



Climate change and its impact on population health in Southern China: Implication for adaptation policy

Key messages

- The research on climate change and health conducted in Guangdong province indicates that extreme climate events, such as heat wave and cold spell, increased the risk of mortality and infectious diseases.
- Vulnerability to heat wave was higher in economically undeveloped regions; there is a large room to improve the risk perception and adaptation behaviors of heat wave in the public.
- Meteorological and health departments should cooperate to build up and improve the monitoring systems on climate change and public health in whole Guangdong province.
- Establishing a multi-sectoral cooperation mechanism to develop and implement temperature early warning system will substantially help to minimize adverse health impacts of climate change.
- Risk communication strategies and adaptation policies should be developed by provincial authority to improve risk perception to climate change and further reduce the adverse health impacts of climate change.

Background

As several other countries, China has experienced noticeable changes in its climate. Annual average air temperature has risen by 0.5-0.8°C, slightly higher than the average global temperature increase (0.74°C), and most of these changes have been observed over the past 50 years. In the southern China province of Guangdong, the annual average air temperature increased from 21.4°C in 1960s to 21.9 °C in 1990s, with an increase of 0.5 °C and is predicted to increase between 1.0°C and 2.8°C between 2011 and 2100.

There is now widespread consensus that global climate change will have significant adverse impacts on human health. Such a concern is important to the broader international audience of policy makers and researchers, and has become increasingly important within the Chinese context. Although climate change research in China has been supported by the government since 1990s and has focused on areas such as agriculture and water, research on health has only recently begun. As a part of the project of Adapting to Climate Change in China (ACCC), supported by British, Swiss and Chinese partners, Guangdong Center for Disease Control and Prevention (GDCDC) is undertaking the first comprehensive study in China into the health impacts and adaptation policy of climate change. This policy brief summarizes findings from this research.



Extreme temperatures and mortality

The potential impacts of climate change on population health within China are significant and include a range of disease outcomes and health issues. Research associated with the Adapting to Climate Change in China project has identified several areas of potential concern for population health in Guangdong Province.

Heat waves have been and are predicted to remain a significant problem in Guangzhou. A total of 66 heat waves in Guangzhou from 1951 to 2010 were observed with significant increases being recorded during the first decade of the 21st century (Fig 1).

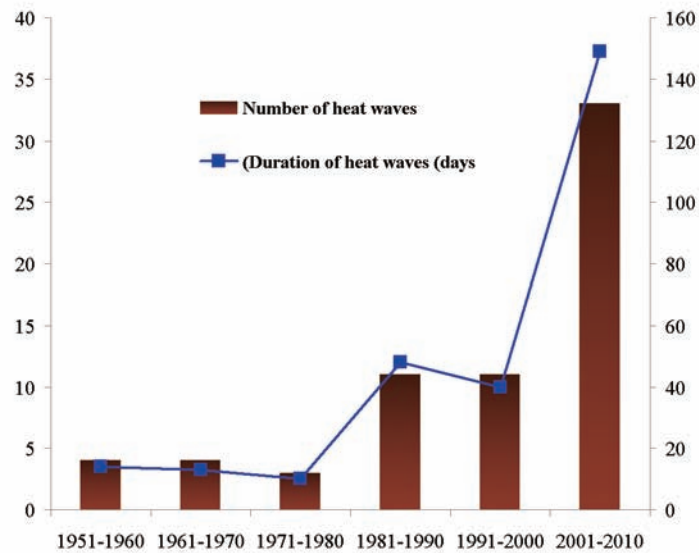


Figure 1: Decade trend of heat wave during the last 60 years in Guangzhou

The potential health impact has been significant. Data for Guangzhou between 2006-2008 has illustrated a significant link between daily maximum temperature, total mortality, cardiovascular disease, respiratory disease and cerebrovascular disease, especially among elderly at risk populations (Figure 2).

