

Table 2. Planned, current and previous institutional collaborations.

International collaboration	Nordic collaboration	National collaboration
Harvard School of Public Health (MA, USA)	The International Centre for Reindeer Husbandry (Norway)	Aalto University
Johns Hopkins Bloomberg School of Public Health (USA)	Sámi University of Applied Sciences (Norway)	Finnish Meteorological Institute (FMI)
National Defence Medical School (Taipei, Taiwan)	University of Umeå (Sweden)	National Institute for Health and Welfare
National Taiwanese University (Taipei, Taiwan)	Norwegian Institute of Public Health (Norway)	Oulu University Hospital District
Peking University (China)		The Finnish Institute of Occupational Health
Sverdlovsk Sanepid (Yekaterinburg, Russia)		The Finnish Defense Forces
University of Birmingham (UK)		University of Helsinki
University of Cape Coast (Ghana)		Helsinki University Hospital (HUS)
University of Queensland (Australia)		University of Turku
Queensland University of Technology (Australia)		University of Lapland
University of Canberra (Australia)		Finnish Red Cross
University of Texas Southwestern Medical Center (USA)		
Maastricht University (The Netherlands)		



CERH
Center for Environmental and Respiratory Health Research

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- Understanding the Changing Global Health

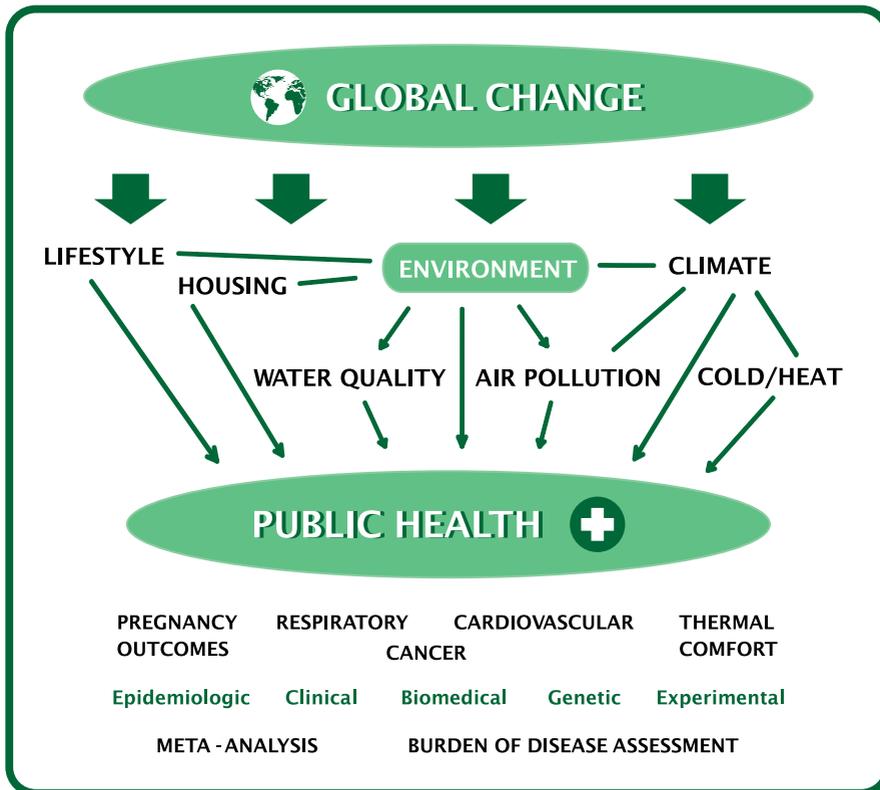


Figure 1. CERH framework.



Climate change is the biggest global health threat of the 21st century.

UCL-Lancet Commission on Managing the Health Effects of Climate Change (Lancet 2009; 373: 1693-733).

