

---

# ***TOBACCO BREAKS HEARTS***

*Choose health, not tobacco*

**31 MAY: WORLD NO TOBACCO DAY**

**#NoTobacco**





# TOBACCO BREAKS HEARTS

## Choose health, not tobacco

**31 MAY: WORLD NO TOBACCO DAY #NoTobacco**



© World Health Organization 2018

Some rights reserved. This work is available under the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 IGO licence (CC BY-NC-SA 3.0 IGO; <https://creativecommons.org/licenses/by-nc-sa/3.0/igo>).

Under the terms of this licence, you may copy, redistribute and adapt the work for non-commercial purposes, provided the work is appropriately cited, as indicated below. In any use of this work, there should be no suggestion that WHO endorses any specific organization, products or services. The use of the WHO logo is not permitted. If you adapt the work, then you must license your work under the same or equivalent Creative Commons licence. If you create a translation of this work, you should add the following disclaimer along with the suggested citation: "This translation was not created by the World Health Organization (WHO). WHO is not responsible for the content or accuracy of this translation. The original English edition shall be the binding and authentic edition".

Any mediation relating to disputes arising under the licence shall be conducted in accordance with the mediation rules of the World Intellectual Property Organization.

**Suggested citation.** World No Tobacco Day 2018: Tobacco breaks hearts – choose health, not tobacco. Geneva: World Health Organization; 2018 (WHO/NMH/PND/18.4). Licence: CC BY-NC-SA 3.0 IGO.

**Cataloguing-in-Publication (CIP) data.** CIP data are available at <http://apps.who.int/iris>.

**Sales, rights and licensing.** To purchase WHO publications, see <http://apps.who.int/bookorders>. To submit requests for commercial use and queries on rights and licensing, see <http://www.who.int/about/licensing>.

**Third-party materials.** If you wish to reuse material from this work that is attributed to a third party, such as tables, figures or images, it is your responsibility to determine whether permission is needed for that reuse and to obtain permission from the copyright holder. The risk of claims resulting from infringement of any third-party-owned component in the work rests solely with the user.

**General disclaimers.** The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of WHO concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by WHO in preference to others of a similar nature that are not mentioned. Errors and omissions excepted, the names of proprietary products are distinguished by initial capital letters.

All reasonable precautions have been taken by WHO to verify the information contained in this publication. However, the published material is being distributed without warranty of any kind, either expressed or implied. The responsibility for the interpretation and use of the material lies with the reader. In no event shall WHO be liable for damages arising from its use.

Design and layout by NOVASB

Printed in Switzerland

This document is available electronically at <http://www.who.int/tobacco>.

Any queries regarding this document should be addressed to [tfi@who.int](mailto:tfi@who.int).



# CONTENTS

<b>Tobacco kills</b>	<b>06</b>
Magnitude of cardiovascular disease mortality	06
Tobacco breaks hearts	07
Second-hand smoke exposure	07
<b>How does tobacco break hearts?</b>	<b>08</b>
Smokeless tobacco	09
Electronic nicotine delivery systems	09
Heated tobacco products	10
Do people know that tobacco can damage your heart?	10
Benefits of quitting tobacco use	12
Benefits to society	13
<b>Solutions</b>	<b>14</b>
WHO Framework Convention on Tobacco Control	14
Global Hearts Initiative	15
Best buys for noncommunicable disease prevention and control	15
<b>Opportunities</b>	<b>16</b>
<b>References</b>	<b>18</b>



# TOBACCO KILLS

Tobacco kills over 7 million people every year (1), which means that, every day, more than 19 000 people die from tobacco use or second-hand smoke exposure. Most tobacco-related deaths occur in low- and middle-income countries: populations that are targets of intensive tobacco industry marketing.

Tobacco can be deadly even for non-smokers: second-hand smoke contributes to heart disease, cancer and other diseases, causing around 890 000 premature deaths annually (1).

The scale of this devastation of human health is shocking, but these deaths are preventable.

The tobacco industry continues to aggressively promote the use of tobacco products and to conceal the dangers of tobacco use, but we are fighting back to help prevent this ongoing devastation.

