

Maladies of Prosperity

Methodology

The GeoRisQ Monitor ‘Maladies of Prosperity’ shows the challenges to public health that affect European countries (EU-27 + Norway + Switzerland). Non-communicable diseases (NCDs), including diabetes, cardiovascular diseases, cancer, chronic respiratory diseases and mental disorders are and will remain by far the biggest endangerment to health in the European Region. The World Health Organization estimated that they account for 86% of the deaths and 77% of the disease burden in the European region,ⁱ and that they are predicted to remain or become major public health issues in terms of the loss of healthy lives among European populations.ⁱⁱ For this reason, the GeoRisQ Monitor ‘Maladies of Prosperity’ reveals and assesses the major underlying drivers and behavioral risk factors that cause NCDs, namely Unhealthy Lifestyles, Aging, and Environmental Degradation (as shown in Figure 1 below).ⁱⁱⁱ At the end of this document, a table summarizes the selected indicators. A brief analysis of the results, complemented by higher-level reflections and conclusions, is available in the main report.¹

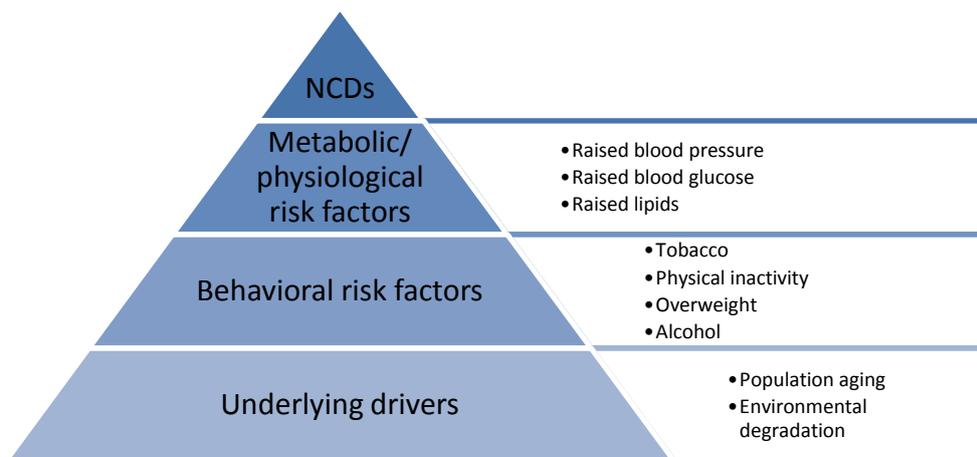


Figure 1: Causal links between underlying drivers for NCDs, behavioral risk factors, metabolic/physiological risk factors and NCDs (this figure is based on Alwan^{iv})

To measure Unhealthy Lifestyles, we used existing data sets on *Smoking, Physical Inactivity, Overweight, and Alcohol Consumption*; Aging is measured by the *Percentage of population over 65 years old*; to measure the health impact of Environmental Degradation, we looked at outdoor air pollution and relied on data on *Particulate Matter (PM)*.

Unhealthy Lifestyles – namely tobacco smoking, physical inactivity, overweight and alcohol consumption – are directly related to the rising prevalence of NCDs.^v *Smoking* is one of the biggest

¹ The reader is referred to the main report which can be retrieved by returning to the main page and clicking the ‘Download Report as PDF’ button.



health threats and an enormous driver for the rise of NCDs – especially cardiovascular diseases and respiratory system illnesses.^{vi} *Alcohol Consumption* is the European Union’s third-largest risk factor for disease burden, and is associated with cardiovascular diseases, cirrhosis of the liver and various cancers.^{vii} Diseases associated with *Physical Inactivity* – the fourth leading risk factor for global mortality – are breast and colon cancers, diabetes and ischemic heart diseases.^{viii} *Overweight and Obesity* are ranked fifth on the list of leading causes of death. Common health consequences are cardiovascular diseases, including mainly heart diseases and strokes, and diabetes.^{ix}