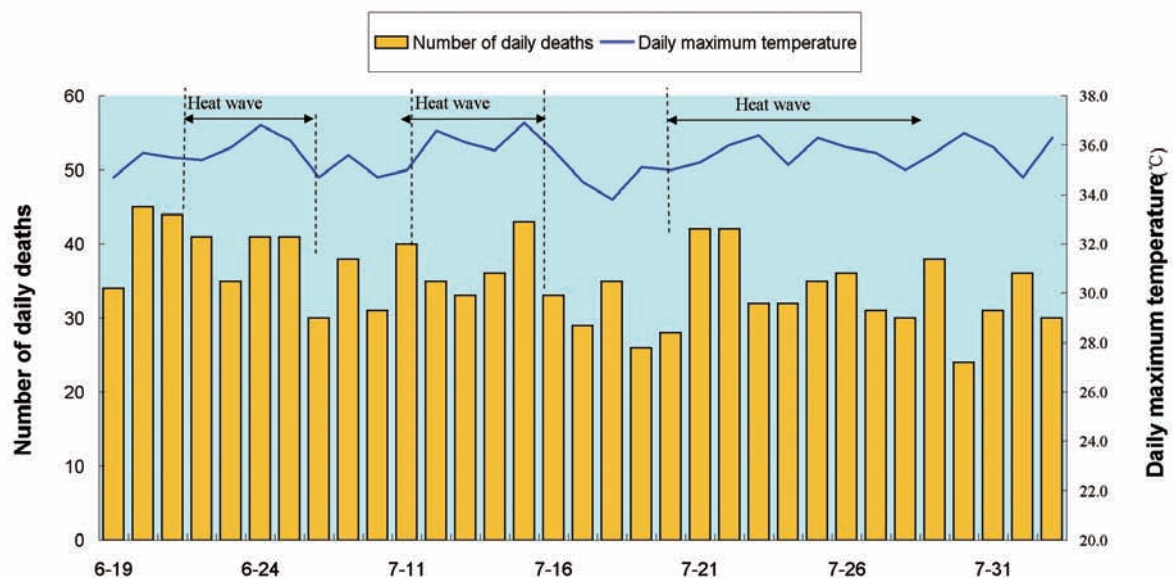


Figure 2: Daily maximum temperature and mortality during heat wave in Guangzhou, 2007

Apart from heat waves, cold spells are also likely to have a significant impact on population health. Data from Guangdong showed that the impact of a period of excess cold weather in 2008 had a significant impact on mortality in three cities of Guangdong. In Fig. 3, the x-axis indicates the duration from 15 days before the start of cold spell to the 35 days later after the cold spell end, and the two Vertical lines define the cold spell duration. The log RR value in y-axis represents the logarithm of RR which indicates the risk of death. These results reveal that the number of deaths during cold spell increased dramatically compared to the period without cold spell.

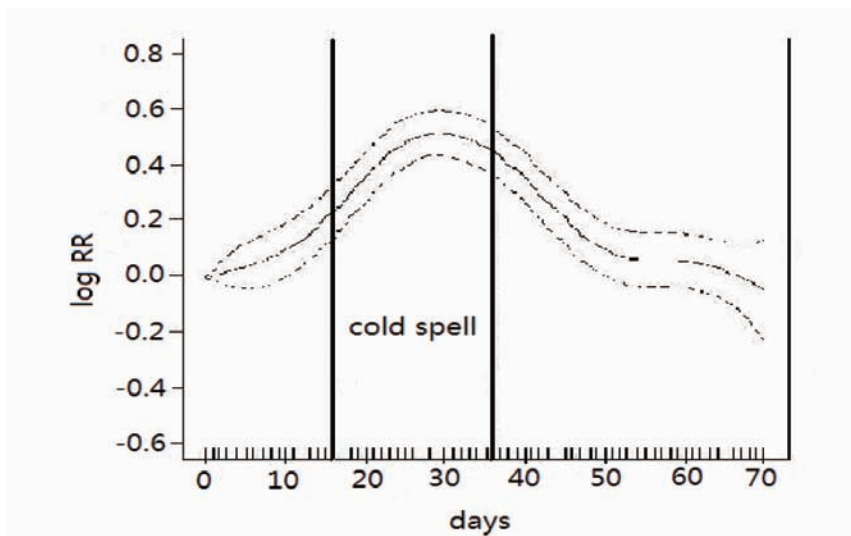


Figure 3: Comparing mortality during 2008 cold spell with that of the corresponding period in 2006, 2007 and 2009 in Guangzhou

Meteorological factors and Infectious diseases

While extremes in temperature are likely to be among the most important issues impacting on population health in Guangdong, meteorological factors will likely increase the potential impacts of infectious diseases. Research conducted in Guangzhou from 2008 to 2010 has found a significant association between the sunny time (cumulated hours of sunshine per day) and temperature on hand-foot-disease (Fig. 4). The RR indicates the risk of hand-foot-disease, the red curves reflect the changing of RR value, and the gray area denotes the 95% confidence of RR. This finding indicates that intestinal infectious disease are likely to increase in the context of global change and variation.

