spectra 135

Environment and health

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Environment and health: Viewing the system in its entirety

Climate change, air, noise, chemicals, drinking water and the natural world. Our health is affected by a large number of environmental variables, and there is a close link between the environment and human health. This edition of spectra shows just how close.

In 1854 there was an outbreak of cholera in the Soho district of London. At the time, people thought that this dreadful disease was caused by "bad air". Unlike many of his colleagues, the British doctor John Snow was sceptical about this explanation. He went from door to door in Soho, asking local residents which pump they got their water from and if anyone in their house had caught cholera. By mapping cases, he was able to identify a pump in Broad Street as the possible cause of the outbreak and was successful in persuading the local council to disable the well pump by removing its handle. After that, the outbreak subsided. Although the germ theory of disease did not even exist at the time, Snow's observations led him to conclude that cholera was transmitted not by bad air, but through drinking water.

The incident is not only regarded as the moment epidemiology was founded, it also shows just how big an impact the environment has always had on our health. Drinking water is just one of many environmental factors that are capable of having a negative – and positive – effect on our health. Other examples include chemicals, air, noise, radiation, climate change and the natural world (see diagram).

However, the example also highlights a further point: public health issues can only really be resolved by considering all the factors that are involved and thinking out of the box sometimes pays off. Since public health problems are often caused by factors outside the healthcare system, it is essential to look at the system in its entirety. This insight is as true today as it was then – as is the fact that health problems are still often only investigated within the boundaries of one specialist discipline.

Greater cooperation thanks to One Health

In recent decades, various strategies have been developed to promote this holistic approach, including Health in All Policies and the One Health approach. One Health is an integrative approach to partnership between human and veterinary medicine. There are plenty of recent examples to demonstrate the importance of the approach, such as the Ebola outbreaks in western Africa, the first SARS outbreak in 2002, the BSE ("mad cow disease") crisis and the COVID-19 pandemic. The One Health approach is also being employed to address the antibiotic resistances that are circulating in humans, animals and the environment (see editorial).

With the effects of accelerating climate change on human health becoming ever more visible, efforts are currently under way to make the environment a more significant part of One Health. The environment is reacting to an increasing extent to problems caused by humanity, such as air pollution, global warming, changes in water cycles, species loss and declining soil fertility. Health maintenance strategies can no longer be restricted simply to humans and animals, but need to incorporate ecosystems to a greater extent. For this reason, various international organisations, including the FAO (Food and Agriculture Organization) and WHO, proposed a new definition in December 2021. "One Health is an integrated, unifying approach that aims to sustainably balance and optimize the health of people, animals and ecosystems."

Health maintenance strategies can no longer be restricted simply to humans and animals, but need to incorporate ecosystems to a greater extent.

Roadmap for Switzerland

Switzerland's Federal Council has also recognised the urgency of the situation by including the environment as a major determinant of health in its 2030 health policy strategy. The aim is to promote health through the environment. In response, the Federal Office of Public Health (FOPH) and Federal Office for the Environment (FOEN) have drawn up a roadmap. This important instrument shows how the Federal Council will approach the implementation of its environmental- and health-strategy goals in the coming years.

The issues addressed by the roadmap cover the following four areas: "Climate change and loss of biodiversity", "Pollutants, ionising radiation and noise", "Health and non-ionising radiation (electrical, magnetic and electromagnetic fields [EMFs], light, UV light)", and "Health-promoting natural and landscape attributes in the built environment". The roadmap incorporates various measures (action plans, monitoring tasks, etc.) in each of these areas. FOEN and the FOPH are working with a large number of other partners to implement the roadmap.

