

Non-Communicable Diseases Watch

May 2016

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衛生防護中心
Centre for Health Protection



衛生署
Department of Health

Climate Change and NCD Connections

Key Points

- ※ Climate change refers to any change in climate over time, whether due to natural variability or as a result of human activities. Its impacts on human health are not only physical, but also psychological.
- ※ Apart from altering transmission and occurrence of infectious diseases, climate change may also directly and indirectly increase the incidence of non-communicable diseases (NCD) including cardiovascular diseases, respiratory allergies and diseases, kidney diseases, some cancers, malnutrition, injuries and poisonings, as well as mental health problems.
- ※ Affected by global warming and exacerbation of local urbanization, Hong Kong also experienced an average rise of 0.12°C per decade from 1885 to 2015. More importantly, Hong Kong is expected to have an increase in the number of very hot days, average rainfall intensity, frequency of extreme rainfall events and rising sea level in the this century.
- ※ Among local populations, studies observed an association between certain weather phenomena (such as elevated temperature) with increased risk of NCD mortality and morbidity.
- ※ Acting on climate change is everyone's responsibility. As responsible global citizens, we should cut down our own carbon footprint. Leading a healthier lifestyle, such as eat greener with more seasonal fruits and vegetables but less meat, can also help protect the environment and fight climate change.

Climate Change and NCD Connections

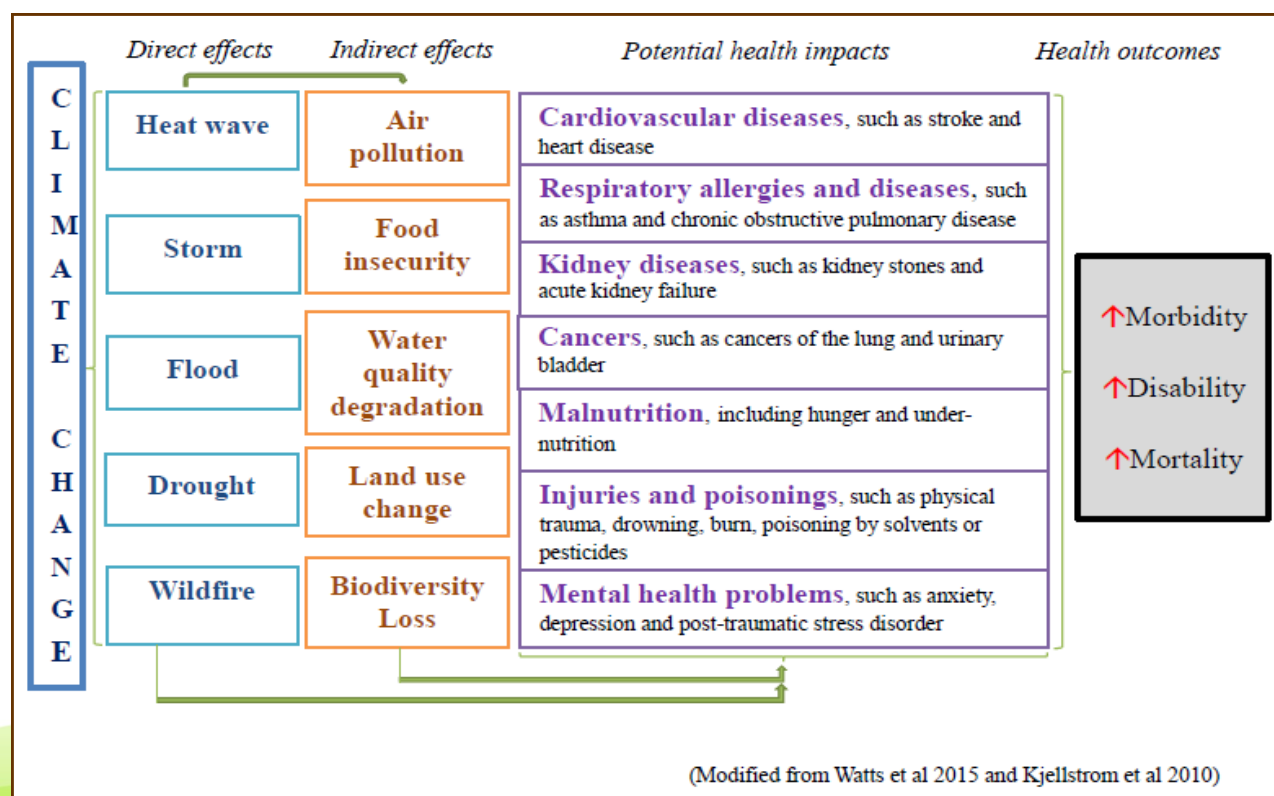
Climate change is one of the biggest global health issues of the 21st century, threatening billions of peoples' lives and wellbeing.¹ Climate change refers to any change in climate over time, whether due to natural variability or as a result of human activities. Human activities through fossil fuel use, deforestation, and intensive livestock farming cause an increase in greenhouse gases including carbon dioxide, methane, nitrous oxide, and fluorinated gases. The greenhouse gases act like a blanket in the atmosphere, trapping heat on Earth and keeping it warm (a phenomenon called greenhouse effect). Increase in greenhouse gas concentration will enhance the greenhouse effect.^{1,2} According to the World Meteorological Organization, 2015 was a record warm year both globally and in many individual countries.³ The average temperature across the global land and ocean surfaces was 0.9°C above the 20th century average.⁴ With general rise in global temperature, this can trigger more extreme weather events (such as heat waves, storms, floods and droughts), cause disruptions to the biodiversity and ecological

