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Policy implications of urban HEDRM: the cases of extreme wind events and vector-borne diseases

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Introduction

Natural hazards have direct and indirect health impacts. Apart from physical and mental trauma, other health impacts include malnutrition, disrupted disease treatment plans, and risk of infectious diseases. Health impacts may be mitigated through health-related emergency and disaster risk management (Health-EDRM). They are systematic analysis and management of health risks through the reduction of hazards and vulnerability in all stages of the disaster management cycle, from prevention/mitigation, preparedness, response to recovery (Lo et al., 2017; World Health Organization [WHO], 2019). Furthermore, the Health-EDRM approach aims to shift the disaster paradigm from the emphasis on reactive to proactive measures, and from a single-hazard focus to an all-hazards approach, among others. As an urban city, Hong Kong may be exposed to particular health and climate risks such as altered rainfall pattern, urban heat island effect, and rising temperatures and humidity (Chan, Ho, Hung, Liu, & Lam, 2019) The city itself has specific vulnerabilities such as high population density, heavy reliance on infrastructure, suboptimal community resilience, and low disaster risk literacy (Chan, Yeung, & Lo, 2015). With climate change, it is expected that the frequency and severity of natural hazards such as typhoons and infectious diseases will only increase (Chang, 2011; WHO, 2017). In 2018, two unprecedented hazards with health impact were recorded in Hong Kong, the most severe typhoon in 30 years (Mangkhut) and the largest local dengue outbreak on record. This paper aims to identify policy recommendations for Hong Kong regarding Health-EDRM, focusing on Hong Kong people's response to Mangkhut and the local dengue outbreak.

Urban Extreme Wind Events

Globally, there has been an increase frequency and severity in extreme weather events, especially meteorological and hydrological events. According to CRED 2018 report, floods and storms has the highest occurrence globally in 2018; 3 out of the top 5 countries affected by natural hazards were in Asia, with Typhoon Mangkhut being second (the Philippines) (Centre for Research on the Epidemiology of Disasters [CRED], 2019).

Hong Kong faces on average five to six typhoons per year, of which three (Typhoon Vicente, Hato, and Mangkhut) in the last decade were categorized in the highest tropical cyclone warning category (T10) (Hong Kong Observatory, n.d.a). No related deaths have been recorded since 1999 yet the number of injuries for each T10 typhoon exceeded 100 people. Compared to the global trend, mortality rates have decreased yet the severity of each typhoon has increased (Doocy et al., 2013).

The most recent Typhoon Mangkhut in September of 2018 saw over 450 injuries in Hong Kong. In particular, it left over 13,500 households without electricity supply for over 24 hours (Choy & Wu, 2018; Hong Kong Observatory, n.d.b). A telephone survey conducted the day after Mangkhut (540 respondents; September 17 2018 - October 02 2018) found a total of 33.1% of household respondents reported being affected or injured by the typhoon, of which the most common was not able to go to work or school due to the traffic conditions the day after the typhoon hard-hit Hong Kong (70.2%; excluding the first two post-typhoon school days when the government announced school closure), loss of electrical or water supply (14.6%), and home damage (13.5%) (Table 1). 88.0% of participants felt the Hong Kong government provided enough information for them to prepare for Mangkhut. Of concern was the 15.9% of respondents (86 out of 540 people) who went out when the warning signal was hoisted T8 or above, when the Hong Kong Observatory recommended people to stay in a safe place. Of the 15.9%, a further 75.6% left their homes for non-emergency reasons and 18.6% left for work. It is

important to highlight the inconsistency on how individual and community response may not align with the hoisted warning, especially since the hoisting of the signal occurs relatively quickly (Chan et al., 2019; Chan et al., 2017; Wong & Chan, 2019).