## MAGNITUDE OF CARDIOVASCULAR DISEASE MORTALITY

One in three deaths worldwide is caused by cardiovascular disease (CVD) (2), despite the availability of effective, inexpensive and safe treatments. In fact, CVD is the world's leading cause of death, killing around 18 million people every year (2), with over 80% of these deaths occurring in low- and middle-income countries (2).



# TOBACCO BREAKS HEARTS

---

Tobacco use and second-hand smoke exposure are major causes of CVD (1), contributing to approximately 17% of all cardiovascular deaths globally, about 3 million deaths per year (3).

The cardiovascular risks attributable to tobacco smoking increase with the amount of tobacco smoked and the years of having smoked. Although there is a strong dose-response relationship between the amount of tobacco smoked per day and cardiovascular risk, the relationship is not linear (4). The risk is substantially increased by exposure even to low levels of tobacco smoke, as with exposure to second-hand smoke. In fact, smoking only about one cigarette per day incurs half the risk of developing coronary heart disease and stroke incurred by smoking 20 cigarettes per day (5).

## SECOND-HAND SMOKE EXPOSURE

---

Exposure to second-hand smoke can cause coronary heart disease, increasing the risk of disease by approximately 25–30% (6). CVD is by far the greatest cause of deaths associated with second-hand smoke; around 55% of the estimated 890 000 worldwide deaths caused by second-hand smoke are attributed to ischaemic heart disease (1, 7).

The 2014 report on smoking by the United States Surgeon General concluded that a causal relationship exists between second-hand smoke and acute cardiovascular events and that the implementation of smoke-free laws and policies significantly reduced coronary events in non-smokers under 65 years of age (8).