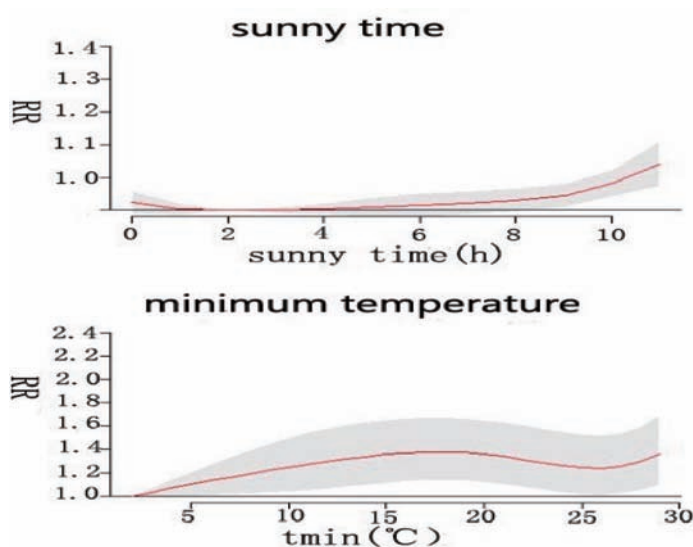


Figure 4: The relationship between climate factors and incidence of hand-foot-mouth disease

Health Vulnerability Assessment

Methodology development

Vulnerability is defined as the susceptibility to harm in a given system in response to an external stimulus. A vulnerability index relating to the impacts of climate change or extreme weather events is calculated as a function of exposure (EI), sensitivity (SI) and adaptation (AI):

$$VI=f(EI, SI, AI)$$

Exposure (EI) is defined as the nature and degree to which a system is exposed to significant climatic variations; sensitivity (SI) is the degree to which a system is affected, either positively or negatively by climate-related stimuli; and adaptive capacity (AI) is the ability of a system to adjust to climate change to moderate potential damages, to take advantage of opportunities, or to cope with the consequence.

Vulnerability assessment of heat wave

The vulnerability of heat wave in 124 counties or districts of Guangdong province shows a gradient of change from north to south (Fig. 5). Economically undeveloped regions in the north of Guangdong were more vulnerable to the negative impacts of heat waves compared to more economically developed regions in the southern coast (The Pearl River Delta).