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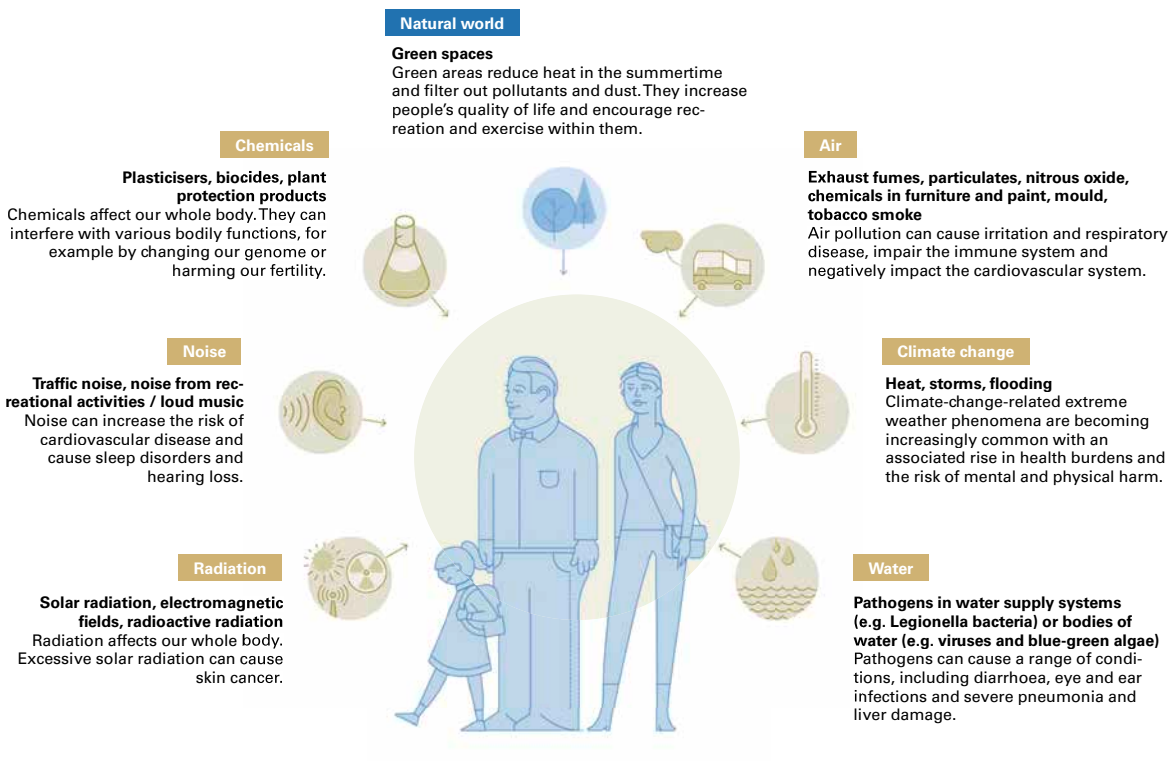
Links:
- Environment & health (FOPH): https://tinyurl.com/4wbsyear
- spectra print edition "Health in All Policies": https://tinyurl.com/5n7kh23j
- FOEN's topics: https://tinyurl.com/ypkwt2x8
- New definition of One Health (WHO): https://tinyurl.com/mr3pnb9w

Environmental influences on health



The environment influences our health on many levels.

Source: www.umweltbundesamt.de, www.bfs.de, www.rki.de

“A lot of environmental risks aren’t even on the radar”

Even though traffic volumes have risen, air quality in Switzerland has improved significantly. However, environmental research shows there are still gaping holes. Going forward, we should focus more attention on an environment that encourages us to be active, says environmental epidemiologist Martin Röösli.

Professor Röösli, is the environment we are living in today healthier than 30 years ago?
It’s hard to give a generalised answer to that because some environmental factors – particulate pollution, for example – have improved significantly in Switzerland, whereas others, such as summer heatwaves, have got worse in the wake of global warming. Although negative and alarmist messages tend to hold sway in many people's minds, as well as in the media, I’m inclined to think that environmental conditions in the country have improved overall. For example, there are far fewer indoor wood-burning stoves, which has resulted in a substantial reduction in air pollution – the greatest environmental risk to human health in quantitative terms.