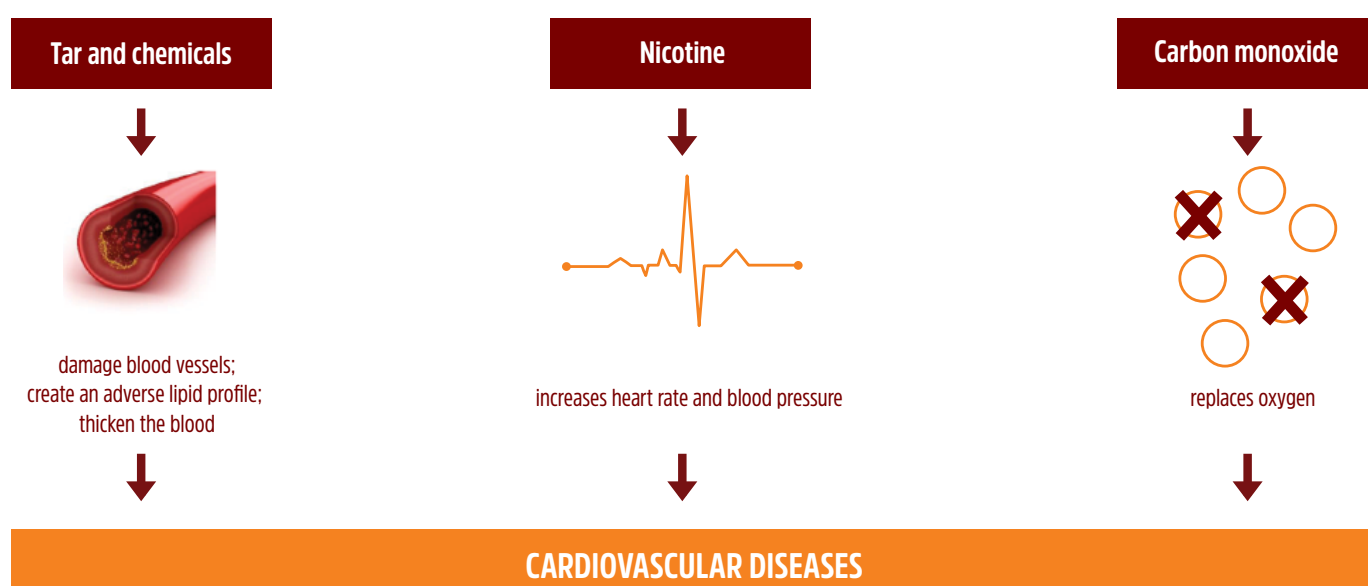


# HOW DOES TOBACCO BREAK HEARTS?

Tobacco smoke contains over 7000 chemicals (4) and is divided into two phases: a particulate phase and a gas phase (9). The particulate phase of smoke contains nicotine, a highly addictive substance associated with increases in heart rate, blood pressure and myocardial contractility (6), and the total aerosol residue (tar), which together contribute to heart disease through the following pathways: inflammation, impairment of the endothelium (the lining of the blood vessels), enhanced formation of clots and reduced level of high-density lipoprotein (HDL) cholesterol (4, 9, 10). The gas phase contains the poisonous gas carbon monoxide, along with other gases. Carbon monoxide replaces oxygen in the blood, thereby reducing the availability of oxygen for the heart muscle and other body tissues (4, 11).

These pathophysiological effects of tobacco predispose both active tobacco users and passive smokers to the formation of atherosclerosis or narrowing of the arteries, leading to various types of CVD such as ischaemic heart disease, cerebrovascular disease, peripheral artery disease and aortic aneurysm (see Fig. 1).

**FIG. 1. PATHOPHYSIOLOGICAL MECHANISMS OF TOBACCO USE LEADING TO CARDIOVASCULAR DISEASE**



Sources: (9, 10, 12); illustration provided by the Dutch Heart Foundation.





# SMOKELESS TOBACCO

---

All tobacco products are inherently harmful, including smokeless tobacco, which contains over 2000 chemical compounds, including nicotine (4, 12-15). Heavy metals such as cadmium and other substances contained in smokeless tobacco products, and additives such as liquorice or punk ash, are reported to affect the cardiovascular system adversely (13). Smokeless tobacco may also cause heart disease by acutely elevating blood pressure and contributing to chronic hypertension (16-18). Reviews of studies have found associations between smokeless tobacco use and fatal myocardial infarction and stroke (12, 14, 15, 19-21). Smokeless tobacco use is increasing in many parts of the world, and in some countries (e.g. Bangladesh, India) it is more commonly used than smoked tobacco (15, 20).

# ELECTRONIC NICOTINE DELIVERY SYSTEMS

---

Electronic nicotine delivery systems (ENDS), also known as e-cigarettes, vape pens, e-cigars or vaping devices, are battery-operated devices that heat a solution, or e-liquid, to generate an aerosolized mixture containing flavoured liquids and nicotine that is inhaled by the user (22). They also emit various potentially harmful and toxic chemicals that have known health effects resulting in a range of significant pathological changes. Further, the mixture contains nicotine, which can have adverse effects during pregnancy and may contribute to CVD. The cardiovascular system is very sensitive to nicotine and these other chemicals, and the body experiences direct effects from ENDS use (e.g. narrowing of the arteries, increased heart rate and blood pressure). Also non-users, including children and young people, are at risk of CVD through second-hand vaping (23). Evidence so far suggests that ENDS generally contain fewer toxicants than cigarette smoke. However, long-term health effects of use of ENDS are unknown; they are thought to increase the risk of chronic obstructive pulmonary disease, lung cancer and possibly CVD, as well as some other diseases associated with smoking. Further, it is presently unknown whether ENDS use translates into reduced cardiovascular risk in comparison with cigarette smoking.



# HEATED TOBACCO PRODUCTS

---

Heated tobacco products (HTP), also known as heat-not-burn (HNB) tobacco products, are battery-operated devices that heat tobacco to a lower temperature (up to 350°C) than when a conventional cigarette is burned, a process which occurs around 600°C. This causes an aerosol containing nicotine and other chemicals, leaving the leaf material intact but depleted of volatile substances. Currently, there is no evidence to demonstrate that HTPs are less harmful than conventional tobacco products. All forms of tobacco use are harmful, and HTPs should be subject to policy and regulatory measures like all other tobacco products.

