Organization

GLOBAL ACTION PLAN

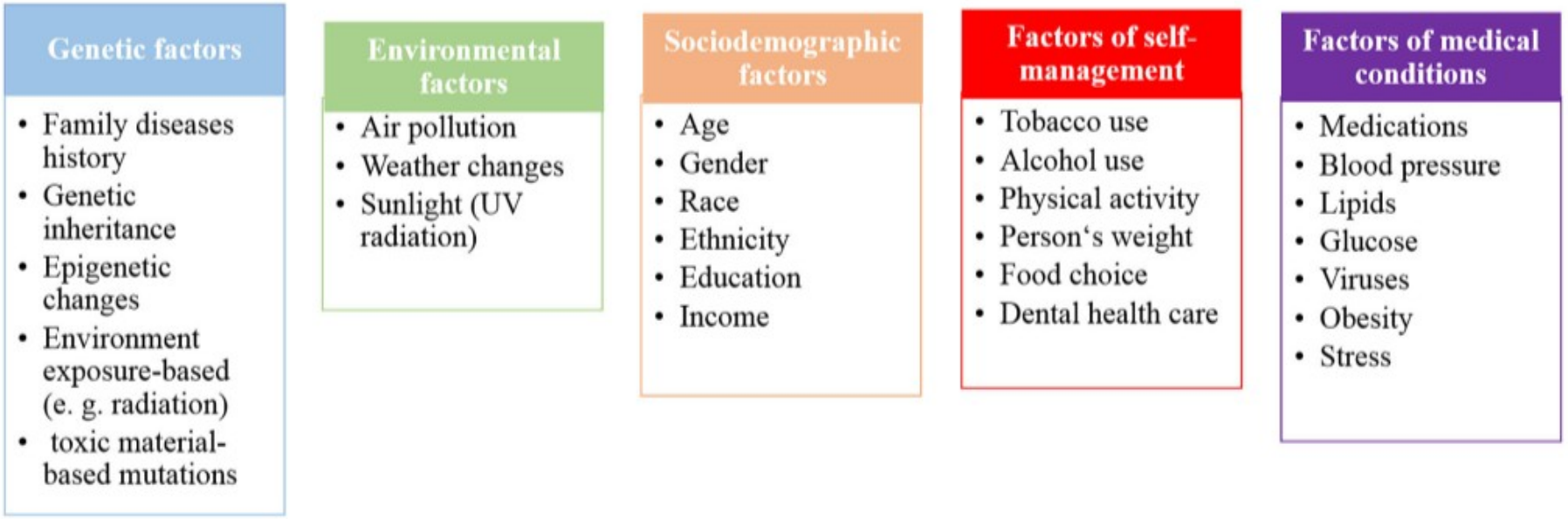
FOR THE PREVENTION AND CONTROL OF NONCOMMUNICABLE DISEASES

2013-2020

1. To raise the priority accorded to the prevention and control of noncommunicable diseases in global, regional and national agendas and internationally agreed development goals, through strengthened international cooperation and advocacy.
2. To strengthen national capacity, leadership, governance, multisectoral action and partnerships to accelerate country response for the prevention and control of noncommunicable diseases.
3. To reduce modifiable risk factors for noncommunicable diseases and underlying social determinants through creation of health-promoting environments.
4. To strengthen and orient health systems to address the prevention and control of noncommunicable diseases and the underlying social determinants through people-centred primary health care and universal health coverage.
5. To promote and support national capacity for high-quality research and development for the prevention and control of noncommunicable diseases.
6. To monitor the trends and determinants of noncommunicable diseases and evaluate progress in their prevention and control.

Obiettivo: ridurre del 25% rispetto al 2010 la mortalità prematura dovuta alle MCNT entro il 2025

Fattori di rischio



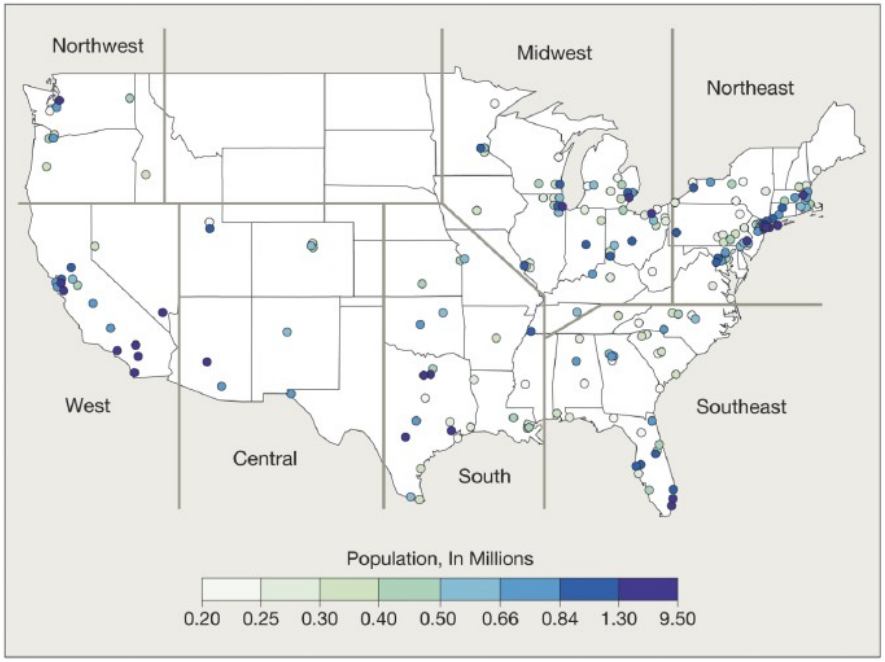
Budreviciute A, Front Public Health. 2020 Nov 26;8:574111

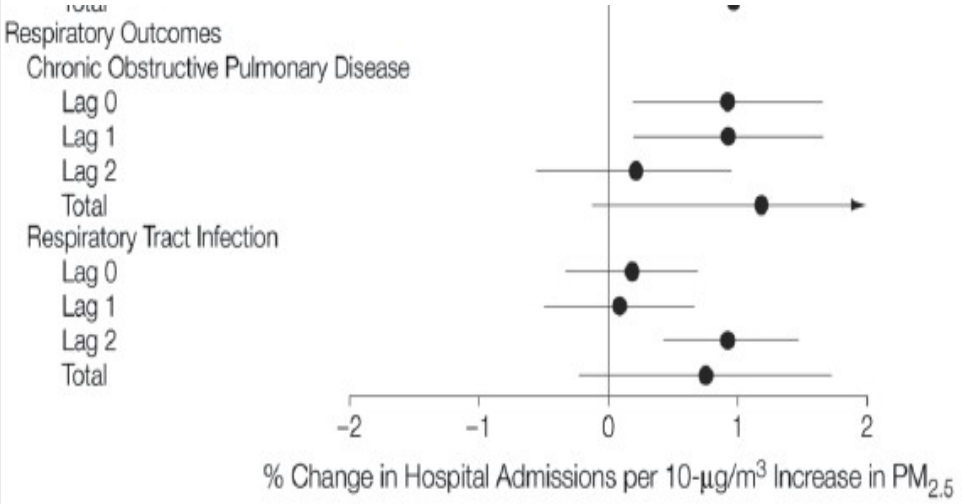
MCNT: fattori difficilmente modificabili

- Globalizzazione
- Urbanizzazione
- Inquinamento
- Invecchiamento
- Determinanti sociali, culturali ed economici

Respiratory diseases acute effects

Fine particulate air pollution and hospital admission for respiratory diseases

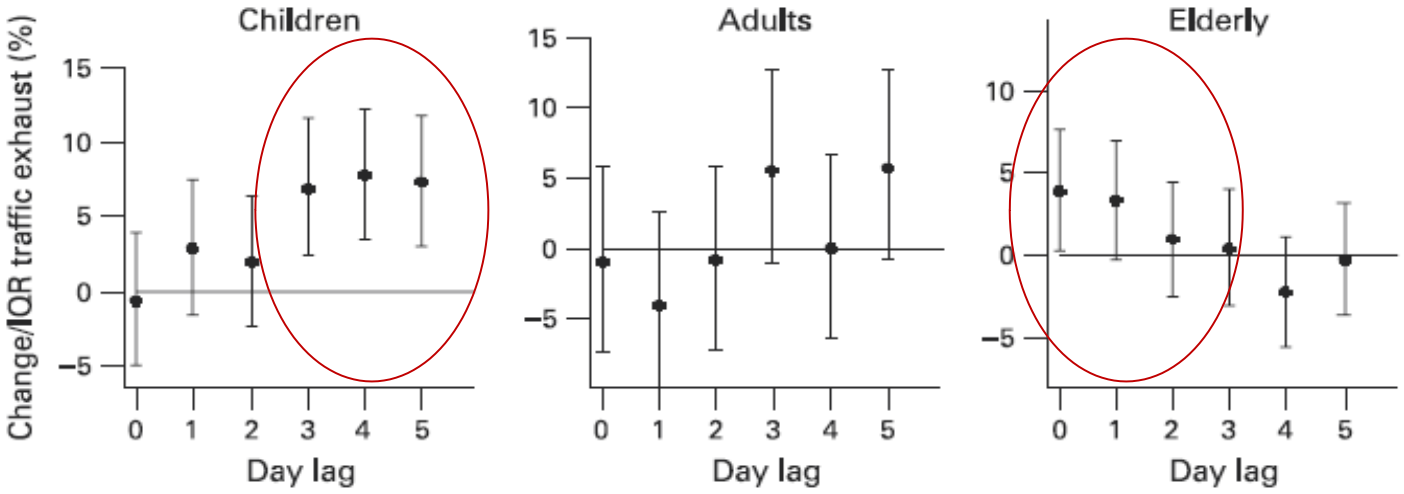




Dominici F, et al. JAMA 2006;295: 1127–34.