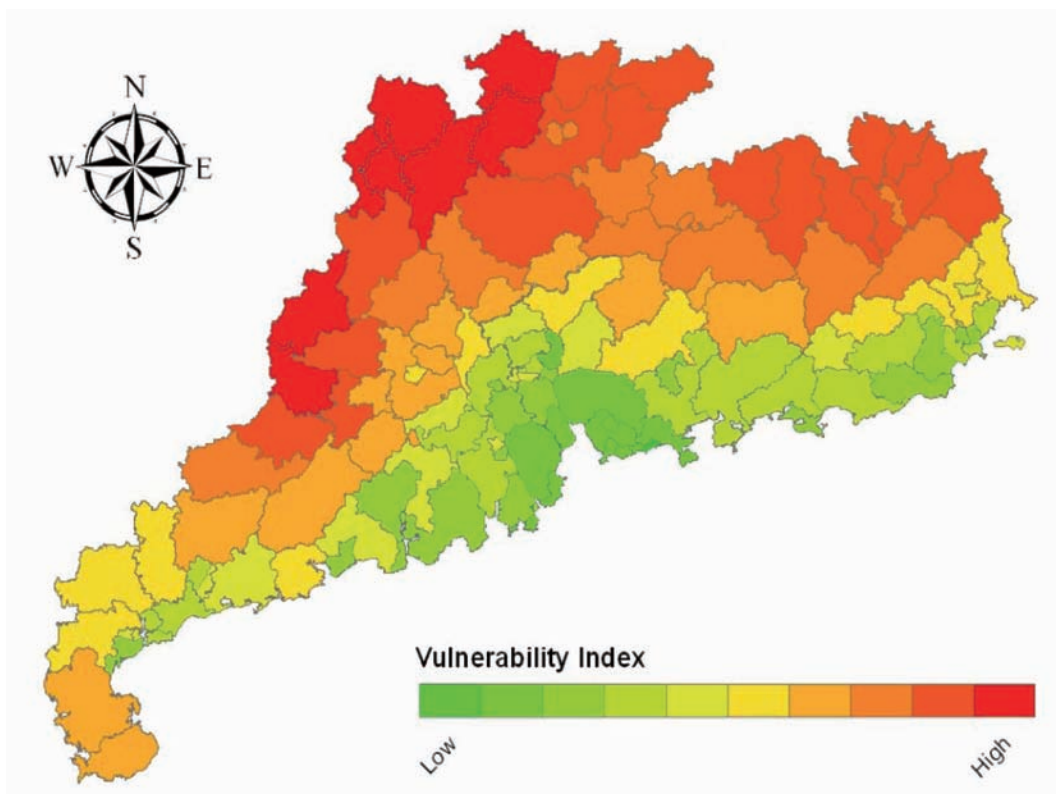


Figure 5: The vulnerability of heat wave in 124 districts of Guangdong

Risk perception and adaptation behaviors to heat wave risks

As part of the ACCC research conducted in Guangdong in 2010, analysis was undertaken into risk perception and adaptation behaviors to heat wave events in 2183 adults selected from Guangdong province. It was found that there is a lack of awareness about health risks of heat waves in the sample, and especially among vulnerable populations such as the elderly and rural populations (Fig. 6).

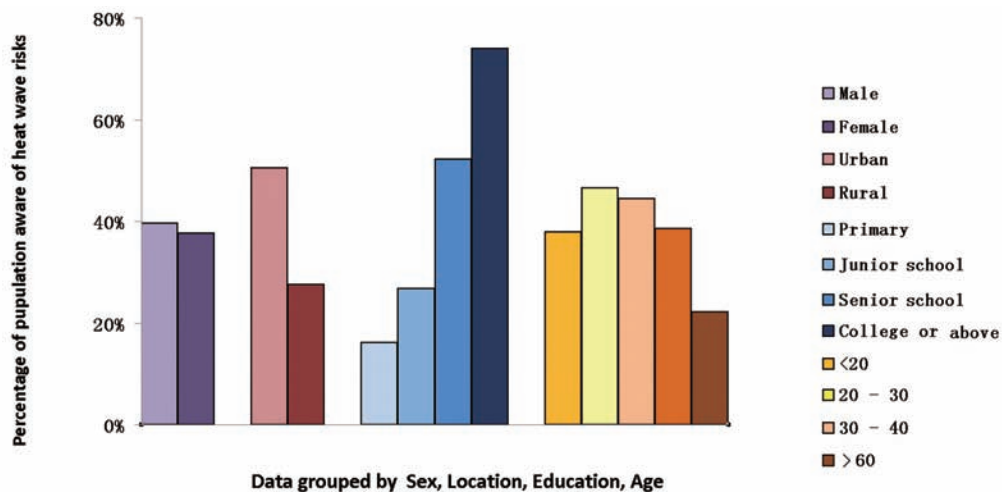


Figure 6: The percentage of population aware about heat waves risks in Guangdong province, by socioeconomic status

Adaptation behaviors to reduce heatstroke risks were evaluated by a multiple choice questionnaire with answers containing nine possible adaptation behaviors (see Fig 7 below). Results show that the three most common behaviors to cope with heat wave were drinking water, opening windows and staying indoors. However, as shown in Fig 7, there are varying rates of heat stroke incidence in relation to each of the adaptation behaviors. This suggests that there should be a closer examination of the effectiveness of each, or combination of the adaptive behaviors towards reducing risk of heat stroke from heat waves.