systems, and shape disease patterns and mortality.^{5,6} Compared with a future without climate change, the World Health Organization (WHO) projected an additional 241 000 deaths for the year 2030 from heat exposure in elderly, childhood under-nutrition, diarrhoea and malaria.⁷

Effects of Climate Change on NCD

The public health impacts of climate change are immense. Apart from altering transmission and occurrence of infectious diseases, climate change may also directly and indirectly increase the incidence of NCD.⁸⁻¹⁰ As shown in Figure 1, the impacts of climate change on NCD can be directly through heat wave, extreme weather events, sea level rise, or indirectly through air pollution, reduced crop yields and food provisions, degraded water supplies and quality, compromised soil fertility and land usage, or accelerated loss of biodiversity. Impacts on human health are not only physical, but also psychological.⁹⁻¹¹

Figure 1: Pathways from climate change to NCD



Heat Waves and NCD

Heat waves are associated with a series of health problems ranging from increased morbidity to excess death toll. During heat wave periods, studies found an increased demand for emergency medical care, including ambulance services, emergency department visits and hospital admissions.¹² Compared with the reference period from 1998 to 2002, more than 70 000 additional deaths occurred during hot periods across Europe in summer 2003.¹³ Most of the increase in heat-related morbidity and mortality were attributed to cardiovascular, respiratory and kidney diseases.^{10, 12, 13} In India, extreme heat is common in summer. But in May 2015, casualties were abnormally high that about 2 500 people died due to heat when India was gripped by a severe heat wave.³

Extreme Weather Events and Injuries

Extreme weather events cause injuries and deaths directly. Between 1993 and 2012, more than 530 000 people died as a direct result of almost 15 000 extreme weather events globally.¹⁴ Analyses of the impact of common natural disasters on human populations also estimated that floods caused approximately 540 000 deaths and 360 000 injuries (excluding 38 000 to 2.7 million unrecorded injuries) between 1980 and 2009.¹⁵ There were 412 000 people who died and 290 000 injured (excluding an estimated 28 000 to 114 000 unrecorded injuries) by tropical cyclones over the same 30-year period.¹⁶

Effects of Climate Change on Mental Health

Exposure to extreme weather events are likely to have significant psychological impacts among the affected communities directly through trauma, or indirectly through physical stress (e.g. extreme heat exposure) or deteriorating environments and key community assets.^{8, 17} Studies suggest that between 25% and 50% of all people exposed to an extreme weather event may have some forms of mental

disorders, including anxiety, depression, phobic disorder and post-traumatic stress disorder (PTSD).¹⁸ In certain regions of the world, catastrophic climate change contributes to the mass migration of people fleeing conditions where sustaining livelihoods is no longer possible. Between 2008 and 2014, an average 22.5 million people have been displaced each year by climate or weather-related disasters, particularly floods.¹⁹ Research into the mental health of displaced people has documented elevated rates of mental health problems. Poor mental health can be attributed to pre-displacement experiences of violence and trauma or post-displacement stressors.²⁰