How, exactly?
Scientists use what are known as health impact assessments to calculate the disease burden caused by particular risk factors. The latest such assessment from the 2019 Global Burden of Disease Study concludes that annually, air pollution causes 6.5 million premature deaths worldwide, an estimated 3,500 of which are in Switzerland. In other words, particulate pollution claims significantly more lives than heat, for example, which causes up to 1,000 additional deaths in a hot summer.

Those are striking figures.
Even though the relative health risks that environmental pollutants present for individuals are fairly small, they are very significant in public health terms because they affect a large number of people. That puts me in a permanent quandary to a certain extent. It’s difficult to find a good way to talk about the risks without scaring people, since that has negative implications for health too. All the same, I think it’s important that we as a society don’t treat the risks lightly. After all, the health-related effects of air pollution kill several thousand people in Switzerland each year. Nevertheless, air pollution in Switzerland has declined since the 1990s. This is quite amazing when you consider that both the population and the traffic volumes have risen dramatically during the same period.

Last year, the World Health Organization (WHO) adjusted its guideline values for air pollutants downwards. Why was that?
An increasing amount of environmental research appears to show that for many pollutants there are no harmless concentrations below particular thresholds, but that health risks increase even at low exposure levels. Twenty years ago, when I first started out in epidemiology, there were very few studies of the health impact of airborne pollutants. The studies were too small in scope to produce meaningful information on the risks of low exposure. Nowadays there are a lot more and larger studies, so it is possible to model exposure in the population with much greater accuracy and detail. That means there are now relatively good, reliable figures to show that even low exposure levels have an effect.

So far, we’ve been talking mainly about airborne pollutants. What’s the situation as regards soil and water pollution?
Around 20,000 different chemical substances are manufactured in Switzerland. While many of them are used in industry, they are also used in agriculture and households. We know very little about how much these chemicals affect the Swiss population. This is a gaping hole in environmental research. We are aware that medicine or pesticide residues can be detected in groundwater or drinking water, but their effects on our health are only well documented in cases of acute poisoning. In contrast, studies of low-dose, long-term pollution are hampered by significant uncertainties.

Where else are there gaps in our knowledge?
Air pollution is the showcase discipline in environmental research, because work started on it 40 years ago and we now know a lot about it. But environment and health constitute a wide-ranging complex of issues that comprises much more than just air quality. A lot of other environmental risks aren’t even on the radar. For example, nitrate levels in drinking water exceed thresholds levels in many places in Switzerland. There is a plausible mechanism by which nitrate ingestion can lead to colon cancer, yet there has been virtually no research into this issue. In addition, very little is happening on this at a political level; nitrate pollution of drinking water is simply being accepted.

In general, what would you like to see going forward?
Greater cooperation between spatial planning, environmental and public health specialists. And the development of holistic approaches to prevention so that we see more quiet, low-pollutant neighbourhoods with short, attractive connections. Encouraging people to be active not only helps reduce health costs, it also improves quality of life. People who are active are more content in their life.

Prof. Dr. Martin Röösli

After graduating in environmental science from ETH Zurich, Martin Röösli did his PhD on airborne pollutants and the associated health risks at Basel’s air hygiene office and at the Institute of Social and Preventive Medicine (ISPM) at the University of Basel, where he is now Professor of environmental epidemiology. At the Swiss Tropical and Public Health Institute (Swiss TPH), Martin Röösli is Head of the Environmental Exposures and Health unit.

At first hand

Anne Lévy, Director of the Federal Office of Public Health

Achieving health together

Healthy people need a healthy planet. We are inseparably linked to and dependent on the natural environment. The air we breathe, the food we eat, the water we drink and the biodiversity that surrounds us all have an effect on our health. Without an intact environment, people can never be healthy. As the recent pandemic and numerous environmental disasters have demonstrated all too clearly, we are reliant on functioning ecosystems and a stable climate. Sooner or later, the way we treat our planet will leave traces on human health. Since everything is interlinked, achieving health requires a joint effort with other sectors. This is the idea underpinning the One Health approach.

