

DISASTER PREPAREDNESS IN HONG KONG



November 2016 (updated)

A Scoping Study

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Supported by:



Funded by:



香港賽馬會慈善信託基金
The Hong Kong Jockey Club Charities Trust
同心 同步 同進 RIDING HIGH TOGETHER

Acknowledgments

We thank Dr. Donald Li, President of the Hong Kong Academy of Medicine, for his constant support to the Hong Kong Jockey Club Disaster Preparedness and Response Institute-Harvard collaboration, and for HKJCDPRI's invaluable assistance with the Scoping Study.

We thank, especially, Dr. Kevin Hung, and Agatha Lin of the HKJCDPRI for their support in facilitating all stakeholder interviews and their invaluable help with procuring permissions from and access to the response agencies. We thank Patrick Vinck and Tino Kreutzer of Harvard Humanitarian Initiative for their technical support.

The authors are most grateful to the study participants. Senior officials from key agencies and healthcare administrators gave generously of their time, as did the online survey respondents and the one thousand residents of Hong Kong who participated in our survey.

Funding for the study was provided by The Hong Kong Jockey Club Charities Trust.

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Executive Summary

The Hong Kong Jockey Club Disaster Preparedness and Response Institute (HKJCDPRI) was established in 2014 with the goal of creating a center of excellence in disaster response research and training, in collaboration with a range of local, regional, and international partners.

In order to assist HKJCDPRI in identifying priority areas for research, training and partnerships, the FXB Center for Health and Human Rights at the Harvard T. H. Chan School of Public Health took the lead, in coordination with the Harvard Humanitarian Initiative, the Emergency Medicine Unit at the University of Hong Kong (HKU), and the Collaborating Centre for Oxford University and the Chinese University of Hong Kong for Disaster and Medical Humanitarian Response (CCOUC), in undertaking an extensive survey of multiple stakeholders in Hong Kong.

Methods

The Scoping Study was a mixed-methods needs assessment that combined innovative sampling techniques with online surveys and in-depth interviews. The Community Survey recruited over 1000 Hong Kong residents, located via randomly generated GPS points distributed in proportion to the population of each district in Hong Kong. The Agency Personnel Surveys were administered online to over 600 responders from the Hong Kong Police Force, the Hong Kong Fire Services Department, Auxiliary Medical Service, and the Civil Aid Service. The online Healthcare Personnel Survey included over 200 responses from physicians and nurses from across 10 colleges of the Hong Kong Academy of Medicine, and 14 nursing colleges. These structured surveys were augmented by in-depth interviews with senior officials from 19 government and service agencies, and 4 healthcare institutions.

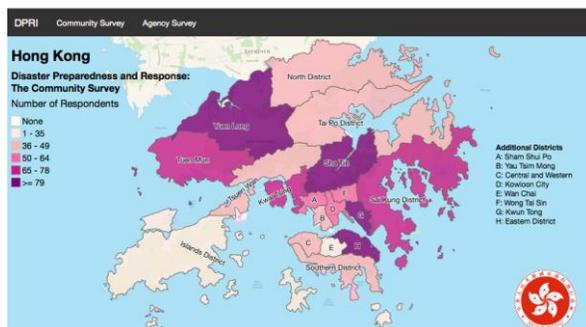


FIG1: Screen shot of online data visualization tool accessible at TheScopingStudy.org

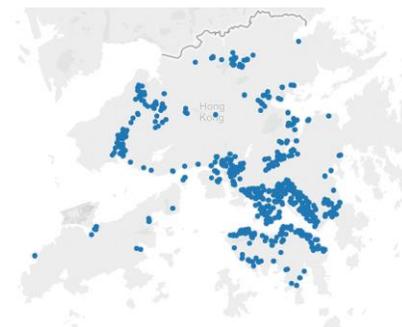


FIG 2: Distribution of over 500 sites at which the Community Survey was administered

The Questions

The survey instruments spanned a broad spectrum of issues, including questions on individual, institutional, and city preparedness and response capabilities; anticipated behavior and choices in the face of a disaster; and information on specific mitigation and response skills. Community members were asked questions around

communication, evacuation, financial safety-nets, and response strategies. First-responders were queried on the type, frequency, and efficacy of their trainings. Healthcare professionals answered questions specific to disaster response training and professionalization. Senior officials were asked about their training needs with a focus on coordination, communication, and community-outreach. Those familiar with HKJCDPRI shared their views on HKJCDPRI's potential role within the disaster mitigation community.

The Results

Hong Kong has a highly accomplished disaster planning, preparedness, and response system anchored under the Security Bureau but encompassing an impressive range of highly sophisticated partners. Agencies like the Police, Fire, Fire Ambulance, Hospital Authority, and Civil Aid Service are some of the predictable major players, but a plethora of public and private actors also play critical roles in various types of disasters. These agencies include the Information Services Department, Hong Kong Observatory, MTR Corporation, Towngas, Marine Department, Drainage Services Department, Buildings Department, and many others. Each of these agencies has well developed contingency plans; most of them train their personnel on a regular, periodic cycle; and some institutions participate in inter-agency drills on an occasional basis. Almost all respondents within agencies and their senior administrators expressed a strong interest in promoting greater community engagement in disaster preparedness, including general and targeted community training in disaster mitigation and response.