Center for Environmental and Respiratory Health Research (CERH)
Director Professor Jouni J. K. Jaakkola
P.O. Box 5000, FI-90014 University of Oulu, FINLAND
Visiting address: Medical Faculty Main Building
Aapistie 5 B, 1st floor, Oulu, FINLAND
tel. +358 2 9448 5669

www.oulu.fi/cerh
cerh@oulu.fi

Staff email addresses:
firstname.lastname@oulu.fi
Information updated May 25, 2016

WHO Collaborating Centre in Global Change, Environment and Public Health
A Part of the Medical Research Center Oulu (MRC)

WHAT IS CERH

The Center for Environmental and Respiratory Health Research (CERH) is a research and education institution at the University of Oulu, Finland. CERH has a strong focus on the health effects of global change with a special interest in climate change. We study, inter alia, public health, climate change, air pollutants, asthma, allergies and cardiovascular diseases. Still little is known about climate change's various health impacts, susceptible populations, and appropriate methods of mitigation and adaptation. CERH aims to respond to these challenges.

Climate change is a global research priority of WHO.

(Protecting Health from Climate Change, WHO 2009).

WHO WE ARE

CERH comprises a multidisciplinary group of researchers with expertise in epidemiology and biostatistics, clinical medicine, biology, genetics, environmental sciences, ecology, geography and anthropology. CERH consists of 30 faculty and non-faculty research and support staff.

MISSION

The mission of CERH is to produce information to promote human health in a changing global environment. This is implemented through strong scientific multidisciplinary research, wide international collaboration, education, consulting functions and contribution to national and international public health guidelines.

CERH AS A WHO COLLABORATING CENTRE

Starting from May 2014 we are a WHO Collaborating Centre in Global change, environment and public health. CERH is designated by the WHO Director-General to carry out activities such as: 1) to support WHO programme implementation on climate change and public health, 2) to provide research information on global change, environment and public health, 3) to provide case-studies relevant to the research framework, 4) to contribute dissemination of information and 5) to train students. CERH operations are integrated to meet the WHO terms of reference.

EDUCATION

CERH provides training in public health, epidemiology and environmental health for medical and

doctoral students. Post-graduate training courses are also available. Twinning programs are currently being developed with various top universities.

Climate Change is happening. Now.

Global mean temperature has risen nearly 1 °C in Finland and 2.3 °C from 1850 to 2010. The warming has been most considerable in early winter – with almost a 5 degrees increase in mean temperature. (Finnish Meteorological Institute 2016).

RESEARCH

The overall aim of CERH research is to assess the health impact and burden of disease from environmental exposures directly or indirectly related to global environmental change.

The ground-breaking approach of CERH is to apply multidisciplinary complementary research methodologies by conducting broad nationwide registry-linkage studies, follow-up of large population-based epidemiologic studies, controlled experimental studies and synthesize the evidence applying meta-analyses and burden of disease assessment. We use geographical Information System (GIS) and other interdisciplinary methods. The obtained results of empirical research are applied to future scenarios that can be extrapolated to all parts of the world.

Climate change has adverse health effects.

There is a growing amount of evidence of both direct, indirect and tertiary adverse health effects related to climate change, such as excessive weather-related mortality and morbidity with the increasing number and amplitude of heat waves and cold spells, accidents, spread of animal-borne and infectious diseases and social and cultural implications such as immigration. (Climate Change 2014: Working Group II, IPCC 2014). Between 2030 and 2050, climate change is expected to cause approximately 250 000 additional deaths per year (Quantitative risk assessment of the effects of climate change on selected causes of death, 2030s and 2050s, WHO 2014).

PARTNERS

CERH cooperates actively with national and international partners and collaborators in the field of climate change, global environmental health and well-being (Table 2). CERH is part of an international and interdisciplinary research network Health-Earth (H-Earth). It aims to build knowledge about global change and health and develop capacity for effective responses targeted to policymakers, practitioners and communities.