Interdisciplinarity in action
One area where One Health has been in use for several years is the fight against antibiotic resistance. Bacteria adapt to antibiotics and become resistant to them if they are used too frequently or incorrectly. Antibiotic resistance is an issue that affects human medicine, veterinary medicine, agriculture and the environment. Adopting a cross-sectoral approach to the problem therefore seems the logical thing to do. The Strategy on Antibiotic Resistance (StAR) gives us a structure within which we can work closely and effectively with the Federal Food Safety and Veterinary Office, the Federal Office for Agriculture and the Federal Office for the Environment. The only way we can avoid resistance is by reducing antibiotic use in all areas.

Interdisciplinary collaboration is the key to creating a positive framework for health. Environmental and health problems often have shared roots, which can only be addressed by concerted action. Efforts to combat climate change and protect the environment are ultimately also forms of health promotion and disease prevention. An interdisciplinary approach is essential in preventing and managing hazards such as pandemics and antibiotic resistance.

Climate change: Healthcare systems are part of both the problem and the solution

Climate change is affecting our health. Heatwaves, the spread of infectious diseases and ozone pollution are just some of the risk factors. The effects are already perceptible in healthcare provision, yet at the same time our healthcare system is having a not inconsiderable impact on the climate. As part of its efforts to protect health, the FOPH is implementing the "Adaptation to climate change action plan, 2020–2025".

"The earth has a fever, and it is rising", said US politician and climate activist Al Gore in 2007. The truth of his words is becoming ever more perceptible. Without climate protection measures, the CH2018 climate scenarios for Switzerland predict that average yearly temperatures will rise by a further two to three degrees by the middle of the century. With systematic climate protection, however, two thirds of the potential climate impact could be avoided until 2060.[1]

Overall public health affected

Even now, extreme weather events such as heatwaves or floods are occurring with greater frequency. They are also impacting our health. There is good reason why climate change has been called the biggest global health threat of the 21st century.[2]

Climate change has both a direct – say through heat or smog – and indirect – by changing ecosystems – impact on our health. It affects non-communicable conditions such as cardiovascular disease, transmissible diseases such as respiratory tract infections and also mental health, for example by triggering stress. Climate change, including loss of biodiversity, is therefore a priority in the "Environment and Health Roadmap" that the FOPH is currently drafting in partnership with the Federal Office for the Environment FOEN.

Driving CO_2 emissions

Healthcare systems have conflicting roles in the context of climate change. While they provide treatment for climate-related diseases, they are also a significant source of greenhouse gas emissions. According to estimates, Switzerland's healthcare system is responsible for 6.7 percent of the country's total CO_2 footprint.[3] "This is perhaps ironic – as medical professionals commitment is to 'first, do no harm'", said Tedros Adhanom Ghebreyesus, Director-General of the World Health Organization (WHO), commenting on the issue. "Places of healing should be leading the way, not contributing to the burden of disease."

The "Green Hospital" research project funded by the Swiss National Science Foundation (2018–2022) has investigated this issue, identifying hospital processes that impact the environment and which have potential for improvement. The areas with the biggest savings potential in terms of greenhouse gas emissions are energy supplies (heating: 26% savings potential in an average hospital, electricity: 9%), catering (17%), building infrastructure (15%) and medicines (12%).[4] Catering in particular is an area where steps can be quickly and easily taken, for example by serving meat less often.

Solutions are cross-sectoral

The effects of climate change are not just limited to healthcare provision, but they are also closely linked to other areas such as food safety, natural hazards, agriculture, energy, etc. For this reason, the Confederation is endeavouring to find cross-sectoral solutions. The Federal Council established the framework for coordinated action in 2012 with its "Adaptation to climate change in Switzerland" strategy. Implementation between 2020 and 2025 is covered by the second action plan. The FOPH is involved in this plan too, acting as lead agency on measures to protect human health. These include providing information and recommendations on heat stress or monitoring, preventing and recognising early signs of infectious diseases transmitted by mosquitoes, for example.