Table 1: Impact from Mangkhut of Hong Kong household respondents¹

Type of Damage (n=178)	Home damage (e.g. broken windows)	Item loss (e.g. cars or pets)	Loss of energy source (e.g. water or electricity)	Road or traffic blockage therefore unable to be at work or school*	Affected living means e.g. shop was damaged	Other
n	24	7	26	125	10	32
%	13.5%	39.0%	14.6%	70.2%	5.6%	18.0%

¹ Sample size = 540; collection date = 17/09/2019-02/10/2019; response rate= 31.6%

*Excluding the government closure

Dengue Vector-borne Disease Section

Hong Kong has a relatively high risk of dengue infections as it has the disease-carrying vector (*Aedes albopictus* mosquito), a favourable environment and subtropical climate, dense population, and high volumes of foreign and domestic travellers [8]. The World Health Organization’s Western Pacific Region reported the annual dengue cases have grown from 213,000 in 2008 to 460,000 in 2014. Hong Kong has 2.7 times more dengue cases within the same time period (42 and 112 cases) (Centre for Health Protection, n.d.; WHO, 2017). Hong Kong has a relatively high risk of dengue infections as it has the disease-carrying vector (*Aedes albopictus* mosquito), a favourable environment and subtropical climate, dense population, and high volumes of foreign and domestic travellers (Centre for Health Protection, 2016). Most of Hong Kong’s cases are imported and have increased to over 100 cases every year since 2013. On average, there has been less than 5 local cases per year, with the exception of the 2002 construction site outbreak in Ma Wan (Center for Health Protection, 2005) and the 2018 outbreak around Ma On Shan, of which the latter had 29 confirmed local cases, the highest number on record (Centre for Health Protection, 2019). There were no case fatalities for the 2018 local outbreak.

A telephone survey was completed (610 respondents; September 06 2018 – September 15 2018) to understand Hong Kong residents’ related perception and behaviours. Locally in Hong Kong, people living in the New Territories reported being the most affected by mosquito bites, especially at places whilst waiting for transportation. Other locations with frequently reported bites were near grassy areas (62.4%) and at home (42.0%). Of the respondents who travelled abroad in the past year, 60.5% (n=254 respondents) had visited countries or locations with endemic dengue (e.g. Malaysia, Thailand, Singapore, etc.). For their last trip abroad, only 30.0% of respondents had taken protection measures against mosquitoes and 48.2% felt their chances of getting dengue abroad was low. Of note, 71.8% of respondents also felt their chances of being infected in Hong Kong by dengue were low. The relatively poor rate of practicing protective measure against mosquitos may be a reflection of their low risk perception on being infected by dengue.

Policy Gap

Emergency and disaster risk management needs to be in place well before the onset of disasters. Target E for the Sendai Framework for Disaster Risk Reduction 2015-2030 promotes local practices through the development and adoption of local disaster risk reduction (DRR) strategies/plans by 2020 (United Nations, 2015). There is also a push to not only periodically update contingency policies but also review them and ensure climate change scenarios are accounted for, as mentioned in the Legislative Council Panel on Security: Review of the Government's Handling of Super Typhoon (Legislative Council Panel on Security, 2019). Multisectoral coordination between education, transport, communication, health, etc. should enable an all-of-society approach to address all facets of a disaster. As further highlighted by the 2018 Ulaanbaatar Declaration from the Asia Ministerial Conference for Disaster Risk Reduction (AMCDRR), early warning systems need to be translated to ensure early action for all relevant stakeholders (UNDRR & Ministers and Heads of Delegations responsible for Disaster Risk Reduction in Asia and the Pacific, 2015). Evidence-based research and monitoring and evaluation from the science and technology community is needed to ensure at risk populations and relevant stakeholders are educated on DRR and well-informed practices are subsequently identified and operational (Chan & Murray, 2017; Gerdin et al., 2014). Such a multi-layered level of coordination requires time management, resource allocations, and adequate training that cannot be sufficiently addressed immediately prior to the onset of a disaster (Donahue & Tuohy, 2006).