Demographic changes lead towards ever-older populations which suffer from age related diseases. In this monitor, we use *Aging* as a proxy for age related diseases. Associated with aging are several NCDs and chronic conditions (including asthma and diabetes), neurodegenerative diseases, cancers as well as mental health disorders.^x

In an OECD report on the relationship between health issues and Environmental Degradation,² outdoor air pollution is described as “a major environmental problem in OECD countries”.^{xi} Indeed, the current level of air pollution in European cities accounts for a mentionable amount of deaths and cardiorespiratory diseases.^{xii} As a result, *Outdoor Air Pollution* is deemed here as a proxy of the environmental health burden.³ According to the WHO, human activity through industries or traffic emits “complex mixtures of air pollutants, many of which are harmful to health. Of all of these pollutants, fine particulate matter has the greatest effect on human health”. We therefore use Particulate Matter (PM) as the exposure variable for outdoor air pollution. Not only is this indicator used in many epidemiological studies and has been linked consistently with serious health effects;^{xiii} it is also the most serious air pollution health risk in the EU,^{xiv} and affects more people than any other frequently measured pollutant such as ozone, carbon monoxide, oxides of sulfur and nitrogen.^{xv} The European Commission Clear Air for Europe estimated that in 2000, outdoor pollution of fine particulate matter alone had caused the premature death of around 350,000 people.^{xvi}

Using normalized scores to render indicators comparable,⁴ we ranked the countries on the basis of how they score relative to one another, and integrated five of the six drivers of NCDs into a Composite Index: *Maladies of Prosperity*. Thereby, it represents a measure of the extent to which European populations may be affected by these major health threats. For calculating the Composite

² According to the OECD, “Environmental Degradation is the deterioration in environmental quality from ambient concentrations of pollutants and other activities and processes such as improper land use and natural disasters”. Source: OECD, “Glossary of Statistical Terms”, <http://stats.oecd.org/glossary/detail.asp?ID=821>.

³ Indoor air pollution, or water, sanitation and hygiene issues are much more of a concern in the developing world than in the developed world. Source: WHO, “Estimated deaths & DALYs attributable to selected environmental risk factors, by WHO Member State, 2002”.

⁴ Due to the different measurement units of the selected indicators, normalization is required prior to data aggregation. We used the Min-Max method, which according to the literature can be used “in conjunction with all the weighting schemes and for all aggregation systems”. “Min-Max normalizes indicators to have an identical range [0, 1] by subtracting the minimum value and dividing by the range of the indicator values”. See *Handbook on Constructing Composite Indicators - Methodology and User Guide* (OECD and European Commission, 2008), 30, <http://www.oecd.org/std/leadingindicatorsandtendencysurveys/42495745.pdf>.



Index, we attributed equal weights to two groups of drivers, namely: Unhealthy Lifestyles and Aging, and different weights to the four indicators within the group Unhealthy Lifestyles itself.

The relative importance and direct effects of Unhealthy Lifestyles and Aging on DALYs (disability-adjusted life years, indicating a loss of a year's healthy life, either from time lived with a disability or from time lost through premature death^{xvii}) and deaths on the rising prevalence of NCDs, although known as considerable, is not quantified in the literature. In addition, the prevalence of several NCDs is influenced by *both* Aging and Unhealthy Lifestyles. Due to these uncertainties, and as suggested in the literature on composite index design,⁵ we decided to attach equal weight of 0,50 to both Aging and Unhealthy Lifestyles. Within the group Unhealthy Lifestyles itself, the weight of 0,50 is split up based on the amount of deaths each driver represents in the EU. Each year, 650,000 deaths in the EU are due to tobacco smoking,^{xviii} 485,000 deaths are directly related to physical inactivity in Europe as whole,^{xix} 400,000 deaths to overweight, and 195,000 deaths are associated with alcohol consumption in the EU.^{xx} As a result, we weigh *Tobacco Smoking* with 0,19, *Physical Inactivity* with 0,14, *Overweight* with 0,11, and *Alcohol Consumption* with 0,06.⁶