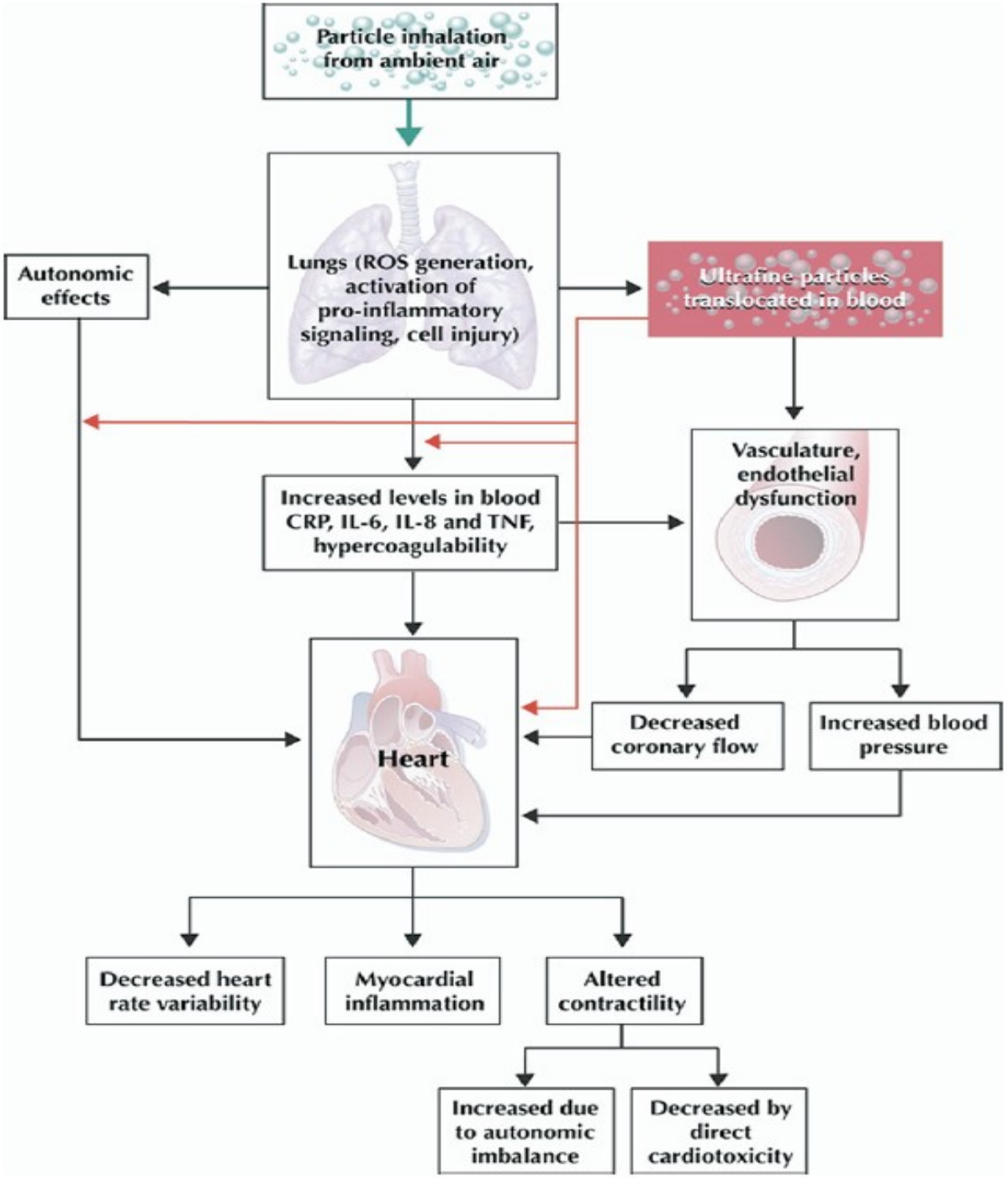
Respiratory diseases acute effects
Urban air pollution, and asthma and COPD hospital emergency room visits

Levels of particulate air pollution, NO2 and CO measured from 1998 to 2004 at central outdoor monitoring sites in Helsinki, Finland



Acute changes in levels of PM2.5 were associated with hospital admissions for asthma and COPD with a lag of 4 days in children but additionally demonstrated an immediate effect in the elderly.

Halonen JI et al Thorax 2008;63:635–41.

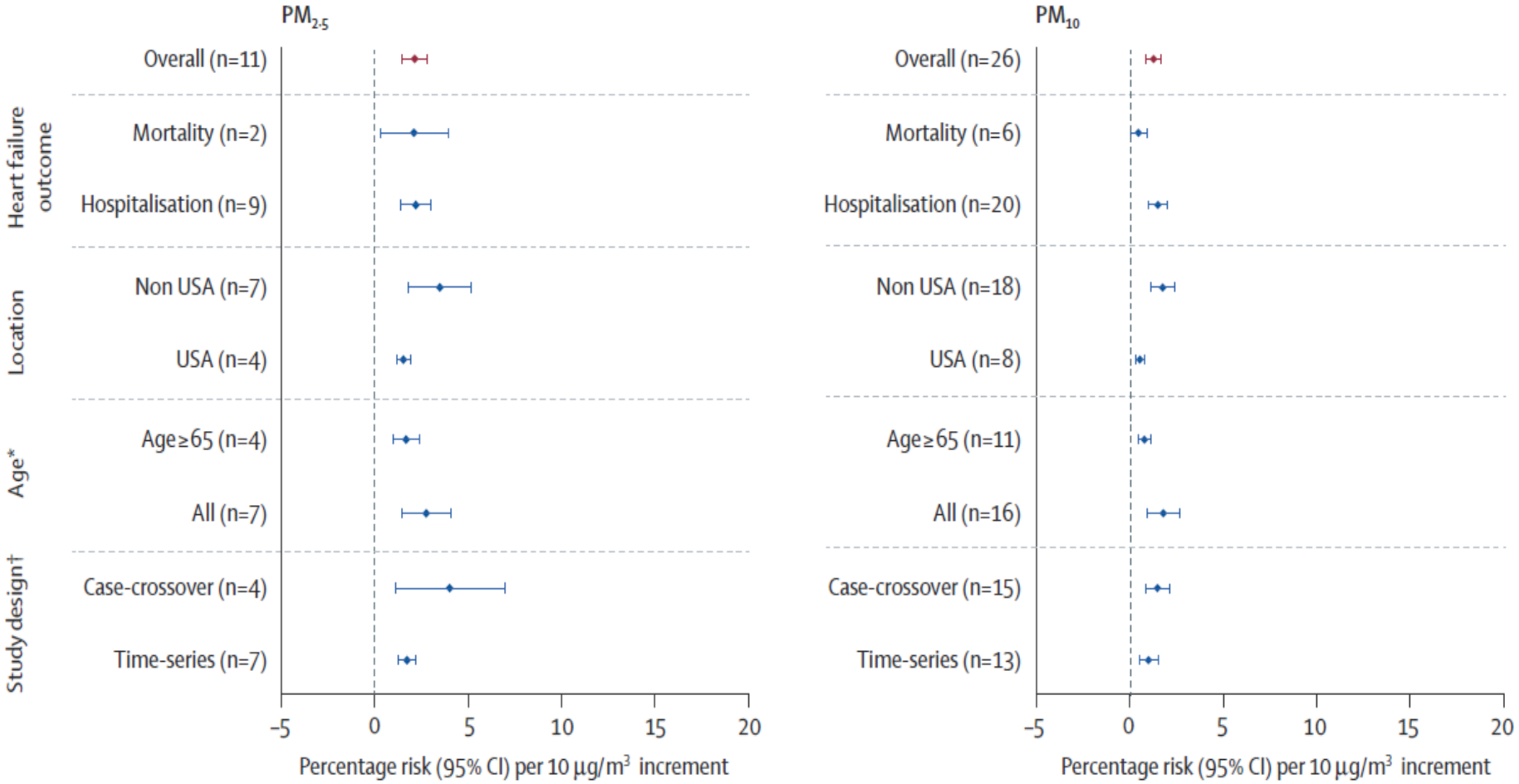

Particle inhalation from ambient air
Lungs (ROS generation, activation of pro-inflammatory signaling, cell injury)
Autonomic effects
Ultrafine particles translocated in blood
Increased levels in blood CRP, IL-6, IL-8 and TNF, hypercoagulability
Vasculature, endothelial dysfunction
Heart
Decreased coronary flow
Increased blood pressure
Decreased heart rate variability
Myocardial inflammation
Altered contractility
Increased due to autonomic imbalance
Decreased by direct cardiotoxicity

Global association of air pollution and heart failure: a systematic review and meta-analysis

	Gaseous pollutants				Particulate matter	
	Carbon monoxide (ppm)	Nitrogen dioxide (ppb)	Sulphur dioxide (ppb)	Ozone (ppb)	$PM_{2.5}$ ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)
Increment	1 ppm	10 ppb	10 ppb	10 ppb	10 $\mu g/m^3$	10 $\mu g/m^3$
Median pollutant concentration (IQR)*	1·1 (0·9–1·6)	26·4 (22·5–30·1)	6·3 (4·7–11·9)	23·5 (17·6–32·0)	15·0 (10·8–17·6)	38·0 (27·0–45·5)
Range (min–max)†	0·6–5·6	16·0–77·0	3·0–32·0	12·3–75·0	4·5–20·5	19·0–75·3
Number of studies	18	18	14	18	10	22
Number of estimates	27	28	23	25	11	26
Heterogeneity, I^2	91%	91%	78%	87%	53%	75%
Population-attributable risk, % (95% CI)‡	3·41 (2·46–4·34)	1·67 (1·23–2·11)	2·31 (1·33–3·27)	N/A	2·06 (1·38–2·72)	1·60 (1·18–2·03)

Anoop S V Shah ***Lancet*** **2013; 382: 1039–48**

Global association of air pollution and heart failure: a systematic review and meta-analysis