## DO PEOPLE KNOW THAT TOBACCO CAN DAMAGE YOUR HEART?

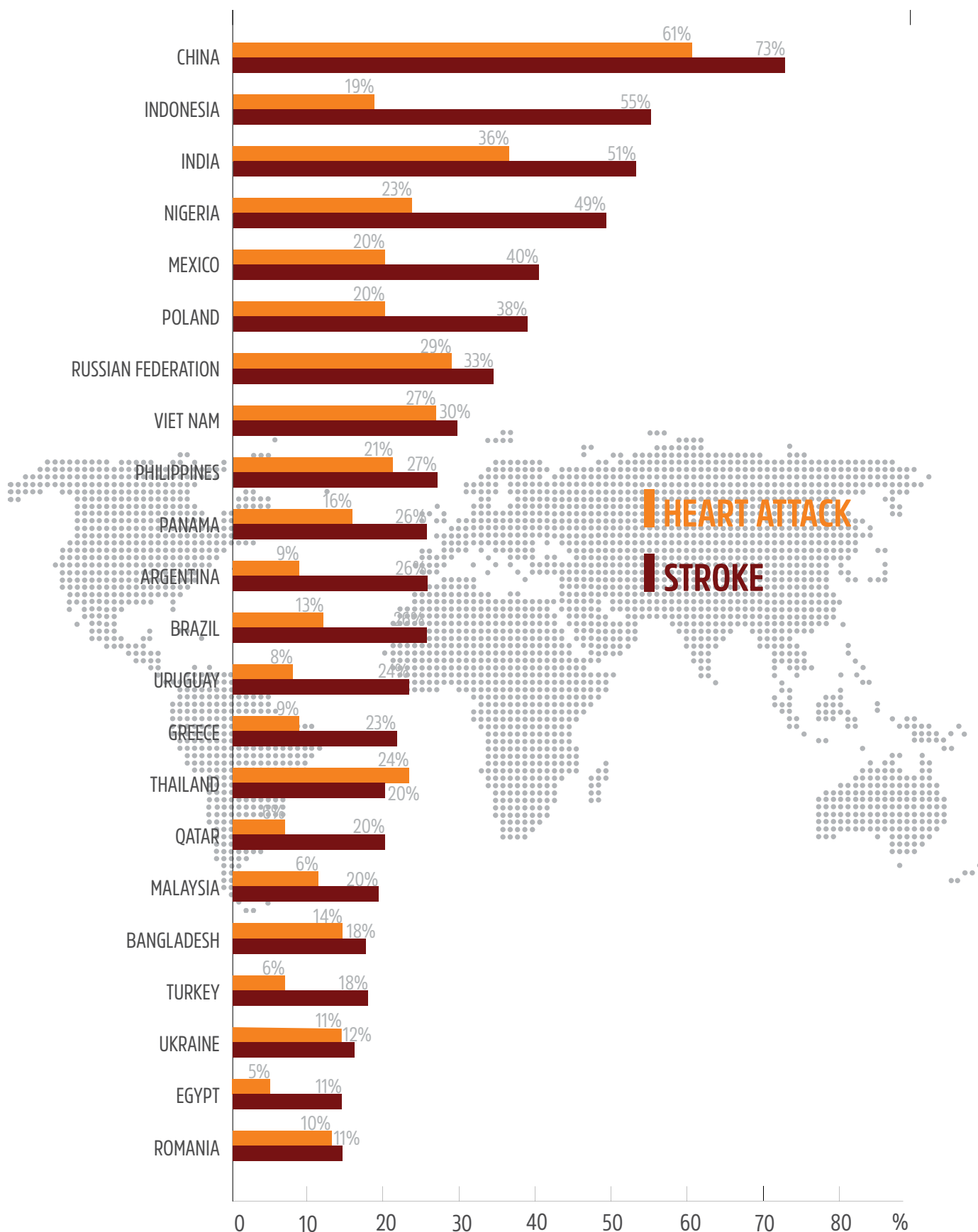
---

While most people are aware that tobacco use increases the risk of cancer, there are gaps in knowledge of the CVD risks of tobacco use – and in many countries, these knowledge gaps are substantial (24).