We chose not to integrate *Particulate Matter* as a measure of Outdoor Air Pollution in the Composite Index for several reasons. According to the WHO, about 15% of the DALYs and deaths are due to environmental factors.^{xxi} However, these 'environmental factors' are broadly defined by the WHO, and include injuries – which are not directly linked to NCDs. In addition, within the logic of the current Index, weight is distributed based on the magnitude of impact each driver has on health. Although the impact of Outdoor Air Pollution is considerable, it contributes significantly less to the burden of disease compared to the other two categories of selected drivers. Furthermore, quantifying the impact of exposures to air pollution presents major challenges due to the complexity of man-made air pollution – which consists of many toxic components – and to limited data availability.^{xxii}

In the Monitor, we added a map showing the Gross Domestic Product per Capita (PPP) in US dollars, in order for the reader to visualize a scatter plot that determines the relationship between other selected indicators and the national income of each Member State. The objective is to verify whether relatively higher or lower living standards may be one explanation behind the vulnerability to health risk factors – for instance, levels of outdoor air pollution.

⁵ "Most composite indicators rely on equal weighting (EW), i.e. all variables are given the same weight. This essentially implies that all variables are 'worth' the same in the composite, but it could also disguise the absence of a statistical or an empirical basis, e.g. when there is insufficient knowledge of causal relationships or a lack of consensus on the alternative". See *Handbook on Constructing Composite Indicators - Methodology and User Guide*, 31.

⁶ For Cyprus, no data on smoking was available. In this case we relatively increased the weight for the three other risk factors in the group Unhealthy Lifestyles, in order to keep the weight for this group of drivers at 0,5: 0,22 for physical inactivity, 0,19 for overweight, and 0,09 for alcohol consumption. For Switzerland, no data on physical inactivity was available. In this case, we relatively increased the weight for the three other risk factors in the group Unhealthy Lifestyles in order to keep the weight for this group of drivers at 0,5: 0,26 for smoking, 0,16 for overweight, and 0,08 for alcohol consumption.



Note on sensitivity analysis

The Composite Index 'Maladies of Prosperity' allows for a synthetic measure of the selected drivers of health challenges, an intentional aggregation of separable facts, and a form of analysis that is more conveniently presented. A number of choices have to be made when building a composite index, in particular with regard to the selection of indicators, normalization of scores, weighting schemes, and dealing with missing data. These choices could be subjected to dispute. It may also present methodological issues in terms of robustness of the results. Against the background of this note of caution, we do consider it useful for aforementioned reasons to provide an aggregated view of different drivers of the maladies of prosperity in Europe.

<u>Category of Indicator</u>	<u>Indicator</u>	<u>Definition</u>	<u>Source</u>	<u>Reference year(s)</u>
Maladies of Prosperity: Composite Index		Sum aggregate of normalized values for Smoking (19%), Physical Inactivity (14%), Overweight (11%), Alcohol Consumption (6%), and Aging (50%).		
Unhealthy Lifestyles	Unhealthy Lifestyles: Composite Score	Sum aggregate of normalized values for Smoking (38%), Physical Inactivity (28%), Overweight (22%), and Alcohol Consumption (12%).		
	Smoking	Current smoking of any tobacco product: prevalence estimates among adults aged 15 and over. 'Tobacco products' includes cigarettes, cigars, pipes or any other smoked tobacco products. 'Current smoking' includes both daily and non-daily or occasional smoking.	WHO ^{xxiii}	2009
	Physical Inactivity	Percentage of defined population aged 15 and over attaining less than 5 times 30 minutes of moderate activity per week, or less than 3 times 20 minutes of vigorous activity per week, or equivalent.	WHO ^{xxiv}	2008
	Overweight	Percentage of population aged 15 and over with a body mass index (BMI) of 25 kg/m ² or higher. A BMI superior to 25 means an individual is overweight, and a BMI superior to 30 corresponds to obesity. According to the WHO, the Body Mass Index (BMI) "is a simple index of weight-for-height that is commonly used to classify underweight, overweight and obesity in adults".	WHO ^{xxv}	2010
	Alcohol Consumption	Recorded amount of alcohol consumed among adults aged 15 and over, in liters of pure alcohol per person per year.	WHO ^{xxvi}	2005
Aging	Population over 65	Percentage of population over 65 years old.	European Commission ^{xxvii}	2010
Environmental Degradation	Outdoor Air Pollution	Annual particulate matter (PM10) in micrograms per cubic meter of air. "The major components of PM are sulfate, nitrates, ammonia, sodium chloride, carbon, mineral dust and water. It consists of a complex mixture of solid and liquid particles of organic and inorganic substances suspended in the air".	WHO	2008
National Income	GDP per Capita, in PPP	Gross Domestic Product (GDP) on a purchasing power parity (PPP) basis divided by population as of 1 July for the same year, in US dollars.	CIA World Factbook	2011