Anoop S V Shah ***Lancet*** **2013; 382: 1039–48**

Risk Factors for COPD

Genes

Exposure to particles

- Tobacco smoke
- Occupational dusts, organic and inorganic
- **Indoor air pollution from heating and cooking with biomass in poorly ventilated dwellings**
- **Outdoor air pollution**

Lung growth and development

Gender

Age

Respiratory infections

Socioeconomic status

Asthma/Bronchial hyperreactivity

Chronic Bronchitis

MCNT: fattori difficilmente modificabili

- Globalizzazione
- Urbanizzazione
- Inquinamento
- Invecchiamento
- Determinanti sociali, culturali ed economici

Social determinants (GDP of the country of origin)

Table 1 MMRs by country-of-birth groups in Europe adjusted for age and diabetes mortality level of countries of residence[61]

	Age and country-adjusted MRRs[a]	
Regression model	Men MRR (95% CI)	Women MRR (95% CI)
All migrants	1.9 (1.8–2.0)	2.2 (2.1–2.3)
North African[b]	1.4 (1.3–1.4)	1.7 (1.5–1.8)
Turkish	1.7 (1.4–2.0)	2.1 (1.7–2.6)
South Asian	3.7 (3.4–4.0)	4.4 (4.0–4.9)
GDP of COB		
1Q (<$2400)	3.8 (3.5–4.2)	3.9 (3.4–4.5)
2Q ($2400–$5300)	2.8 (2.6–2.9)	3.5 (3.2–3.7)
3Q ($5300–$9500)	1.8 (1.7–2.0)	2.2 (2.0–2.4)
4Q (≥$9500)	1.0 (0.9–1.2)	0.9 (0.8–1.1)

CI, confidence interval; COB, country of birth; GDP, gross domestic product; Q (1Q–4Q), quartile (first–fourth quartile); MMR, mortality rate ratio. [a] Derived from Poisson regression model with local-born populations as reference category. [b] Refers to migrants originating either from Algeria, Egypt, Libya, Morocco, Sudan or Tunisia.

Modesti PA et al. *J Cardiovasc Med* 2014, 15:683–692

Understanding the consequences of education inequality on cardiovascular disease: mendelian randomisation study

Alice R Carter,[1,2] Dipender Gill,[3] Neil M Davies,[1,2] Amy E Taylor,[2,4] Taavi Tillmann,[5] Julien Vaucher,[6,7] Robyn E Wootton,[1,4,8] Marcus R Munafò,[1,4,8,9] Gibran Hemani,[1,2] Rainer Malik,[10] Sudha Seshadri,[11,14] Daniel Woo,[15] Stephen Burgess,[1,16,17] George Davey Smith,[1,2,4] Michael V Holmes,[1,18,20] Ioanna Tzoulaki,[3,21,22] Laura D Howe,[1,2] Abbas Dehghan[3,21]

UK Biobank data
503.317 British adults

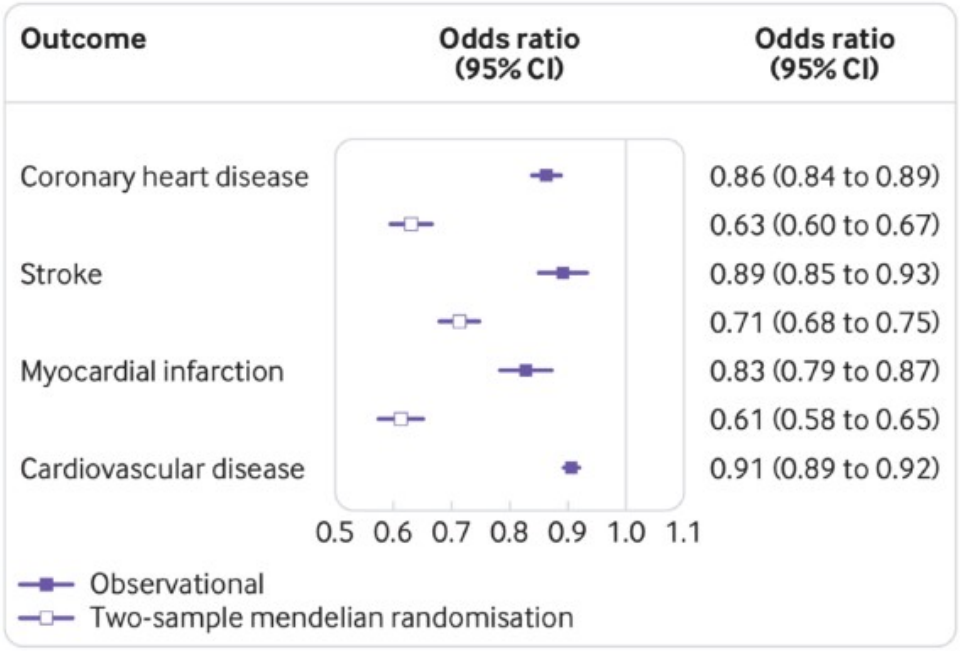


Fig 1 | The effect of a one standard deviation increase in education on the risk of cardiovascular disease outcomes

BMJ 2019;365:l1855

MCNT: fattori modificabili

- **Fattori di rischio comportamentali**: fumo, consumo dannoso di alcool, alimentazione non corretta, inattività fisica

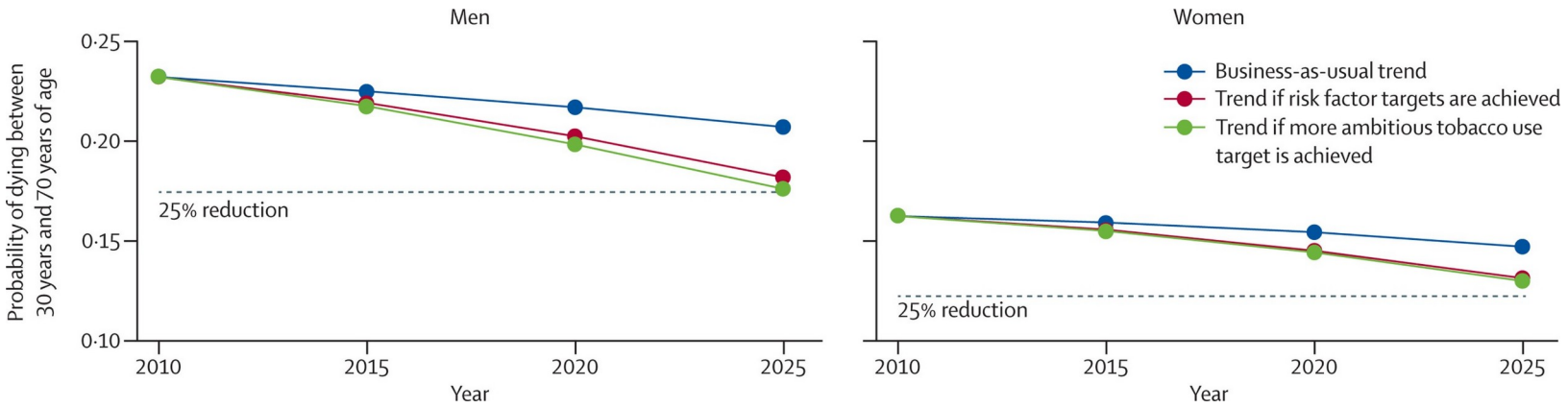
- **Fattori di rischio intermedi/metabolici**: ipertensione arteriosa, ipercolesterolemia, iperglicemia, sovrappeso/obesità

I fattori di rischio modificabili sono comuni alle diverse patologie, derivano da scelte individuali condizionate dal contesto di vita.

E' quindi fondamentale il loro rilevamento e contrasto, tramite la promozione di uno stile di vita sano e la prevenzione.

Contribution of six risk factors to achieving the 25×25 non-communicable disease mortality reduction target: a modelling study.

	Agreed target: 30% relative reduction in prevalence
Tobacco use	More ambitious target: 50% relative reduction in prevalence*
Harmful alcohol use	10% reduction in per-person alcohol consumption
Salt intake	30% reduction in mean population intake of salt
Obesity	Halting the rise in the prevalence of obesity
Raised blood pressure	25% relative reduction in the prevalence of raised blood pressure
Raised blood glucose and diabetes	Halting the rise in the prevalence of diabetes



Raggiungimento del target dei 6 fattori di rischio: la probabilità di morire per una delle quattro principali MCNT tra i 30 e i 70 anni si riduce del 22% negli uomini e 19 % nella donne, tra il 2010 e il 2025 (rispetto a una riduzione prevista del 11% negli uomini e 10% nelle donne mantenendo lo stesso trend senza azioni per contrastare i fattori di rischio)

Kontis V, et al. Lancet. 2014 Aug 2;384(9941):427-37

Fumo di tabacco

E’ il primo fattore di rischio delle MCNT a livello mondiale con circa un miliardo di fumatori, di cui l’80% vive in Paesi a basso e medio reddito.

Si stima che il consumo di tabacco sia la causa di otto milioni di decessi ogni anno a livello mondiale.