Effects of Climate Change on Air Quality and NCD

Greenhouse gases have an effect on climate change which in turn has an effect on air quality. Weather elements like temperature, humidity, wind, precipitation and extreme weather events (such as drought-driven wildfires and dust storms) can affect air pollutant emission, chemistry, deposition and transport.^{21, 22} For example, higher atmospheric concentration of carbon dioxide and a warmer climate prolong the pollen season and increase pollen levels. High pollen concentrations will contribute to asthma morbidity.^{13, 23, 24} Studies have also associated exposures to ground-level ozone with emergency department visits and hospitalisations for asthma, worse asthma control, and reduced lung function.^{23, 24} In 2013, the International Agency for Research on Cancer (IARC) classified outdoor air pollution as a cancer-causing agent to humans. There is sufficient evidence that exposure to outdoor air pollution causes lung cancer.²⁵ As WHO estimated, outdoor air pollution caused 3.7 million premature deaths worldwide in 2012, of which some 80% of the deaths were due to ischaemic heart disease and stroke, 14% were due to COPD or acute lower respiratory infections, and 6% were due to lung cancer.²⁶

Effects of Climate Change on Food Security and Nutrition

Among the most significant impacts of climate change is the potential increase of food insecurity and malnutrition.²⁷ Climate change could damage the ecological systems and lead to biodiversity loss, and thus affect food availability, stability, access and utilisation through long-term climate risks (such as increases in temperature, rainfall or sea level) and extreme weather events. These weather-associated phenomena would affect crop yields, favour pathogens growth or transmissions, and have an effect on the nutritional values of most crops. Extreme weather events may facilitate the entry of contaminants (such as pesticides, heavy metals and hazardous waste) into the food chain, destroy critical infrastructure thereby interrupting delivery of or access to food. As a result, it will further worsen the global situation of hunger and malnutrition.^{27, 28} As WHO estimates, climate change may result in an additional 7.5 million young children aged under 5 years with moderate to severe stunting by 2030.⁷ Of note, emerging evidence suggests that early childhood stunting is closely associated with risk of subsequent obesity and NCDs in adulthood.^{29, 30}

Hong Kong Situation

Affected by global warming and exacerbation of local urbanization, Hong Kong has also observed significant climate changes over the last hundred years (Table 1).³¹ More importantly, Hong Kong is expected to have an increase in the number of very hot days, average rainfall intensity, frequency of extreme rainfall events and rising sea level in this century.^{31, 32}

Studies also observed an association between certain weather phenomena with increased risk of NCD morbidity and mortality among local populations. A study based on routine mortality, temperature and other data reported that an average 1°C increase in daily mean temperature above 28.2°C was associated with an estimated 1.8% increase in non-accidental mortality.³³ During the hot season, another study observed that hospitalisations for respiratory diseases and unintentional injuries increased 7.6% and 1.9% respectively for every 1°C increase in mean daily temperature above 28.5°C.³⁴ Furthermore, a study which reviewed records of all patients presenting to 15 Hong Kong's public hospital emergency departments between 2004 and 2009 found a total of 460 tropical cyclone-related injuries and one fatality. Falls (42.6%) and being hit by a falling or flying object (22.0%) were the most common mechanisms of injury.³⁵

Table 1: Observed climate changes in Hong Kong from the last century to 2015

Climatic variables	Changes per decade
Annual mean temperature	↑ by 0.12°C (1885-2015)*
Annual total rainfall	↑ by 31 mm (1947-2015)
Annual number of heavy rain days (hourly rainfall >30mm)	↑ by 0.3 days (1947-2015)
Annual number of days with thunderstorms	↑ by 1.9 days (1947-2015)
Annual mean sea level (Victoria Harbour)	↑ by 30 mm (1954-2015)

Note: *Data are not available from 1940 to 1946.