While the No. 2/2015 Contingency Plan for Natural Disasters (Including those arising from Severe Weather Conditions) does communicate messages about transport to the public according to each the typhoon warning levels, there is a gap in communication during the recovery and recovery phase. From our study, 69.8% of respondents who were impacted by Mangkhut were unsure if they had to work the next day. This impacts the most vulnerable population (e.g. living below the poverty line) as they may fear losing their job(s) and thereby risk their lives in unnecessarily dangerous situations by going to work (Eisenman et al., 2007; Lock et al., 2012). The State of Disaster Bill 2018 drafted by Alvin Yeung, Legislative Counsellor, has included suggestions that addresses that can be addressed under the Labour Laws. The 46,500 fallen trees which blocked major roads and train tracks was also one of the main barriers for Hong Kong residents travelling to work or school, which caused massive overcrowding in some Mass Transit Railway stations. Such extended delays may also have direct impact for Hong Kong's economy.

The unexpected amount of home damage (13.5%), suspension of water and electricity supply (14.6%), and falling electrical appliances (e.g. air conditioners) are gaps for urban DRR. Despite the high volumes of public outreach and warnings for people not to venture outside during typhoons, there were still a significant number of residents who went out for non-emergency reasons. This likely increased the personal health risks of Hong Kong residents as they are directly exposed to the typhoon. Additionally, societal risk may also increase as search and rescue resources may be deferred from more pertinent situations.

Surrounding the low dengue risk perception of Hong Kong residents, risk awareness should be raised in Hong Kong. While the knowledge, attitude, and behaviour has been researched, as seen in the Personal and Environmental Hygiene Survey (Dengue Fever and SARS), 2004, the findings should be used to the update means and modes of communicating to the public (Department of Health, 2004). The epidemiology of the 2018 local dengue outbreak is a glimpse of how an unforeseen disease outbreak can impact Hong Kong. Unexpected outbreaks in developed nations are becoming more common, as in

seen Tokyo (2014) when 160 local dengue cases were recorded when local transmission was not reported for nearly 70 years, and a measles outbreak in the United States (2015) which transmitted to five states and Mexico (Centre for Health Protection, 2016; McCarthy, 2015). Along with the 2003 SARS outbreak, it further reinforces the need for a publicly accessible action plan that takes into account outbreaks from unknown diseases- not just for identifiable pathogens. As shown in other Hong Kong emergency contingency plans, disaster management must involve a variety of government bureau and departments, not just the healthcare sector.

Information from this policy brief encourages Urban Health-EDRM practices in Hong Kong. Through the identification of specific factors which may require regular and continuous monitoring and health promotion interventions that can raise risk awareness and change behavioural patterns. The importance of an all-of-society and all-hazards approach from the WHO's Health-EDRM framework, with this policy brief, can facilitate infrastructure to bolster scientific enquiry and to support a multidisciplinary dialogue across different government departments and other stakeholders across civil society.

Recommendations

To incorporate and/or strengthen current disaster action plans and guidelines in the following areas:

- Identify which public transport routes and mode of transport will remain operational immediately after a disaster.
- Explore communication channels and timely release of information to the public regarding public transportation, evacuation plans, and personal risk reduction actions during all stages of the disaster management cycle. Evaluate existing means and modes for risk communication messages, especially for populations who take high risks.
- Cross-departmental committees (e.g. Disaster Response Committee) and leadership personnel involved in disaster management should allocate roles, duties, and funds before the onset or announcement of a disaster (preparedness and mitigation stages).
- Identify the demography and injury epidemiology of typhoon-related injuries to support evidence-based recommendations for injury preventative measures. Explore occupational risks for non-essential emergency workers.
- Mobilize social capital, mechanisms to screen and coordinate volunteers to assist with recovery such as clearing roads/debris, build resilience, rebuilding the society etc.
- Evaluation mechanisms to understand which actions and practices are effective to strengthen evidence-based practices and remove ineffective actions.

Specific actions about dengue fever risks in urban context:

- Increase awareness of the different risk for dengue transmission abroad and locally.
- Monitor and evaluate the effectiveness of dengue preventive measures as published by the Hong Kong Government.
- Include biological hazards (disease outbreaks) in the Contingency Plan for Natural Disasters.
- Multi-sectoral input from various fields to ensure evidence-based preventative actions e.g. expertise from medicine/public health, architecture, civil engineering, and social welfare.

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