Findings from the Global Adult Tobacco Survey (GATS) show that the percentage of adults who do not believe that smoking causes stroke ranges from 73% in China to 11% in Egypt and Romania; for heart attacks, the figure ranges from 61% in China to 5% in Egypt (24) (see Fig. 2).



**FIG. 2. ADULTS WHO DO NOT BELIEVE, OR DO NOT KNOW, THAT SMOKING CAUSES STROKE AND HEART ATTACKS (%)**



Source: (24)



# BENEFITS OF QUITTING TOBACCO USE

The benefits of quitting tobacco use are substantial. WHO recommends brief advice, use of counselling (toll-free quitlines) and/or mobile text messages (mCessation) as the most effective solutions to help tobacco users to quit. In addition, for those unable to quit with these recommended approaches, there also exist effective medications such as nicotine replacement therapy, bupropion or varenicline to help tobacco users to quit.



## **BENEFICIAL HEALTH CHANGES THAT TAKE PLACE (25,26)**

### **Within 20 minutes**

the heart rate and blood pressure drop (27)

### **Within 12 hours**

the carbon monoxide level in the blood drops to normal (28)

### **2-12 weeks after quitting tobacco use**

the circulation improves and lung function increases (25)

### **6 weeks after quitting smokeless tobacco use**

97% of oral leukoplakic lesions are completely resolved (29)

### **1-9 months after quitting smoking**

coughing and shortness of breath decrease (25)

### **1 year after quitting smoking**

the risk of coronary heart disease is about half that of a smoker (25)

### **1-4 years after quitting smokeless tobacco use**

the risk of death falls to nearly half that of a person who continues to use it (30)

### **5-15 years after quitting smoking**

the risk of stroke is reduced to that of a non-smoker (25)

### **10 years after quitting smoking**

risk of lung cancer falls to about half that of a smoker, and the risk of cancer of the mouth, throat, oesophagus, bladder, cervix and pancreas decreases (25)

### **15 years after quitting smoking**

risk of coronary heart disease is that of a person who never smoked (25)



## PEOPLE OF ALL AGES WHO HAVE ALREADY DEVELOPED HEALTH PROBLEMS RELATED TO TOBACCO USE CAN STILL BENEFIT FROM QUITTING.

### Benefits in comparison with those who continue to use tobacco (26)

- Aged about 30: gain almost 10 years of life expectancy
- Aged about 40: gain nine years of life expectancy
- Aged about 50: gain six years of life expectancy
- Aged about 60: gain three years of life expectancy
- After the onset of life-threatening disease: rapid benefit – people who quit tobacco after a myocardial infarction reduce their chances of death by between 36% (31) and 46% (30)

# BENEFITS TO SOCIETY

The global economic cost of smoking is estimated at more than US\$ 1.4 trillion per year. This includes around US\$ 400 billion in direct medical care costs and nearly US\$ 1 trillion in indirect costs, representing the value of lost productivity due to premature death and morbidity from exposure to second-hand smoke (32, 33). Tobacco cessation interventions are a cost-effective means of preventing CVD and save significant costs in terms of both short- and long-term medical care (34). A study that investigated the economic costs of smoking estimated that the cost of helping a smoker to quit smoking (approximately US\$ 1000–1500) is offset by the short-term costs of avoided heart attacks and stroke alone (35).



# SOLUTIONS

## WHO FRAMEWORK CONVENTION ON TOBACCO CONTROL

The WHO Framework Convention on Tobacco Control (WHO FCTC) (36) provides a strong, concerted response to the global tobacco epidemic and its enormous health, social, environmental and economic costs. It obliges Parties to implement comprehensive, effective tobacco control measures. Through its 181 Parties, the WHO FCTC covers more than 90% of the world's population. The WHO FCTC combines measures to reduce both demand for and supply of tobacco products, and includes other key provisions, such as a requirement that Parties act to protect public health policies from interference by commercial and other vested interests of the tobacco industry. The treaty's scope covers the full chain of tobacco production and distribution, from farm to factory to point of sale.