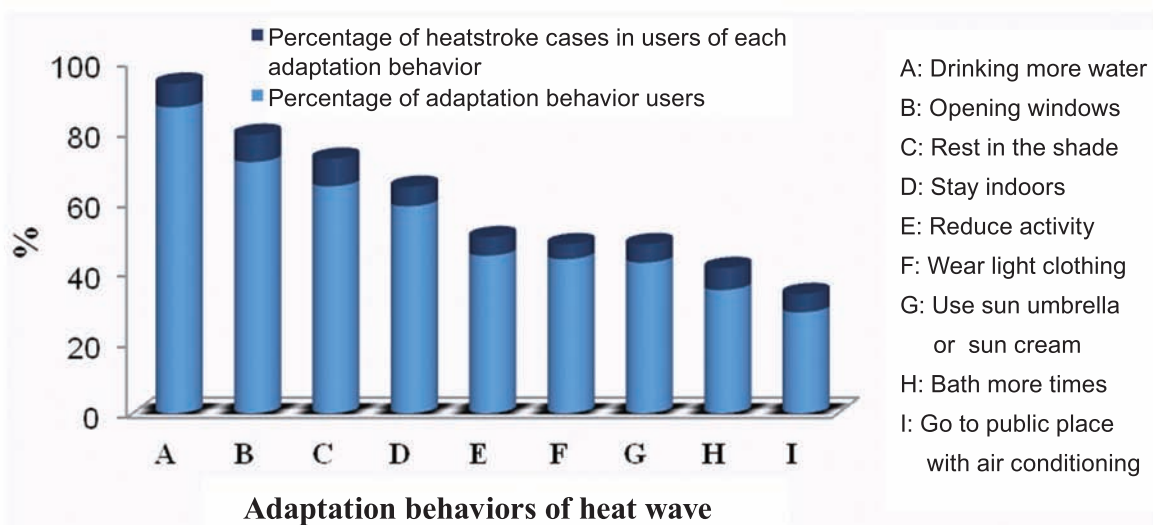


Figure 7. The incidence of heatstroke in relation to each of the adaptation behaviors to cope with heat wave

Implication for public health and adaptation planning

Based on the research findings, the main recommendations for adaptation planning are:

1. To assess the health impacts of climate change, Guangdong Province should develop monitoring systems not only on climate change, but also with reference to the health impacts, particularly within identified vulnerable regions.
2. To develop climate change adaptation plans that minimize adverse health impacts, it is crucial to first identify vulnerable populations and regions in order to prioritize areas of special interest and efforts to reduce health risks.
3. To reduce adverse health impacts from extreme temperature events, provincial authorities should develop real time temperature warning systems based on the integration of meteorological and health data and emergency management plans.
4. Both heat waves and cold spells are important risk factors for population health. In subtropical regions in particular, vulnerable populations should be given special attention during cold spells due to the potential negative effects.
5. A risk perception survey in Guangdong revealed the need for government to develop an action plan with a risk communication strategy to promote public awareness of the potential risks of heat waves and the corresponding adaptive measures.

Lessons learned

The ACCC project attempts to link impacts and vulnerability assessment into adaptation planning in China. While the project is still ongoing, some significant goals have been achieved already and a contribution to capacity building, methodology development, and knowledge sharing has been provided. From the activities in the health sector, several important lessons have been learned:

- Improving surveillance system of climate change related health outcomes is very important to assess the health impact of climate change;
- Information and knowledge sharing among governmental departments is not easy, and an information sharing mechanism between multi-sectors should be established.
- multi-disciplinary expertise should be integrated into health impact assessment and adaptation planning of climate change;
- Stakeholder involvement is critical when we plan adaptation policies.
- Adaptation planning is a process of learning, and international cooperation provides us an opportunity to communicate and learn with others.

Main sources of this Brief

This policy brief draws on ongoing research conducted by Guangdong CDC
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About the ACCC Project

ACCC is an innovative policy research initiative focusing on linking climate change research with policy making and development. This 3 years project started in June 2009 as a collaboration between UK, China and Switzerland; it is funded by the UK Department for International Development (DFID), the Swiss Agency for Development Cooperation and the UK Department for Energy and Climate Change.

For more information and updates visit the project web site:www.ccadaptation.org.cn

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