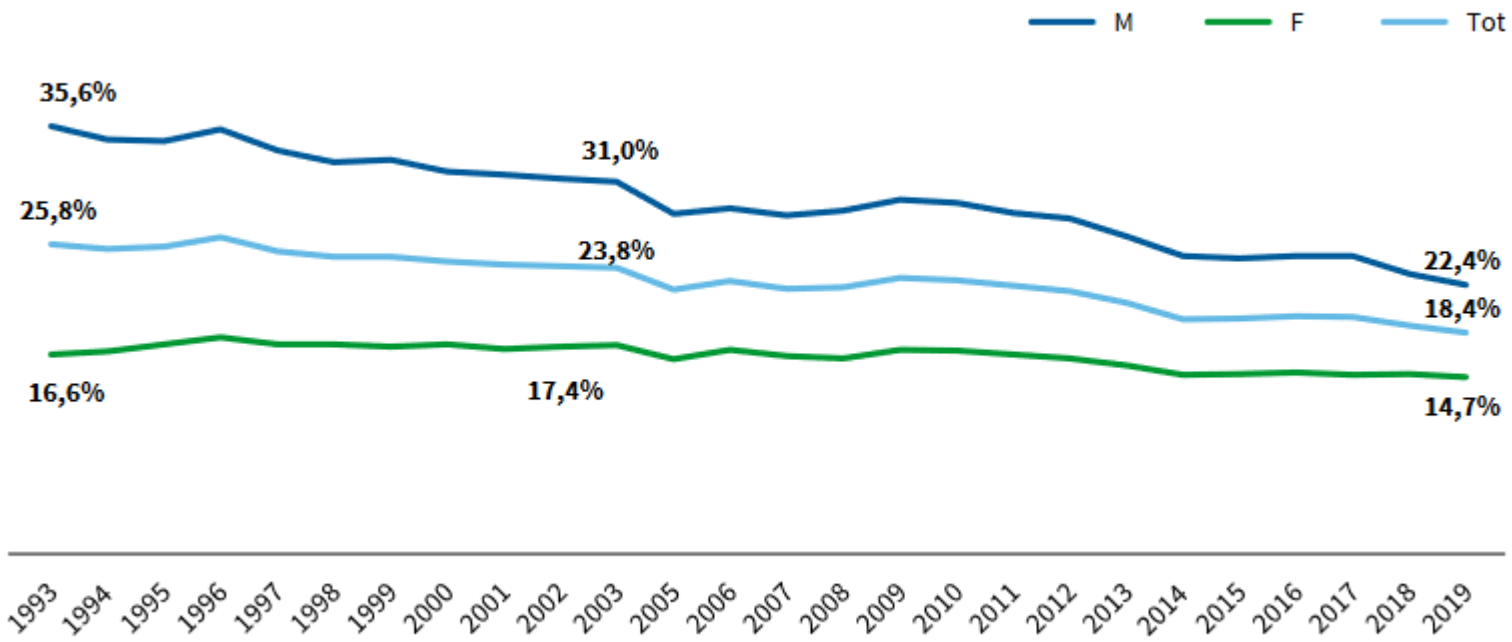
Tobacco dependence should be recognised as a lethal non-communicable disease

Reframing would extend the scope of tobacco control

Dan Xiao *professor*[1 2], Chen Wang *professor*[1 2]

British Medical Journal, 2019

Prevalenza di fumatori in Italia



Indagine ISTAT, «Prevenzione e controllo del tabagismo», 2020, Ministero della salute

Ruolo chiave nella prevenzione cardiovascolare

Patient category	Prevention goals (STEP 1)	Intensified/additional prevention goals[a] (STEP 2)
Apparently healthy persons	For BP and lipids: initiation of drug treatment based on CVD risk assessment or SBP >160 mmHg	
<50 years	Stop smoking and lifestyle optimization SBP <140 down to 130 mmHg if tolerated[b] LDL-C <2.6 mmol/L (100 mg/dL)	SBP <130 mmHg if tolerated[b] LDL-C <1.8 mmol/L (70 mg/dL) and ≥50% reduction in high-risk patients LDL-C <1.4 mmol/L (55 mg/dL) and ≥50% reduction in very-high-risk patients
50–69 years	Stop smoking and lifestyle optimization SBP <140 down to 130 mmHg if tolerated[b] LDL-C <2.6 mmol/L (100 mg/dL)	SBP <130 mmHg if tolerated[b] LDL-C <1.8 mmol/L (70 mg/dL) and ≥50% reduction in high-risk patients LDL-C <1.4 mmol/L (55 mg/dL) and ≥50% reduction in very-high-risk patients
≥70 years	Stop smoking and lifestyle optimization SBP <140 mmHg if tolerated[b] LDL-C <2.6 mmol/L (100 mg/dL)	For specific risk factor management in patients ≥70 years old, please see relevant sections in *section 4*.
Patients with CKD	Stop smoking and lifestyle optimization SBP <140 down to 130 mmHg if tolerated[b] LDL-C <2.6 mmol/L (100 mg/dL) and ≥50% LDL-C reduction Otherwise according to ASCVD and DM history	LDL-C <1.8 mmol/L (70 mg/dL) in high-risk patients and <1.4 mmol/L (55 mg/dL) in very-high-risk patients (see *Table 4*)
Patients with FH	Stop smoking and lifestyle optimization SBP <140 down to 130 mmHg if tolerated[b] LDL-C <2.6 mmol/L (100 mg/dL) and ≥50% LDL-C reduction Otherwise according to ASCVD and DM history	LDL-C <1.8 mmol/L (70 mg/dL) in high-risk patients and <1.4 mmol/L (55 mg/dL) in very-high-risk patients (see *Table 4*)

2021 ESC Guidelines on cardiovascular disease prevention in clinical practice (European Heart Journal)

Ruolo chiave nella prevenzione cardiovascolare

Patient category	Prevention goals (STEP 1)	Intensified/additional prevention goals[a] (STEP 2)
People with type 2 DM		
Well-controlled short-standing DM e.g. <10 years), no evidence of TOD and no additional ASCVD risk factors	Stop smoking and lifestyle optimization	
Without established ASCVD or severe TOD (see *Table 4* for definitions)	Stop smoking and lifestyle optimization SBP <140 down to 130 mmHg if tolerated[b] LDL-C <2.6 mmol/L (100 mg/dL) HbA1c <53 mmol/mol (7.0%)	SBP <130 mmHg if tolerated[b] LDL-C <1.8 mmol/L (70 mg/dL) and ≥50% reduction SGLT2 inhibitor or GLP-1RA
With established ASCVD and/or severe TOD (see *Table 4* for definitions)	Stop smoking and lifestyle optimization SBP <140 down to 130 mmHg if tolerated[b] LDL-C <1.8 mmol/L (70 mg/dL) HbA1c <64 mmol/mol (8.0%) SGLT2 inhibitor or GLP-1RA CVD: antiplatelet therapy	SBP <130 mmHg if tolerated[b] LDL-C <1.4 mmol/L (55 mg/dL) and ≥50% reduction SGLT2 inhibitor or GLP-1RA if not already on *May additionally consider novel upcoming treatments: DAPT, dual pathway inhibition, colchicine, icosapent ethyl, etc.*
Patients with established ASCVD	Stop smoking and lifestyle optimization SBP <140 down to 130 mmHg if tolerated[b] Intensive oral lipid-lowering therapy aiming at LDL-C <1.8 mmol/L (70 mg/dL) and ≥50% reduction Antiplatelet therapy	SBP <130 mmHg if tolerated[b] LDL-C <1.4 mmol/L and ≥50% reduction (55 mg/dL) *May additionally consider novel upcoming treatments: DAPT, dual pathway inhibition, colchicine, icosapent ethyl, etc.*

2021 ESC Guidelines on cardiovascular disease prevention in clinical practice (European Heart Journal)

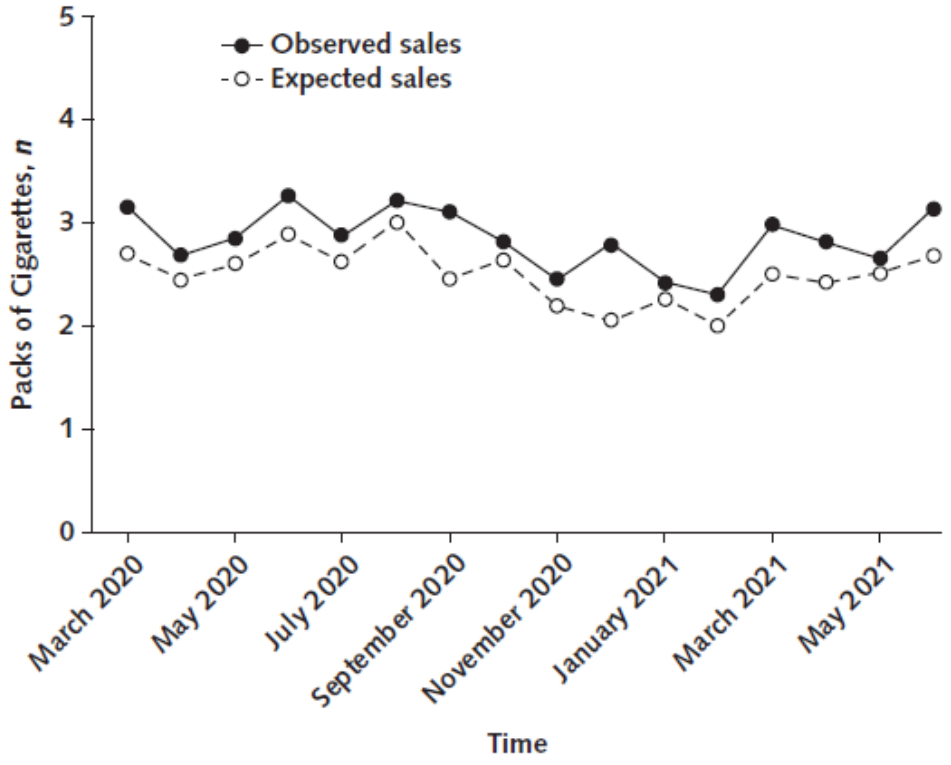
Annals of Internal Medicine

OBSERVATIONS: BRIEF RESEARCH REPORTS

Annals of Internal Medicine 19 October 2021.

Changes in Cigarette Sales in the United States During the COVID-19 Pandemic

Figure 1. Observed and expected monthly cigarette sales per capita (packs) from March 2020 to June 2021.