The FOPH is also contributing to the Confederation's National Centre for Climate Services (NCCS). It is lead agency for the "Human health" priority theme, on which it is partnering with FOEN, the Federal Office for Civil Protection FOCP, MeteoSwiss and Swiss TPH. In addition to providing information for professionals, authorities and the public, scientific principles and prevention measures are also being developed. These will be published via the NCCS priority theme "Human health".

The NCCS programme "Decision support for dealing with climate change in Switzerland" (2022–2025) will generate further findings. One of the six projects in the programme, "Human health and animal health", is a joint project between the FOPH and Federal Food Safety and Veterinary Office FSVO.

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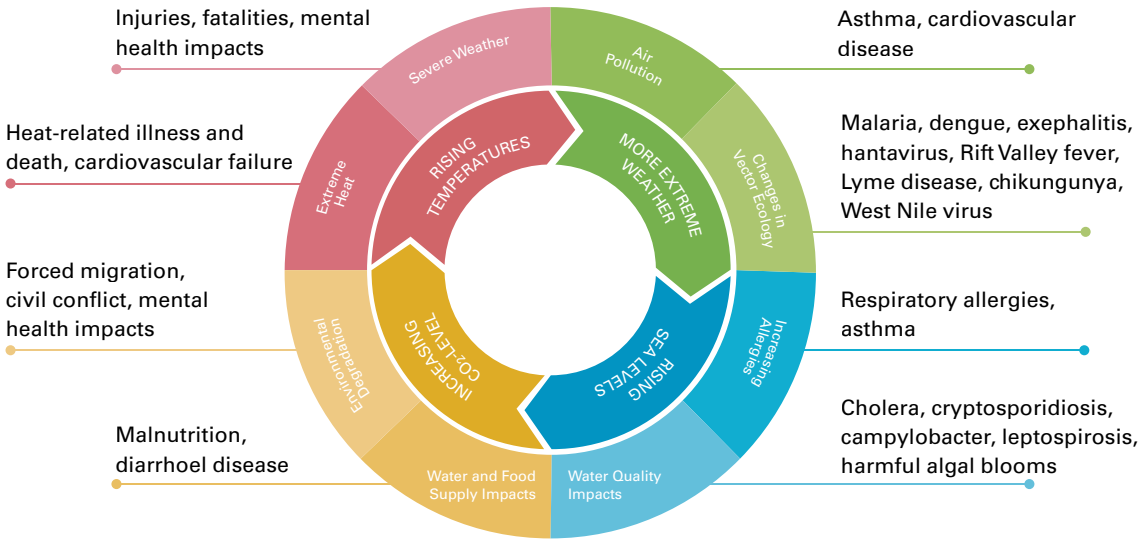
Links:
- Heat (FOPH, in German): www.hitzewelle.ch
- National Centre for Climate Services NCCS: https://tinyurl.com/yv43zvc9
- Climate Scenarios for Switzerland CH2018 (NCCS): https://tinyurl.com/59farwe7
- Human health (NCCS): https://tinyurl.com/avrrdjfr
- "Adaptation to climate change in Switzerland: Action plan 2020–2025" (FOEN, in German): https://tinyurl.com/2s5k8wn6
- "Health Care Without Harm": https://noharm-europe.org
- "Green Hospital" (NRP73, in german): www.greenhospital.ch
- European Climate and Health Observatory: https://tinyurl.com/533mvmka

1 Federal Office for the Environment, "Climate change in Switzerland", 2020: https://tinyurl.com/4823cy3w
2 The Lancet, A Commission on climate change, 2009: https://tinyurl.com/2fyywfau
3 "Health Care's Climate Footprint", Health Care Without Harm, 2019: https://tinyurl.com/mws3hrre
4 Green Hospital: Wenn das Standard-Menu im Spital vegetarisch ist, 2021 [when the standard hospital menu is vegetarian], 2021: https://tinyurl.com/msj2jcah

The impact of climate change on human health



Rising temperatures and sea levels, extreme weather events and increased CO_2 values affect our health.

Source: U.S. Centers for Disease Control and Prevention. https://tinyurl.com/mp9znu7t

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