**FCTC**

WHO FRAMEWORK CONVENTION  
ON TOBACCO CONTROL



# GLOBAL HEARTS INITIATIVE

To support governments in strengthening the prevention and control of CVD, WHO and the United States Centers for Disease Control and Prevention launched Global Hearts, a new initiative comprising three technical packages, in September 2016 (37).

On the prevention side, Global Hearts comprises the MPOWER package<sup>1</sup> for tobacco control, aligned with the WHO FCTC, and the SHAKE package<sup>2</sup> for salt reduction. On the management side, the HEARTS technical package<sup>3</sup> works to strengthen management of CVD in primary health care to reduce complications such as heart attacks and stroke (37).

Combined, these packages provide a set of high-impact, evidence-based interventions that, when used together, will have a major impact on improving global heart health.

## BEST BUYS FOR NONCOMMUNICABLE DISEASE PREVENTION AND CONTROL

The World Health Assembly has endorsed a set of WHO “best buys” and other recommended interventions for governments to implement for the prevention and control of noncommunicable diseases. Tobacco and CVD control feature prominently among these “best buys”, as proven, cost-effective measures that can be scaled up in countries. The MPOWER measures feature prominently in the “best buys” (38).

<sup>1</sup> **MPOWER** package: **M**-onitor tobacco use and prevention policies, **P**-rotect people from tobacco smoke, **O**-ffer help to quit tobacco use, **W**-arn about the dangers of tobacco, **E**-nforce bans on advertising, **R**-aise taxes on tobacco. This technical package is intended to assist in reducing the demand for tobacco products at country level.

<sup>2</sup> **SHAKE** package: **S**-urveillance, **H**-arness industry for reformulation, **A**-dopt labelling, **K**-nowledge improvement, **E**-nvironment for healthy eating. This technical package has been designed to assist Member States with the development, implementation and monitoring of salt reduction strategies in the population.

<sup>3</sup> **HEARTS** package: **H**-ealthy-lifestyle counselling, **E**-vidence-based treatment protocols, **A**-ccess to essential medicines and technology, **R**-isk based charts, **T**-eam-based care, **S**-ystems for monitoring. This technical package provides a strategic approach to improving cardiovascular health in countries.



# OPPORTUNITIES

# OPPORTUNITIES

## EVERYBODY CAN FIGHT AGAINST TOBACCO

### NATIONAL GOVERNMENTS, LOCAL GOVERNMENT AND CITIES CAN:

- advocate for comprehensive tobacco control policies as outlined in the WHO FCTC;
- support the implementation and enforcement of smoke-free laws in all public places and workplaces, including offices, restaurants, bars, casinos, hospitals and clinics, to protect people from the harmful effects of second-hand smoke;
- support the implementation of pictorial health warnings on all tobacco products as a cost-effective method for informing tobacco users about the health risks of tobacco;
- promote the adoption of labels that warn about the CVD risks of tobacco according to the WHO FCTC guidelines for health warnings;
- support the implementation of policies to provide systematic access to smoking cessation advice and pharmacotherapy;
- promote the use of evidence-based mass media campaigns to raise awareness about the CVD risks of tobacco use and second-hand smoke exposure;
- educate the public and correct the misconceptions about CVD and tobacco use;
- implement and enforce policies to prevent tobacco industry lobbying and interference in tobacco control policy.





## **ALL HEALTH-CARE PROVIDERS, GENERAL PRACTITIONERS, DOCTORS AND CARDIOLOGISTS CAN:**

- ask patients about their tobacco use and provide brief advice to quit to every tobacco user;
- model tobacco-free living by not smoking and by helping patients and health professionals who do smoke to quit;
- ensure that clear, comprehensive smoke-free policies are established and enforced in all health facilities, organizations and training facilities (including universities) and at all events (including conferences);
- advocate for tobacco-free investment of their health institute's pension fund, savings and other financial portfolios;
- implement programmes and protocols to ensure that cessation support and advice on eliminating second-hand smoke exposure are provided systematically. Non-smokers should also be advised to eliminate second-hand smoke;
- support the inclusion of tobacco cessation counselling in the medical undergraduate, graduate and postdoctoral curriculum;
- increase the visibility of tobacco control issues, including smoking and second-hand smoke exposure, at major clinical cardiology meetings and in continuing education programmes.