Table 1: Indicators of the GeoRisk Monitor 'Maladies of Prosperity'

- ⁱ WHO Europe, “Noncommunicable Diseases,” *Noncommunicable Diseases*, 2012, <http://www.euro.who.int/en/what-we-do/health-topics/noncommunicable-diseases>.
- ⁱⁱ Reinhard Busse, World Health Organization, and European Observatory on Health Systems and Policies, *Tackling chronic disease in Europe strategies, interventions and challenges* (Copenhagen: World Health Organization on behalf of the European Observatory on Health Systems and Policies, 2010), 17, <http://site.ebrary.com/id/10404036>.
- ⁱⁱⁱ European Foresight Monitoring Network, *Special Issue on Healthcare: Healthy Ageing and the Future of Public Healthcare Systems* (Brussels: European Commission, European Research Area, European Foresight Monitoring Network, November 2009), http://ec.europa.eu/research/social-sciences/pdf/efmn-special-issue-on-healthcare_en.pdf; European Commission, *Establishing a Health for Growth Programme, the Third Multi-annual Programme of EU Action in the Field of Health for the Period 2014-2020*, 2011, http://ec.europa.eu/health/programme/docs/prop_prog2014_en.pdf; “Projections of the Effects of Climate Change on Allergic Asthma: The Contribution of Aerobiology,” *Allergy* 65 (2010): 1073–1081.
- ^{iv} Ala Alwan, *NCDs: A Priority for the Commonwealth*, 2011, <http://www.thecommonwealth.org/files/236497/FileName/HMM%28G%29%2811%293ATechnicalOverviewofNCDsintheCommonwealth.pdf>.
- ^v World Health Organization, *Global status report on noncommunicable diseases 2010* (Geneva, Switzerland: World Health Organization, 2011), http://whqlibdoc.who.int/publications/2011/9789240686458_eng.pdf; World Economic Forum, *The Global Economic Burden of Non-communicable Diseases* (World Economic Forum, September 2011), http://www3.weforum.org/docs/WEF_Harvard_HE_GlobalEconomicBurdenNonCommunicableDiseases_2011.pdf.
- ^{vi} WHO Media centre, “Tobacco - Fact Sheet 339,” *World Health Organization*, May 2012, <http://www.who.int/mediacentre/factsheets/fs339/en/index.html>.
- ^{vii} WHO Media centre, “Alcohol - Fact Sheet,” *World Health Organization*, February 2011, <http://www.who.int/mediacentre/factsheets/fs349/en/index.html>.
- ^{viii} World Health Organization, “Physical Activity,” *Global Strategy on Diet, Physical Activity and Health*, 2012, <http://www.who.int/dietphysicalactivity/pa/en/index.html>.
- ^{ix} WHO Media centre, “Obesity and Overweight - Fact Sheet N°311,” *World Health Organization*, May 2012, <http://www.who.int/mediacentre/factsheets/fs311/en/>.
- ^x European Foresight Monitoring Network, *Special Issue on Healthcare: Healthy Ageing and the Future of Public Healthcare Systems*.
- ^{xi} *Health and the Environment*, Policy Brief (OECD, February 2008), <http://www.oecd.org/health/healthpoliciesanddata/40396531.pdf>.
- ^{xii} WHO Europe, “Air Pollution and Health,” *Air Quality*, 2012, <http://www.euro.who.int/en/what-we-do/health-topics/environment-and-health/air-quality>; World Health Organization, “Chronic Respiratory Diseases,” *World Health Organization*, 2011, <http://www.who.int/respiratory/asthma/scope/en/index.html>.
- ^{xiii} “Environment: Many Europeans Still Exposed to Harmful Air Pollutants,” *Europa.eu*, September 24, 2012, <http://europa.eu/rapid/pressReleasesAction.do?reference=IP/12/1002&format=HTML&aged=0&language=EN&guiLanguage=en>.
- ^{xiv} *Health and the Environment*.
- ^{xv} “Environment: Many Europeans Still Exposed to Harmful Air Pollutants.”
- ^{xvi} European Environmental Agency (EEA), *The European Environment, State and Outlook 2005: Air Quality and Health*, Environment and Health Data Service, 2006, <http://www.eea.europa.eu/themes/human/multimedia/air-quality-and-health/view>.
- ^{xvii} World Health Organization, *The Global Burden of Disease*, 2008, http://www.who.int/healthinfo/global_burden_disease/2004_report_update/en/index.html. “The WHO global burden of disease (GBD) measures burden of disease using the disability-adjusted life year (DALY). This time-based measure combines years of life lost due to premature mortality and years of life lost due to time lived in