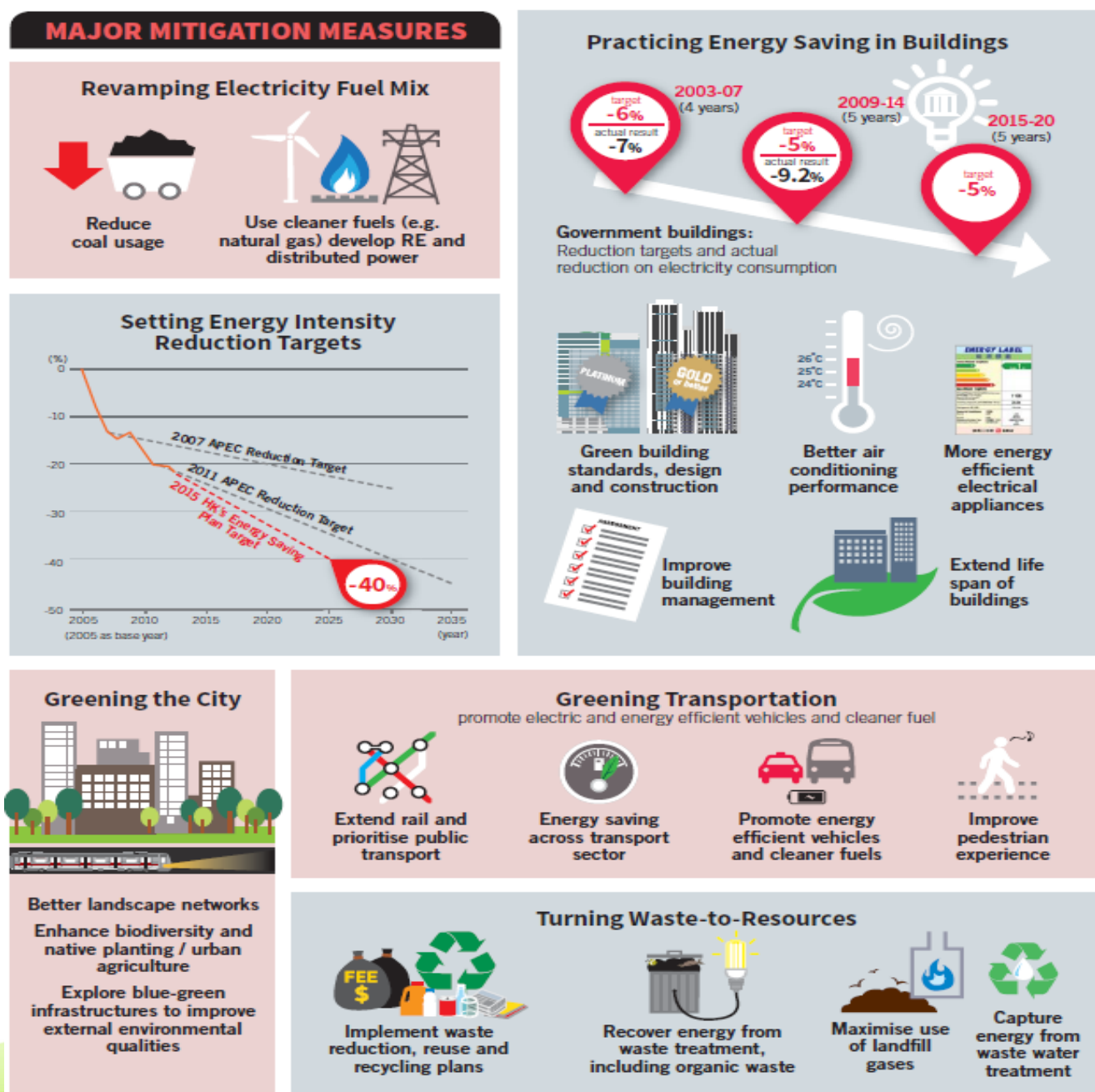
Source: Hong Kong Observatory.