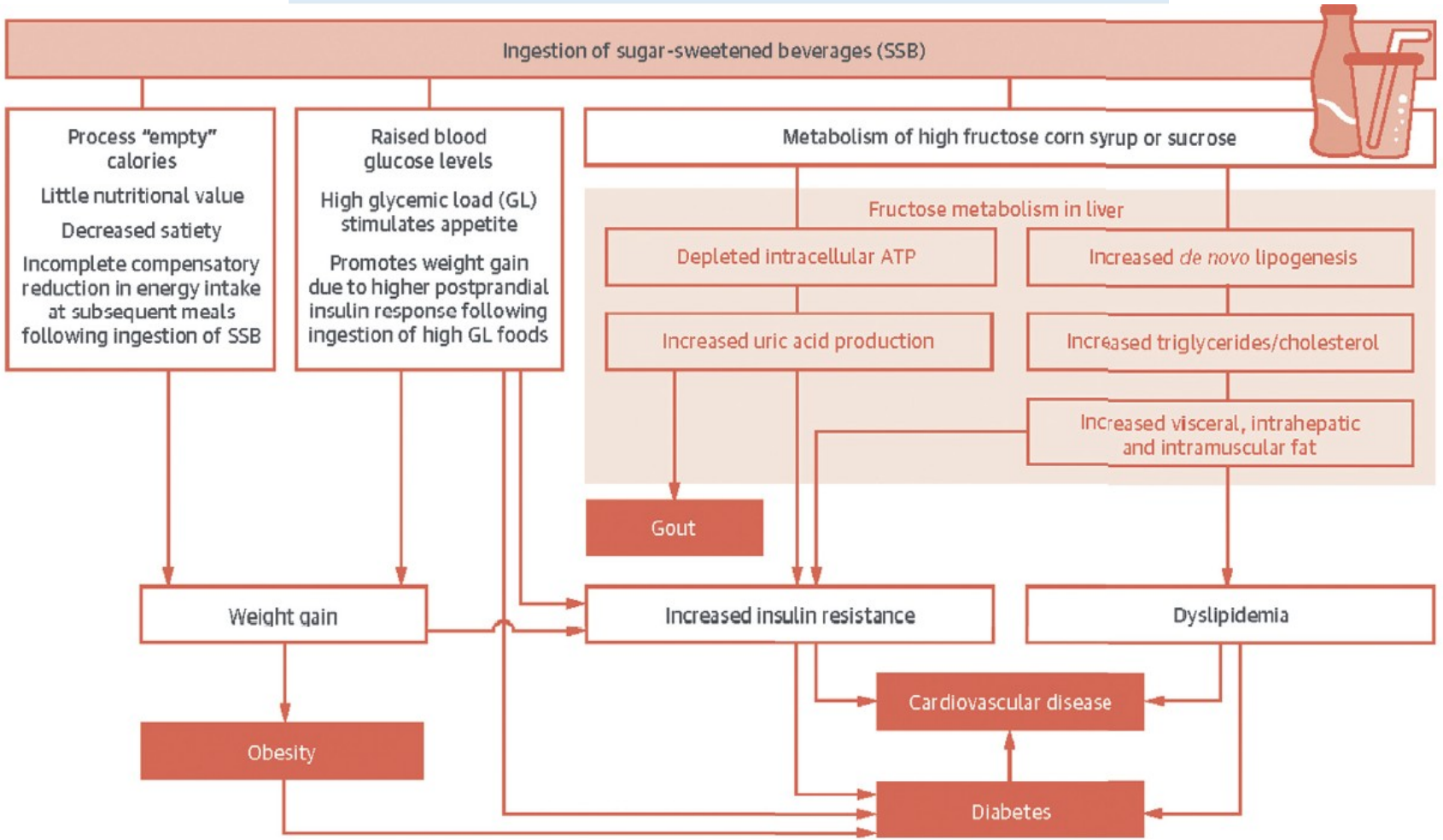


Alimentazione

Modello di dieta mediterranea

- assumere <5 g di sale al giorno
- 30-45 g di fibre al giorno (cereali)
- >200 g di frutta al giorno (>2-3 porzioni)
- >200 g di verdura al giorno (>2-3 porzioni)
- 30 g di noci al giorno
- carne rossa massimo 350-500 g a settimana
- ridurre l'apporto di grassi saturi (che dovrebbero rappresentare meno del 10% dell'apporto energetico totale) e sostituirli con acidi grassi polinsaturi
- ridurre l'assunzione di bevande gasate e succhi di frutta

Fructose and Cardiometabolic Health: Sugar Sweetened Beverages (SSBs)



Malik, V.S. et al. J Am Coll Cardiol. 2015; 66(14):1615–24.

2020 International Society of Hypertension Global Hypertension Practice Guidelines

Thomas Unger, Claudio Borghi, Fadi Charchar, Nadia A. Khan, Neil R. Poulter, Dorairaj Prabhakaran, Agustin Ramirez, Markus Schlaich, George S. Stergiou, Maciej Tomaszewski, Richard D. Wainford, Bryan Williams, Aletta E. Schutte

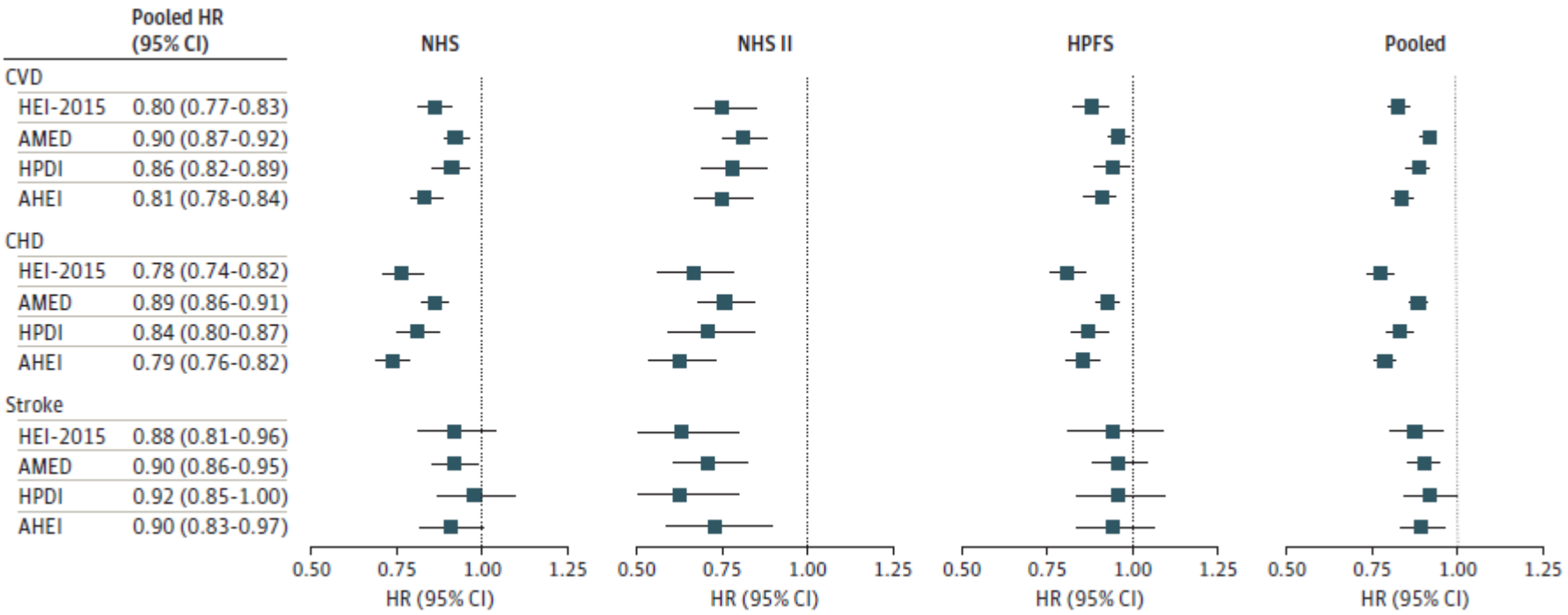
Salt reduction	There is strong evidence for a relationship between high salt intake and increased blood pressure.[47] Reduce salt added when preparing foods, and at the table. Avoid or limit consumption of high salt foods such as soy sauce, fast foods and processed food including breads and cereals high in salt.
Healthy diet	Eating a diet that is rich in whole grains, fruits, vegetables, polyunsaturated fats and dairy products and reducing food high in sugar, saturated fat and trans fats, such as the DASH diet (http://www.dashforhealth.com).[48] Increase intake of vegetables high in nitrates known to reduce BP, such as leafy vegetables and beetroot. Other beneficial foods and nutrients include those high in magnesium, calcium and potassium such as avocados, nuts, seeds, legumes and tofu.[49]
Healthy drinks	Moderate consumption of coffee, green and black tea.[50] Other beverages that can be beneficial include karkadé (hibiscus) tea, pomegranate juice, beetroot juice and cocoa.[49]
Moderation of alcohol consumption	Positive linear association exists between alcohol consumption, blood pressure, the prevalence of hypertension, and CVD risk.[51] The recommended daily limit for alcohol consumptions is 2 standard drinks for men and 1.5 for women (10 g alcohol/standard drink). Avoid binge drinking.

Association Between Healthy Eating Patterns and Risk of Cardiovascular Disease

- AHEI indicates Alternate Healthy Eating Index;
- AMED, Alternate Mediterranean Diet Score;
- HEI-2015, Healthy Eating Index–2015;
- HPDI, Healthful Plant-Based Diet Index;

5 257 190 person-years of follow-up

32 YEARS fu



JAMA Intern Med. 2020;180(8):1090-1100.