Reported findings of CERH investigations:

- Prenatal exposure to air pollution increases the risk of stillbirth (Occup Environ Med 2016, doi:10.1136/oemed-2015-103086)
- Increasing evidence on temperature-related morbidity and mortality in Sub-Saharan Africa based on a systematic review of the empirical evidence (Environ Int 2016;91:133-49.)
- Reduction of household air pollution is critical in the sustainable development goals (Bull World Health Organ 2016;94(3):215-21).
- Cold spells are associated with increased mortality rates in populations around the world (Environ Health Perspect 2016;124:12–22)
- A decrease rather than low temperature and humidity per se during the preceding three days increase the risk of influenza episodes in a cold climate (Environmental Health 2014;13:22)
- Increasing awareness of climate change could lead to increased consumption of climate-friendly food, reduction in GHG emissions, and thus climate change mitigation (PLoS ONE 2014; 9(5): e97480)
- Current asthma is a strong determinant of cold weather-related respiratory symptoms already in young adulthood (Respir Med 2014; 108(1):63–70)
- Short-term cold exposure increases aortic blood pressure and cardiac workload in untreated hypertensive people (Am J Hypert 2014;27(5):656-64)
- A considerable amount of the population of a northern climate suffer from heat-related complaints (Eur J Public Health 2014;24(4):620-6)
- Individuals with asthmatic heredity have a considerably increased risk of developing adult-onset asthma when exposed to second-hand smoking (Am J Respir Crit Care Med 2013;188(7):776–782)
- Dampness and molds in the home are determinants of developing asthma in different climatic zones (PLoS One 2012;7(11): e47526)
- Exposure to traffic-related fine particulates (PM 2.5) causes DNA damage (PLoS One 2012;7(5):e37412)
- Individuals with pre-existing cardiovascular, respiratory or musculoskeletal disease, mental depression or diabetes suffer most from cold-related symptoms (Public Health 2011;125(6):380-388)
- Exposure to second-hand smoke corresponds to 1.0% of all deaths and 0.7% of the worldwide burden of disease in DALYs (Lancet 2011;377(9760):139-146)

Updated lists of scientific articles and links to full texts can be found at www.oulu.fi/cerh/publications.

Cold spells increase mortality around the world.

Adverse health effects of cold spells occur in both subtropical and arctic climates with an average 10% increase in total mortality (CERH / Rytö et al. 2016).

Global atmospheric pollution has a major impact on the health and economic well-being.

Particle air pollution is among the largest health risk factors globally. Particle air pollution was responsible for about 190 million lost disability-adjusted life years (DALY) in 2010 (Climate Change 2014: Working Group II, IPCC 2014). Our recent results indicate that exposure to particles and ozone increases the risk of cardiac and birth defects (Hwang et al. 2016). CERH research team has provided evidence that prenatal exposure to air pollution increases the risk of stillbirth (CERH / Siddika et al 2016).

Table 1. CERH ongoing and planned research projects.

Project	Topic	Time	Funding
GAP (planned)	Centre of Excellence in Global Change, Arctic Environment and Public Health Research	2018-2025	Academy of Finland (pending)
ARAHAT (planned)	The Future of Saami People in the Changing Climate: development of holistic indicators to study and monitor Saami well-being and influences of climate change	2016-2019	EU-Interreg, Regional Council of Lapland (pending)
AMIF-CERH (planned)	Asylum seekers' and refugees' adaptation to an Arctic climate: national model for increasing awareness	2016-2019	EU-Asylum, Migration and Integration Fund (AMIF) (pending)
CAD EX COLD	Coronary artery disease (CAD) and health-enhancing year-round exercise	2015-2018	Finnish Ministry of Education and Culture, Yrjö Jahnsson Foundation
APTA	The influence of Air Pollution, Pollen and Ambient Temperature on Asthma and Allergies in Changing Climate	2013-2017	Academy of Finland
Exercise and asthma	Effects of regular exercise on asthma control, physical fitness and quality of life of asthmatics	2010-2015	GSK, Ida Montin Foundation, Ministry of Education (KEVO), Filha, Väinö and Laina Kivi Foundation