Climate Change Initiatives for a Healthier Hong Kong

Over the past two decades, the Hong Kong SAR Government has put in a range of initiatives in addressing climate change through a cross-sectoral approach. In 2010, Hong Kong put forward the target to reduce the carbon intensity by 50-60% from the 2005 level by 2020. Hong Kong has also developed a range of mitigation measures to meet the stated target (Figure 2). In terms of climate change adaptation, strengthening societal resilience and health protection, relevant bureaux and departments have also put in place meteorological monitoring and

severe weather warning systems; public health information and disease surveillance systems; disaster and emergency plans, such as flood prevention and landslide contingency plans; and public communication strategies to empower community's capacity to cope with climate change.³² The Hong Kong SAR Government has also established a Steering Committee to steer and coordinate the climate actions of various bureaux and departments and to cater for the agreed objectives at the United Nations climate conference on climate change held in Paris in December 2015.

Figure 2: Major mitigation measures developed in Hong Kong



Green living and personal health complement each other

Acting on climate change is everyone's responsibility. As responsible global citizens, we can cut down our own carbon footprint and in turn help to mitigate global warming. Here are some simple actions we can do —

- ✓ Use public transport instead of private cars.
- ✓ Use energy efficient light bulbs.
- ✓ Turn off electrical appliances when they are not in use.
- ✓ Maintain temperature setting of air-conditioner at 25.5 °C during summer months.
- ✓ Recycle all recyclable materials.
- ✓ Install a low-flow shower-head and take a quick shower.
- ✓ Let go an unwanted but usable item by exchange or donation.
- ✓ Treasure food and play an active role to reduce food waste at source.

Besides, leading a healthier lifestyle can help protect the environment and fight climate change^{8,36}, including —



- ✓ Eat greener with more seasonal fruits and vegetables but less meat. Reducing meat consumption and moving to a plant-based diet can reduce greenhouse gas emissions and is better for the environment, and can also be beneficial for health.³⁷



- ✓ Travel more by walking and cycling, and less by motor vehicle. Active living can help maintain physical and mental health; it can also reduce greenhouse gas emissions.

For more tips on healthy living, saving energy at home, green office management and greener transportation, or information about global and local climate change, please refer to websites listed in Box 1.

Box 1: Websites for healthy, 'green' living tips and information

Tips on healthy living

(source: Department of Health's Change for Health website)

<http://www.change4health.gov.hk>

Tips on saving energy at home

<http://www.gov.hk/en/residents/environment/public/green/saveenergy.htm>

Tips on green office management

<http://www.gov.hk/en/residents/environment/public/green/greenoffice.htm>

Tips on greener transportation

<http://www.gov.hk/en/residents/environment/public/green/greentransport.htm>

Information on climate change

(source: Hong Kong Observatory)

http://www.weather.gov.hk/climate_change/climate_change_e.htm

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CLIMATE CHANGE OUR RESPONSE

回應·氣候展

- 03.06—07.06 Hong Kong Central Library 香港中央圖書館
20.06—25.06 Hong Kong Times Square 時代廣場
15.07—26.07 Ping Shan Tin Shui Wai Public Library 屏山天水圍公共圖書館
28.07—04.08 Business Environment Council Headquarters 商界環保協會總部
06.08—17.08 Exchange Square 交易廣場
20.08—31.08 Kowloon Park 九龍公園
02.09—18.09 Hong Kong Science Museum 香港科學館
17.10—27.10 The Hong Kong Polytechnic University 香港理工大學
29.10—06.11 Hong Kong Science Park 香港科學園
08.11—20.11 The Chinese University of Hong Kong 香港中文大學



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please visit <http://www.science.gov.hk/exhib2016/index.htm>.

Non-Communicable Diseases (NCD) WATCH is dedicated to promote public's awareness of and disseminate health information about non-communicable diseases and related issues, and the importance of their prevention and control. It is also an indication of our commitments in responsive risk communication and to address the growing non-communicable disease threats to the health of our community. The Editorial Board welcomes your views and comments. Please send all comments and/or questions to so_dp3@dh.gov.hk.

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