Obesità

- In Italia il 31,6% della popolazione è sovrappeso (BMI 25-29,9), il 10,8% obeso (BMI >30).
- Le persone in sovrappeso o obese sono poco consapevoli del loro eccesso ponderale.
- Ruolo del personale medico:

	Italia		
	%	IC95% inf	IC95% sup
Obesi consigliati dal medico/operatore sanitario di perdere peso	71.8	70.7	72.9
Sovrappeso consigliati dal medico/operatore sanitario di perdere peso	37.2	36.5	37.8
Obesi consigliati dal medico/operatore sanitario di fare attività fisica	50.3	49.1	51.5
Sovrappeso consigliati dal medico/operatore sanitario di fare attività fisica	32.5	31.9	33.2

Sorveglianza PASSI, dati 2017-2020

L’essere in eccesso ponderale è una caratteristica più frequente al crescere dell’età, fra gli uomini rispetto alle donne, fra le persone con difficoltà economiche e fra le persone con un basso livello di istruzione.

Obesi		ITALIA n = 110742		
		%	IC95% inf	IC95% sup
Età	18-34	5.3	5.0	5.7
	35-49	10.0	9.6	10.4
	50-69	15.1	14.6	15.5
Sesso	uomini	11.5	11.1	11.8
	donne	10.2	9.9	10.5
Istruzione	nessuna / elementare	24.2	22.7	25.7
	media inferiore	15.3	14.8	15.8
	media superiore	8.8	8.5	9.1
	laurea	5.8	5.4	6.3
Difficoltà economiche	molte	17.4	16.6	18.3
	qualche	12.2	11.8	12.6
	nessuna	8.3	8.0	8.6
Cittadinanza	italiana	10.8	10.5	11.0
	straniera	11.3	10.4	12.3
Macro area di residenza	nord	10.0	9.7	10.4
	centro	8.9	8.5	9.3
	sud e isole	12.4	12.0	12.9

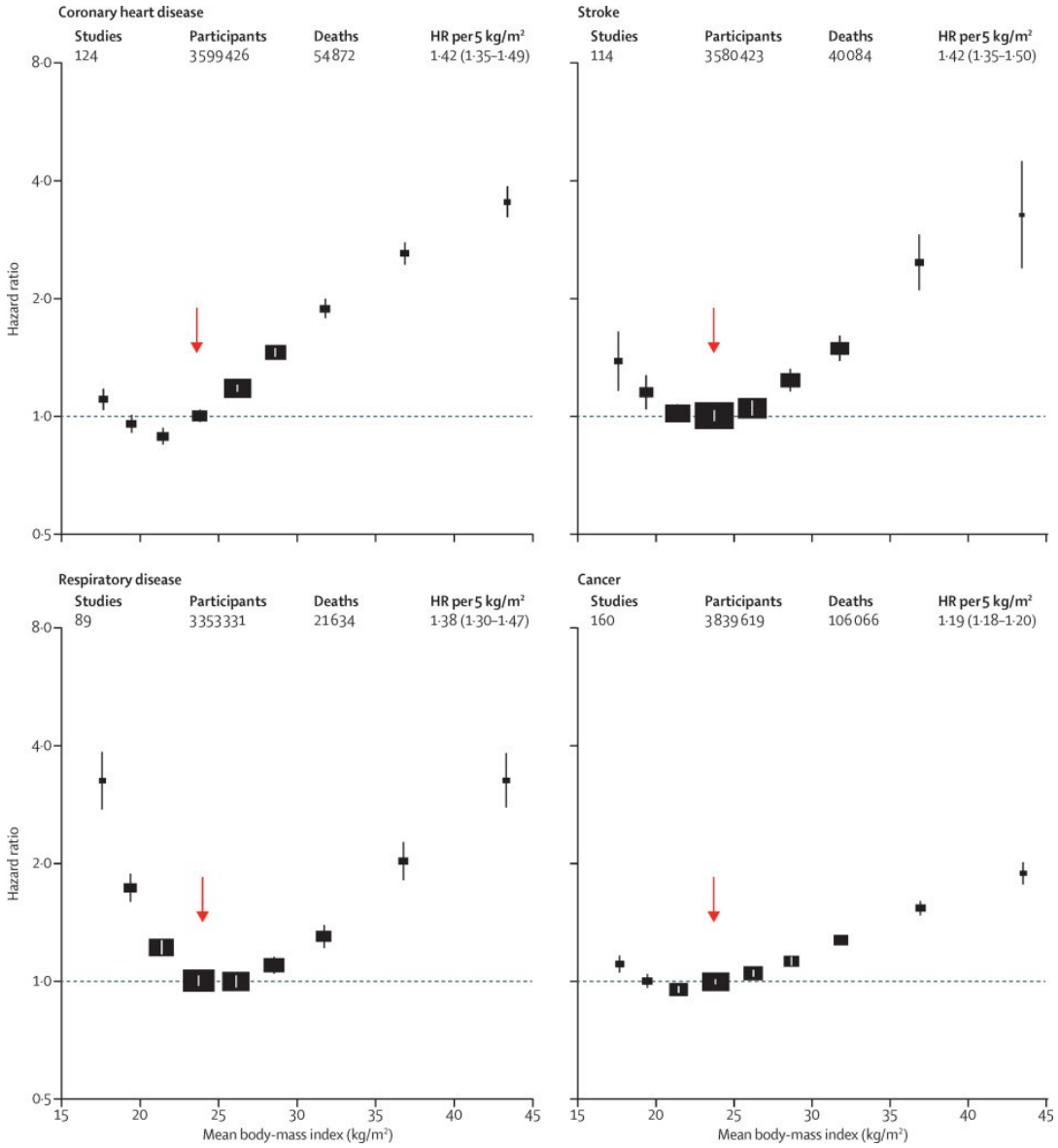
Sovrappeso		ITALIA n = 110742		
		%	IC95% inf	IC95% sup
Età	18-34	20.7	20.1	21.3
	35-49	31.5	30.9	32.1
	50-69	39.0	38.4	39.5
Sesso	uomini	39.3	38.8	39.8
	donne	24.2	23.7	24.6
Istruzione	nessuna / elementare	40.2	38.5	41.9
	media inferiore	37.8	37.1	38.4
	media superiore	29.8	29.3	30.3
	laurea	25.2	24.4	26.0
Difficoltà economiche	molte	33.2	32.1	34.4
	qualche	33.7	33.1	34.3
	nessuna	29.8	29.3	30.3
Cittadinanza	italiana	31.7	31.3	32.0
	straniera	31.5	30.1	32.9
Macro area di residenza	nord	29.5	29.0	30.0
	centro	29.4	28.8	30.0
	sud e isole	34.6	34.0	35.2

Sorveglianza PASSI, dati 2017-2020

Global BMI Mortality Collaboration, Di Angelantonio E, Bhupathiraju ShN, et al **Body-mass index and all-cause mortality: individual-participant-data meta-analysis of 239 prospective studies in four continents**. Lancet. 2016 Aug 20;388(10046):776-86

Above 25 kg/m², BMI was strongly positively related to coronary heart disease, stroke, and respiratory disease mortality, and moderately positively related to cancer mortality; these findings were broadly similar in Europe, North America and east Asia.

In all regions, underweight was associated with substantially higher respiratory disease mortality.



Importanza dello stile di vita

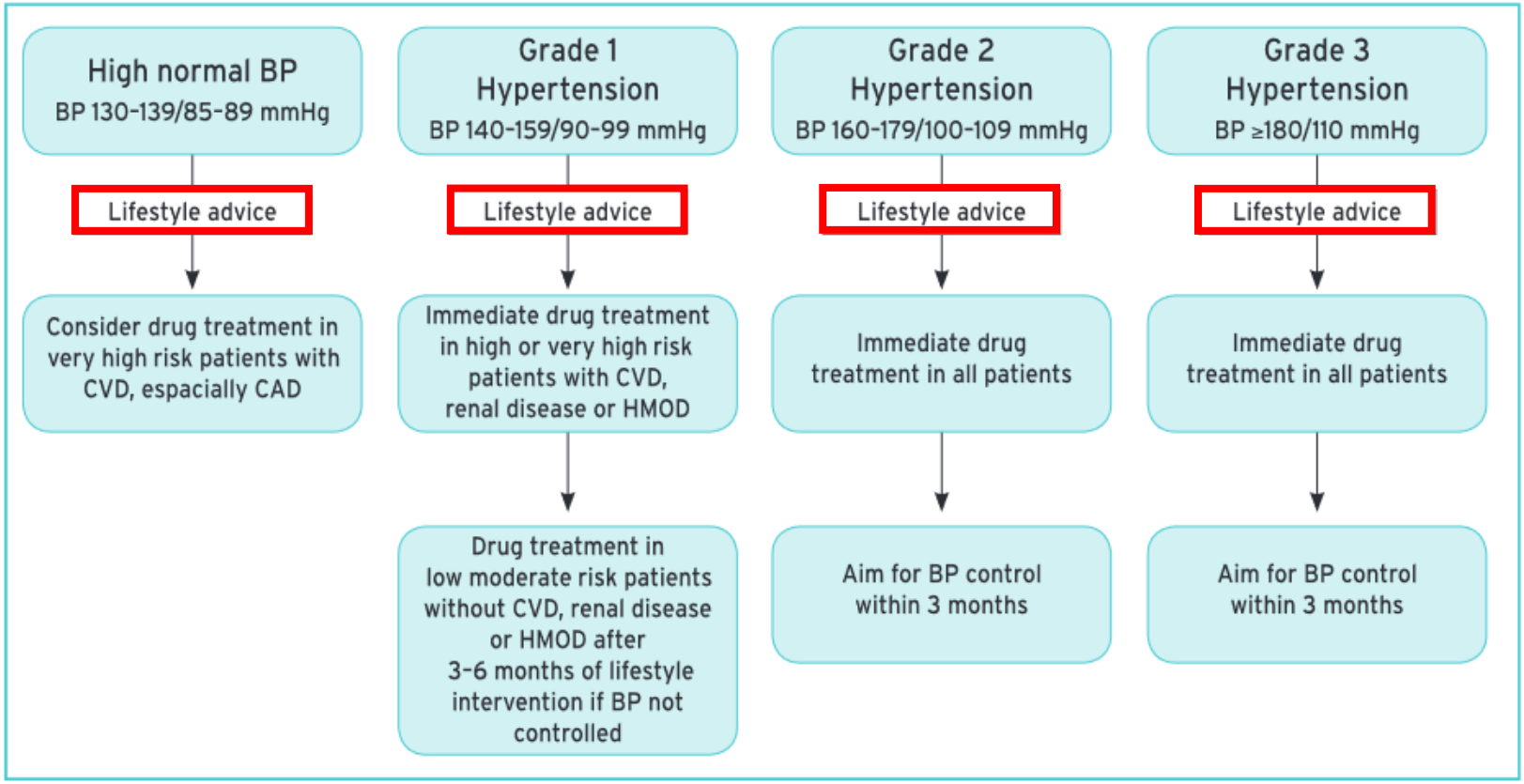
Lifestyle interventions for patients with hypertension or high-normal BP

