



Critical review

Exploring the health context: A qualitative study of local heat and climate change adaptation in Japan



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ABSTRACT

Extreme temperature events and global climatic changes may put human health at risk. Urban centers are particularly vulnerable to adverse effects of climate change. Japan is a densely populated and highly urbanized island frequently exposed to natural hazards and heat episodes. Japanese governments and practitioners design heat adaptation strategies to protect health and reduce risks. Are these strategies implemented at the local level? How do policymakers and researchers perceive heat and climate change adaptation measures? How are these strategies evaluated? In short: what is happening in Japan “on the ground”? This critical review briefly outlines heat adaptation solutions and challenges from three Japanese prefectures. It draws attention to implementation and evaluation barriers, and highlights creative approaches to adaptation, such as involving civil society volunteers.

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1. Introduction

Ongoing and future impacts of global climate change on public health present a multitude of risks. Studies have linked climatic changes to increased frequencies of extreme weather events, extreme temperature events, changes in disease vector distributions, sea level rise and perturbed pollen and air pollution patterns

(IPCC, 2014). These climatic variations increase the risks of a range of diseases, from injuries following storms to increased incidences of infections or heat stroke and heat-related cardiovascular deaths (Smith et al., 2014).

While changes in climate will impact most areas to varying degrees, urban space presents a unique risky space for adverse effects of climatic change, especially for extreme temperature events due to high population density, lack of green space, sealed surfaces and tall concrete buildings, where heat can be trapped (Busato et al., 2014; Glutting, 2011). The densely built environment of inner cities is a particularly vulnerable setting for health-related

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impacts (Klein Rosenthal et al., 2014), although the role of urban sprawl in mediating risks of heat exposure has not yet been thoroughly examined (Stone et al., 2010). Concomitantly, rapid urbanization patterns worldwide suggest that populations are becoming less rural and increasingly urban, thus potentially increasing exposure to magnified heat effects during extreme temperature events (United Nations, 2014). Japan is a prime example of a densely populated country with a high level of urbanization (UN-HABITAT, 2013). Additionally, Japan's inhabitants live in high risk areas vulnerable to various natural hazards, especially earthquakes and tsunamis, typhoons with high winds and heavy precipitation, and hot and humid summers with frequent heat waves (Sundermann et al., 2013).

To reduce vulnerabilities, planned adaptation policies are implemented in Japan (Martinez et al., 2011). Adaptation describes adjustments made by and to systems to strengthen their response to inevitable changes (Füssel and Klein, 2004). Japan has a history of developing innovative environmental policy (Imura and Schreurs, 2005), including heat warning systems and climate change adaptation strategies (Homma, 2012; Honda et al., 2011; Inter-Ministry Coordination Committee to Mitigate Urban Heat Island, 2004). However, the effectiveness of climate change adaptation is inconclusive: while many studies suggest a decreased sensitivity to heat over several decades, attribution of said changes to specific adaptation measures is challenging (Bassil and Cole, 2010; Boeckmann and Rohn, 2014; Toloo et al., 2013). To gain a better understanding of the state of adaptation, its evaluation and effects, an exploratory case study at the local level in Japan was conducted.

2. The state of heat adaptation in local Japan

In this exploratory study, interviews conducted with experts in four Japanese areas, three urban and one rural, revealed that the state of climate change adaptation implementation varies (Table 1): heat adaptation is prominent, yet the concept of adaptation specifically to climate change is contested. Adaptation is not necessarily termed adaptation but goes by many different names. Additional challenges to adaptation result from limited funds and subsequent prioritization of which policy to invest in, as well as a limitation in physical space. Finally, evaluation of adaptation measures is perceived as challenging and not currently a regular practice. These findings are discussed in the following sections.

"In this prefecture we have an easy to understand 5-point-program for citizens that we communicate through public relations" (I2:40).¹

Respondents of interview two (I2) described a portfolio of measures taken to reduce heat stroke vulnerability. Behavior change advice is of high priority: the public relations program described advocates use of air conditioning, increased fluid intake and staying indoors. Cases of elderly people living alone and collapsing inside their apartments have led to additional guidelines provided in the information campaign:

"We additionally encourage citizens to see a physician already with few symptoms, or to actively seek out people in their community and ask them about their water intake" (I2:573)

Awareness raising and sharing information are seen as necessary components of heat stroke prevention. Channels for communicating range from radio and TV, text messages and web-

site downloads, to leaflets and other print media. The scale of these measures is usually limited to the regional level as ads are sent through local TV or radio channels. Conversely, leaflets and information brochures are designed by the national ministry of environment and disseminated at prefectural level, in theory ensuring consistent information flow to citizens. Non-human actants in heat adaptation, i.e. documents or data, outnumber individual human actors (Fig. 1), which might illustrate how adaptation is rooted in human-environment interaction. The concept of environment here does not only encompass nature or climate, but also documents, technologies such as warning systems, the built environment and information dissemination tools (Fig. 1).

As a discursive construct (Fig. 1), the concept of vulnerable populations is ascribed to older people, but also to construction workers and school children taking physical education classes outside in the heat. Nonetheless, the majority of warnings and measures target the elderly. Interviewees revealed a strong social component in their local heat adaptation efforts. The community is mobilized to check on older persons, exemplified by yogurt delivery or trash pick-up workers acting as social controls. A special role is assigned to community volunteers, *Minsei-in*, who are nominated by the local government to provide services as "designated volunteer social workers" (I2:981). These volunteers can be expected to visit the elderly at home, for instance. Additionally, respondents in I2 revealed that air conditioned shops and banks tolerate people taking breaks inside without using their services. This civil society involvement, they describe, relies on value changes:

"Using posters and working together with the community, we hope to make it easier for people to use these spaces and to increase societal acceptance, so that one doesn't have to feel like a 'benefit scrounger'" (I2:75)

A similar program, while not related to health, exists in the rural prefecture, where community volunteers collect information on biological changes to observe climate impacts.

Beyond individualized adaptation, three respondents mentioned structural measures against heat stroke risk: access to public cooled spaces, free provision of cooling towels and "heat stroke measure items," and financial support to purchase air conditioning units. Heat stroke measure items are instruments combining both a thermometer and hygrometer. During hot and humid conditions that could lead to heat stress, an alarm sounds. These items can be bought in electronics shops. The first interview additionally described smart technology, where air conditioning units switch on automatically if indoor temperature exceeds a certain threshold. However, as interviewees three (I3) stated, implementation of these measures was entirely reliant on governmental funding:

"Since then [2 years ago] we don't have a budget plan [for cooling towels or temperature measure items] and measures are limited to public relations." (I3:387)

Tasking the community with looking after its members was brought up in several interviews. These approaches could possibly be linked to participatory local processes, and play a large role already in community-based adaptation (Mendes et al., 2014). The role of social capital and contacts in preventing heat-related illness and death among older people in particular is contested, however (MacKinnon and Derickson, 2012; Wolf et al., 2010). Shifting the responsibility for health protection from state actors to members of the civil society is a convenient and resource-friendly solution for the government; without simultaneously investing in the structures that make community empowerment possible, this solution is short-term and potentially shifts the blame of harm or inaction back to those at risk.

¹ The given numbers refer to the start line of a coding as assigned by MaxQDA software. I1, I2, etc. represent the respective interview (see Table 1).

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