## **COMMERCIAL ESTABLISHMENTS CAN ALSO PLAY A PART:**

- restaurant and bar owners should make sure that they comply with national smoke-free legislation and keep their establishments completely smoke-free;
- shop owners should adhere to existing bans on tobacco advertising and promotion and should not, for instance, distribute free samples and/or display tobacco advertising in their shops;
- sports clubs and sporting, recreational, music, social and cultural events should not accept any form of tobacco sponsorship, particularly for youth events;
- retailers should strictly comply with restrictions on sale of tobacco products to minors, bans on tobacco advertising, promotion and sponsorship, and should not, for example, distribute free samples or display tobacco advertising where this is not consistent with their domestic law.



# REFERENCES

1. GBD 2016 Risk Factors Collaborators. Global, regional, and national comparative risk assessment of 84 behavioural, environmental and occupational, and metabolic risks or clusters of risks, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016. *Lancet*. 2017;390(10100):1345-1422.
2. Global health estimates 2016: deaths by cause, age, sex, by country and by region, 2000–2016. Geneva: World Health Organization; 2018.
3. Institute for Health Metrics and Evaluation. GBD Compare data visualization [website]. Seattle, WA: University of Washington; 2016 (<http://vizhub.healthdata.org/gbd-compare>, accessed 23 April 2018).
4. United States Department of Health and Human Services. How tobacco smoke causes disease: the biology and behavioral basis for smoking-attributable disease: a report of the Surgeon General. Atlanta, GA: United States Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2010.
5. Hackshaw A, Morris JK, Boniface S, Tang JL, Milenković D. Low cigarette consumption and risk of coronary heart disease and stroke: meta-analysis of 141 cohort studies in 55 study reports. *BMJ*. 2018;360:j5855.
6. Catlin MC, Deng R, Martinez RS, Sharma R, Grossblatt N. Secondhand smoke exposure and cardiovascular effects: making sense of the evidence. Washington (DC): Institute of Medicine of the National Academies; 2009.
7. Öberg M, Woodward A, Jaakkola MS, Peruga A, Prüss-Ustün A. Global estimate of the burden of disease from second-hand smoke. Geneva: World Health Organization; 2010.
8. United States Department of Health and Human Services. The health consequences of smoking: 50 years of progress: a report of the Surgeon General. Atlanta, GA: United States Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2014.
9. Ambrose JA, Barua RS. The pathophysiology of cigarette smoking and cardiovascular disease: an update. *J Am Coll Cardiol*. 2004;43(10):1731-7.



10. Csordas A, Bernhard D. The biology behind the atherothrombotic effects of cigarette smoke. *Nat Rev Cardiol.* 2013;10(4):219-30.
11. United States Department of Health and Human Services. The health consequences of smoking: a report of the Surgeon General. Atlanta, GA: United States Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2004.
12. Gupta R, Gupta S, Sharma S, Sinha DN, Mehrotra R. Risk of coronary heart disease among smokeless tobacco users: results of systematic review and meta-analysis of global data. *Nicotine Tob Res.* 2018 [e-pub ahead of print].
13. Gupta R, Gurm H, Bartholomew JR. Smokeless tobacco and cardiovascular risk. *Arch Intern Med.* 2004;164(17):1845-9.
14. Piano MR, Benowitz NL, Fitzgerald GA, Corbridge S, Heath J, Hahn E et al. Impact of smokeless tobacco products on cardiovascular disease: implications for policy, prevention, and treatment: a policy statement from the American Heart Association. *Circulation.* 2010;122(15):1520-44.
15. Siddiqi K, Shah S, Abbas SM, Vidyasagan A, Jawad M, Dogar O et al. Global burden of disease due to smokeless tobacco consumption in adults: analysis of data from 113 countries. *BMC Med.* 2015;13:194.
16. Hergens MP, Lambe M, Pershagen G, Ye W. Risk of hypertension amongst Swedish male snuff users: a prospective study. *J Intern Med.* 2008;264(2):187-94.
17. Pandey A, Patni N, Sarangi S, Singh M, Sharma K, Vellimana AK et al. Association of exclusive smokeless tobacco consumption with hypertension in an adult male rural population of India. *Tob Induc Dis.* 2009;5:15.
18. Anand A, Mik S. The risk of hypertension and other chronic diseases: comparing smokeless tobacco with smoking. *Front Public Health.* 2017;5:255.
19. Boffetta P, Straif K. Use of smokeless tobacco and risk of myocardial infarction and stroke: systematic review with meta-analysis. *BMJ.* 2009;339:b3060.
20. Zhang LN, Yang YM, Xu ZR, Gui QF, Hu QQ. Chewing substances with or without tobacco and risk of cardiovascular disease in Asia: a meta-analysis. *J Zhejiang Univ Sci B.* 2010;11(9):681-9.
21. Vidyasagan AL, Siddiqi K, Kanaan M. Use of smokeless tobacco and risk of cardiovascular disease: a systematic review and meta-analysis. *Eur J Prev Cardiol.* 2016;23(18):1970-81.
22. Grana R, Benowitz N, Glantz SA. E-cigarettes: a scientific review. *Circulation.* 2014;129(19):1972-86.
23. Qasim H, Karim ZA, Rivera JO, Khasawneh FT, Alshbool FZ. Impact of electronic cigarettes on the cardiovascular system. *J Am Heart Assoc.* 2017;6(9).