states of less than full health". Each DALY indicates a loss of a year's healthy life, either from time lived with a disability or from time lost through premature death.

^{xviii} European Commission, "Directorate General for Health & Consumers - Health and Consumer Voice," *Health and Consumers*, 2012,

http://ec.europa.eu/dgs/health_consumer/dyna/consumerveice/create_cv.cfm?cv_id=551.

^{xix} WHO Europe, *Steps to Health. A European Framework to Promote Physical Activity for Health* (Copenhagen, 2007), http://www.euro.who.int/__data/assets/pdf_file/0020/101684/E90191.pdf.

^{xx} Directorate-General for Health and Consumer Protection European Commission, *Alcohol-related Harm in Europe - Key Data*, Factsheet, 2006,

http://ec.europa.eu/health/archive/ph_determinants/life_style/alcohol/documents/alcohol_factsheet_en.pdf.

^{xxi} WHO Europe, "Preventable Environmental Impact on Mortality and Morbidity in Countries of the WHO European Region," *Environment and Health*, 2007, <http://www.euro.who.int/en/what-we-do/health-topics/environment-and-health/evidence-and-data/environmental-burden-of-disease-ebd/preventable-environmental-impact-on-mortality-and-morbidity-in-countries-of-the-who-european-region>.

^{xxii} Aaron J. Cohen et al., "Chapter 17: Urban Air Pollution," in *Comparative Quantification of Health Risks: Global and Regional Burden of Disease Attribution to Selected Major Risk Factors*, vol. 2, 2004, 17, <http://www.who.int/publications/cra/chapters/volume2/1353-1434.pdf>.

^{xxiii} World Health Organization, "WHO | Global Health Observatory Data Repository", 2011, <http://apps.who.int/ghodata/?vid=10011#>; World Health Organization, *Global status report on noncommunicable diseases 2010* (Geneva, Switzerland: World Health Organization, 2011), http://whqlibdoc.who.int/publications/2011/9789240686458_eng.pdf.

^{xxiv} "Global Health Observatory Data Repository," *World Health Organization*, 2011, <http://apps.who.int/ghodata/>.

^{xxv} *Ibid.*

^{xxvi} *Ibid.*

^{xxvii} European Commission, "Percentage of Population Aged 65 and Over," *Eurostat Data Explorer*, 2010, <http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=en&pcode=tps00028>.