Recommendations	Class[a]	Level[b]
Salt restriction to < 5 g per day is recommended [248,250,255,258].	I	A
It is recommended to restrict alcohol consumption to: • Less than 14 units per week for men. • Less than 8 units per week for women [35].	I	A
It is recommended to avoid binge drinking.	III	C
Increased consumption of vegetables, fresh fruits, fish, nuts, and unsaturated fatty acids (olive oil); low consumption of red meat; and consumption of low-fat dairy products are recommended [262,265].	I	A
Body-weight control is indicated to avoid obesity (BMI > 30 kg/m^2 or waist circumference >102 cm in men and > 88 cm in women), as is aiming at healthy BMI (about 20–25 kg/m)^2 and waist circumference values (< 94 cm in men and < 80 cm in women) to reduce BP and cardiovascular risk [262,271,273,290].	I	A
Regular aerobic exercise (e.g. at least 30 min of moderate dynamic exercise on 5–7 days per week) is recommended [262,278,279].	I	A
Smoking cessation, supportive care, and referral to smoking cessation programs are recommended [286,288,291].	I	B

2018 ESC/ESH Guidelines for the management of arterial hypertension

Ipertensione arteriosa

- Uno dei principali fattori di rischio per le malattie cardiovascolari
- Origina dall'effetto combinato di fattori genetici ereditari e di fattori ambientali, come ad esempio l'eccessiva introduzione di sale, l'obesità, il fumo



2018 ESC/ESH Guidelines for the management of arterial hypertension

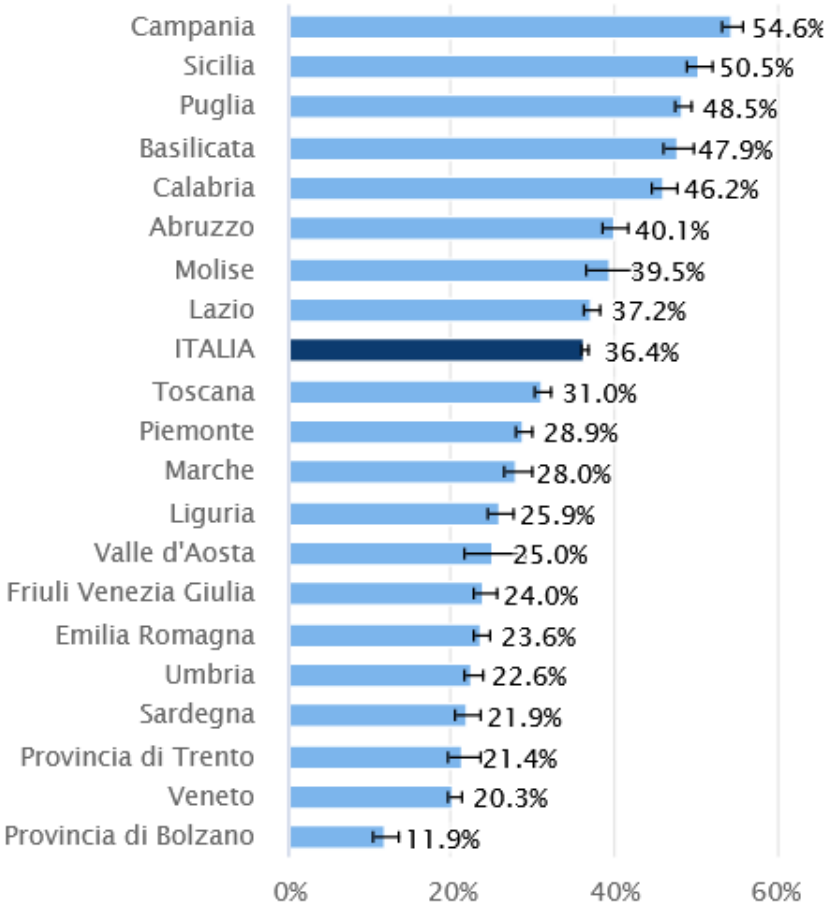
Fattori protettivi

Attività fisica

Definizione: qualsiasi movimento corporeo prodotto dai muscoli scheletrici che richiede un dispendio energetico

Migliora la qualità di vita ad ogni età in quanto influisce positivamente sia sullo stato di salute fisica sia sul grado di soddisfazione personale (supportando il benessere psichico e sociale)

Sedentari in Italia



Sorveglianza PASSI, dati 2017-2020

Lee IM, Shiroma EJ, Lobelo F, Puska P, Blair SN, Katzmarzyk PT; Lancet Physical Activity Series Working Group. **Effect of physical inactivity on major non-communicable diseases worldwide: an analysis of burden of disease and life expectancy.** Lancet. 2012 Jul 21;380(9838):219-29

	Coronary heart disease	Type 2 diabetes	Breast cancer*	Colon cancer	All-cause mortality
Prevalence of inactivity in population (%)†	35·2% (22·3–40·5)	35·2% (22·3–40·5)	38·8% (23·3–44·3)	35·2% (22·3–40·5)	35·2% (22·3–40·5)
Prevalence of inactivity in people eventually developing the outcome (%)†	42·2% (23·0–56·2)	43·2% (23·6–57·6)	40·7% (22·5–56·7)	42·9% (23·4–57·1)	42·9% (23·4–57·1)
RR, unadjusted‡	1·33 (1·18–1·49)	1·63 (1·27–2·11)	1·34 (1·25–1·43)	1·38 (1·31–1·45)	1·47 (1·38–1·57)
RR, adjusted‡	1·16 (1·04–1·30)	1·20 (1·10–1·33)	1·33 (1·26–1·42)	1·32 (1·23–1·39)	1·28 (1·21–1·36)
PAF with unadjusted RR (%)§	10·4% (7·2–13·4)	18·1% (10·8–22·8)	11·6% (6·8–15·5)	11·8% (6·8–15·1)	14·2% (8·3–18·0)
PAF with adjusted RR (%)§	5·8% (3·2–7·8)	7·2% (3·9–9·6)	10·1% (5·6–14·1)	10·4% (5·7–13·8)	9·4% (5·1–12·5)

Physical inactivity was defined as insufficient physical activity to meet present recommendations. RR=relative risk. PAF=population attributable fraction. *Women only.

Table 1: **Summary of estimates of the prevalence of physical inactivity, RRs, and PAFs for coronary heart disease, type 2 diabetes, breast cancer, colon cancer, and all-cause mortality associated with physical inactivity**

E’ stato stimato che l’inattività fisica causa il 6% del burden of disease per malattia coronarica, 7% per DM tipo 2, 10% per tumore alla mammella e 10% per tumore del colon. L’inattività fisica determina il 9% delle morti premature.

Attività fisica: effetti

- Aiuta a prevenire le malattie metaboliche e cardiovascolari (con una riduzione del rischio di incorrere in coronaropatia e ictus che va dal 20% al 35%) e neoplastiche (riduzione del rischio di cancro della mammella del 20% e di tumore del colon tra il 30% e 50%).
- Riduce il tessuto adiposo in eccesso, agisce come fattore protettivo sulla pressione arteriosa e modula positivamente il colesterolo nel sangue, controlla il livello di glicemia e riduce il rischio di diabete di tipo 2 del 35-50%.
- Apporta benefici per l'apparato muscolo-scheletrico prevenendo e/o attenuando l'artrosi.
- Contribuisce a ridurre il rischio di depressione del 20-30%, di ansia, stress e solitudine.

Ridurre del 15% l'inattività fisica entro il 2030

A tale scopo nel 2020 l'OMS ha pubblicato le nuove linee guida sull'attività fisica e sulla prevenzione dei comportamenti sedentari:

- fare un po' di attività fisica è meglio di niente
- "*every move counts*", ovvero qualsiasi tipo di movimento conta

Attività fisica: raccomandazioni

Recommendations	Class[a]	Level[b]
It is recommended for adults of all ages to strive for at least 150 - 300 min a week of moderate-intensity or 75 - 150 min a week of vigorous-intensity aerobic PA, or an equivalent combination thereof, to reduce all-cause mortality, CV mortality, and morbidity.[371,372]	I	A
It is recommended that adults who cannot perform 150 min of moderate-intensity PA a week should stay as active as their abilities and health condition allow.[373,374]	I	B
It is recommended to reduce sedentary time to engage in at least light activity throughout the day to reduce all-cause and CV mortality and morbidity.[375–377]	I	B
Performing resistance exercise, in addition to aerobic activity, is recommended on 2 or more days per week to reduce all-cause mortality.[378,379]	I	B
Lifestyle interventions, such as group or individual education, behaviour-change techniques, telephone counselling, and use of consumer-based wearable activity trackers, should be considered to increase PA participation.[380–382]	IIa	B

In adults, physical activity confers benefits for the following health outcomes: improved all-cause mortality, cardiovascular disease mortality, incident hypertension, incident site-specific cancers,[1] incident type-2 diabetes, mental health (reduced symptoms of anxiety and depression); cognitive health, and sleep; measures of adiposity may also improve.