24. Asma S, Mackay J, Song SY, Zhao L, Morton J, Palipudi KM et al. The GATS atlas. Global Adult Tobacco Survey. Atlanta, GA: CDC Foundation; 2015.
25. United States Department of Health and Human Services. The health benefits of smoking cessation: a report of the Surgeon General. Atlanta, GA: United States Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 1990.
26. Doll R, Peto R, Boreham J, Sutherland I. Mortality in relation to smoking: 50 years' observations on male British doctors. *BMJ*. 2004;328(7455):1519.
27. Mahmud A, Feely J. Effect of smoking on arterial stiffness and pulse pressure amplification. *Hypertension*. 2003;41(1):183-7.
28. United States Department of Health and Human Services. The health consequences of smoking. Nicotine addiction: a report of the Surgeon General. Atlanta, GA: United States Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 1988.
29. Martin GC, Brown JP, Eifler CW, Houston GD. Oral leukoplakia status six weeks after cessation of smokeless tobacco use. *J Am Dent Assoc*. 1999;130(7):945-54.
30. Arefalk G, Hambraeus K, Lind L, Michaëlsson K, Lindahl B, Sundström J. Discontinuation of smokeless tobacco and mortality risk after myocardial infarction. *Circulation*. 2014;130(4):325-32.
31. Critchley JA, Capewell S. Mortality risk reduction associated with smoking cessation in patients with coronary heart disease: a systematic review. *JAMA*. 2003;290(1):86-97.
32. Goodchild M, Nargis N, Tursan d'Espaignet E. Global economic cost of smoking-attributable diseases. *Tob Control*. 2018;27(1):58-64.
33. Hall W, Doran C. How much can the USA reduce health care costs by reducing smoking? *PLoS Med*. 2016;13(5):e1002021.
34. Lightwood J. The economics of smoking and cardiovascular disease. *Prog Cardiovasc Dis*. 2003;46(1):39-78.
35. Basu S, Glantz S, Bitton A, Millett C. The effect of tobacco control measures during a period of rising cardiovascular disease risk in India: a mathematical model of myocardial infarction and stroke. *PLoS Med*. 2013;10 (7):e1001480.
36. WHO Framework Convention on Tobacco Control. Geneva: World Health Organization; 2003.
37. Global Hearts Initiative [website]. Geneva: World Health Organization; 2018 ([http://www.who.int/cardiovascular\\_diseases/global-hearts/en/](http://www.who.int/cardiovascular_diseases/global-hearts/en/), accessed 23 April 2018).
38. Tackling NCDs: 'best buys' and other recommended interventions for the prevention and control of noncommunicable diseases. Geneva: World Health Organization; 2017.











**World Health  
Organization**