It is recommended that:

- **All adults should undertake regular physical activity.**
  Strong recommendation, moderate certainty evidence
- **Adults should do at least 150–300 minutes of moderate-intensity aerobic physical activity; or at least 75–150 minutes of vigorous-intensity aerobic physical activity; or an equivalent combination of moderate- and vigorous-intensity activity throughout the week, for substantial health benefits.**
  Strong recommendation, moderate certainty evidence
- **Adults should also do muscle-strengthening activities at moderate or greater intensity that involve all major muscle groups on 2 or more days a week, as these provide additional health benefits.**
  Strong recommendation, moderate certainty evidence
- **Adults may increase moderate-intensity aerobic physical activity to more than 300 minutes; or do more than 150 minutes of vigorous-intensity aerobic physical activity; or an equivalent combination of moderate- and vigorous-intensity activity throughout the week for additional health benefits.**
  Conditional recommendation, moderate certainty evidence

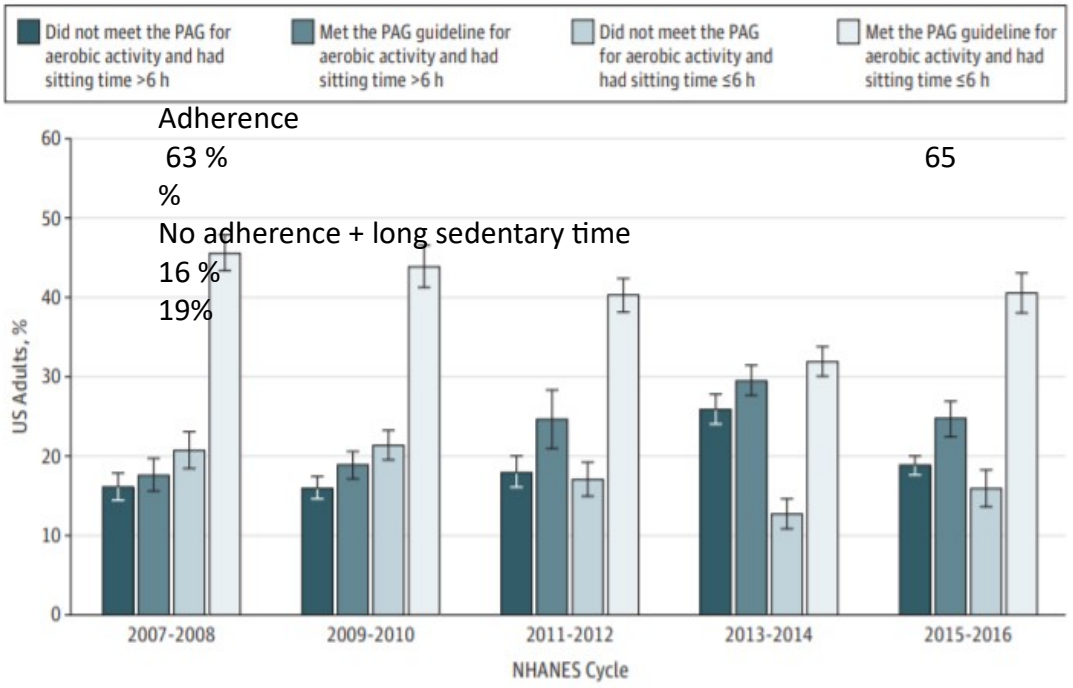
2020 WHO guidelines on physical activity and sedentary behaviour

2021 ESC Guidelines on cardiovascular disease prevention in clinical practice (European Heart Journal)

Trends in Adherence to the Physical Activity Guidelines for Americans for Aerobic Activity and Time Spent on Sedentary Behavior Among US Adults, 2007 to 2016

27 343 participants 18 years or older
52.% female; 66.6% non-Hispanic white

Figure. Trends in the Joint Distribution of Aerobic Physical Activity and Sedentary Time Among US Adults, National Health and Nutrition Examination Survey (NHANES), 2007-2016

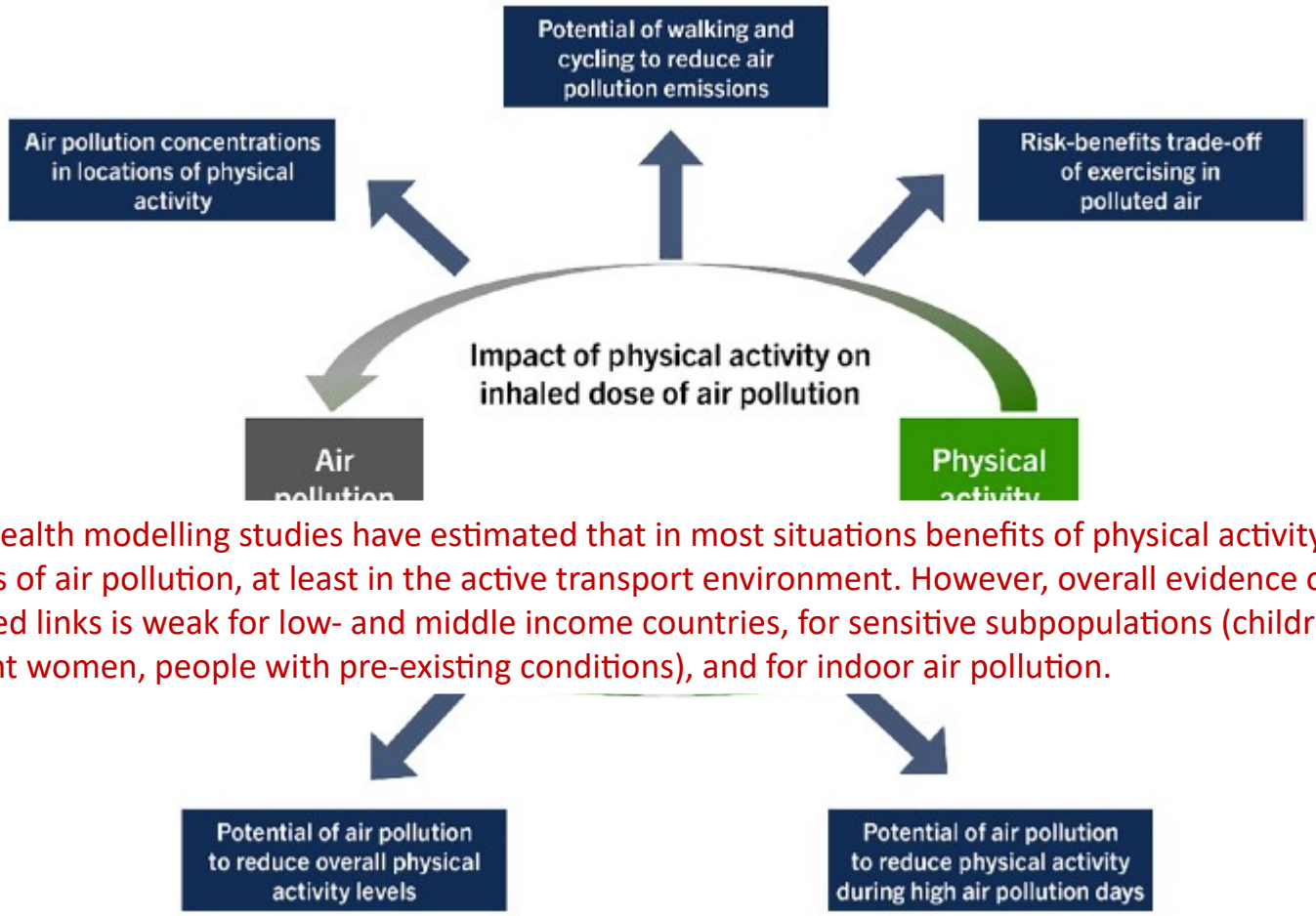


JAMA Network Open. 2019;2(7):e197597. doi:10.1001/jamanetworkopen.2019.7597

Review article

Air pollution, physical activity and health: A mapping review of the evidence

https:// doi.org/10.1016/j.envint.2020.105954



Public health modelling studies have estimated that in most situations benefits of physical activity outweigh the risks of air pollution, at least in the active transport environment. However, overall evidence on all examined links is weak for low- and middle income countries, for sensitive subpopulations (children, elderly, pregnant women, people with pre-existing conditions), and for indoor air pollution.

Le strategie di intervento devono agire a vari livelli

Global Level — WHO, UN

- Design national policies and plans
- Support and encourage research for NCDs prevention and control
- Monitor NCDs
- Support national and international partnerships for NCD prevention and control

Country Level

- Improve budgetary allocations to support primary health care systems
- Engaging nongovernmental organizations, research institutions, and private sector in collaborative partnerships for implementation of an action plan against NCDs
- Develop continuous quality improvement systems focus on primary health care for prevention and management of NCDs

Society Level — Schools, Universities, Non-governmental agencies

- Offer healthy food in the workplace
- Offer opportunities for physical activity in the workplace for all the ages
- Offer new resources from health-related non-governmental organizations to support the services for the prevention and control, treatment and care of NCDs

Individual Level

- Follow healthy lifestyle

Budreviciute A, Damiati S, et al. Management and Prevention Strategies for Non-communicable Diseases (NCDs) and Their Risk Factors. Front Public Health. 2020 Nov 26;8:574111

Challenges of the Health System in Preventing Non-Communicable Diseases

Theme	Sub-theme
Infrastructure challenges	Lack of preventive infrastructure
	Restrictions on access to medicine
	Restrictions on the implementation of primary health care
	Restrictions on access to technology
Economic challenges	Profitability of the disease
	Instability of financial resources
	Failure to implement poverty reduction plans
Demographic challenges	Increasing elderly population
	Migration
Managerial challenges	Fast urban planning without a plan
	Haste in planning
	Lack of internal and external coordination

Hadian et al International Journal of Preventive Medicine 2021, 12: 71