Nearly all ordinary citizens interviewed (99%) expressed an interest in receiving more information about disaster preparedness and many reported that they would not know where to access such information were it available. One third of community members thought that Hong Kong was adequately prepared for disasters, while an equal number (one third) were dissatisfied with the city's preparedness. Although there was wide variation in contingency plans among residents, over half noted that they faced major barriers including disability and mobility challenges or not knowing where to go.

Senior officials across government agencies and healthcare institutions expressed the urgent need to strengthen community engagement. This theme is explored in further detail in the accompanying policy brief, *Community Engagement in Disaster Planning and Response: Recommendations for Hong Kong*.¹ Many agencies expressed a need for multi-hazard drills; planning for prolonged disasters; and for preparing to respond to low probability, high stakes catastrophes like disruptions in essential services or a nuclear power plant accident. Once again, emphasis was laid not only on multi-agency preparedness and coordination but also on the need for community participation.

The 676 frontline responders, who had spent an average of 16.8 years at their institution, had greater confidence than their civilian counterparts in Hong Kong's preparedness and endorsed their agency's training and disaster drill plans. More than half felt that their respective agencies were adequately prepared. Over 91% of the Hong Kong Police Force and Hong Kong Fire Service Department respondents were familiar with their institutions' disaster drills.

There is scope for formalizing smart-phone based communication and social media engagement during disasters. Multiple key response agencies are already on the Unified Digital Communications Platform. In addition, most supervisors reported using commercially available applications like WhatsApp to communicate with teams during disasters, citing speed, reliability and convenience as a motivator. A few agencies, like the

Centre for Health Protection and the Hong Kong Observatory, regularly disseminate information online via their webpages, Facebook or YouTube.

Healthcare professionals report a dearth of professionals trained in disaster response. They note that providers with some degree of training in disaster medicine are mostly from the Accident and Emergency departments (A&Es) or the critical care departments. Their number is not large. Physicians in general medicine and allied specialties have expertise in epidemic infectious diseases but may not be conversant in other aspects of the disaster management. While the SARS epidemic resulted in excellent advances in Hong Kong's preparedness capabilities, the senior physician leaders we interviewed stated that there is much work to be done in training healthcare professionals with core competencies in clinical disaster response skills, disaster response coordination, communication, and leadership. While some see disaster medicine as a natural ally of emergency medicine and a sub-specialty within the College, others see it as foundational knowledge that ought to be a requisite for most medical professionals. The lack of professional incentives to acquire such knowledge and training was reported as a significant barrier to the full-scale development of an independent specialty.

The Potential Role for HKJCDPRI

The Scoping Study demonstrates Hong Kong's unequivocal commitment to disaster preparedness at many levels of governance and professional expertise. Billions of Hong Kong dollars are spent annually in disaster mitigation activities ranging from repairing hillside slopes before the advent of the monsoon, enforcing strict quarantine measures at airports, conducting food inspections, monitoring adherence to building codes, protecting the mass transit infrastructure, conducting agency and inter-agency drills, and maintaining outreach to the community. Many of the agencies interviewed called for HKJCDPRI to augment community preparedness, participation and self-reliance during disasters.

Many healthcare personnel expressed an interest in overseas engagement to learn from international best practices and gain hands-on experience in a variety of settings. Currently, the opportunities to do so are limited and include government initiated interventions aimed at assisting Hong Kong citizens or deployments by NGOs like MSF or the Red Cross. However, the barriers to entry are high because NGOs like MSF require two years of clinical work experience in addition to didactic requirements not routinely covered in Hong Kong medical school curricula. Physicians already working in the public hospitals are not likely to be sanctioned a one year leave, the minimum commitment that MSF requires. In such, senior healthcare leaders desire a policy change favoring greater regional engagement of Hong Kong's disaster response and medical teams.

Several interviewees suggested that HKJCDPRI serve as a knowledge repository and a regional information-exchange hub, leading academic research and collaboration across the region.

In summary, the Scoping Study reaffirms Hong Kong's robust disaster planning machinery and sheds light on the universally felt need for expansion of efforts in these domains:

- Outreach to and engagement of members of the general Hong Kong community;
- Inclusion of less familiar and infrequent disasters within the scope of disaster preparedness and community engagement;
- Investment of more resources in training and professionalizing the Hong Kong response sector, including healthcare professionals; and

- Deployment of capabilities in mobile technology and the internet for disaster communication and coordination.

Disaster Preparedness in Hong Kong

A SCOPING STUDY

Introduction

The Hong Kong Jockey Club Disaster Preparedness and Response Institute (HKJCDPRI) was established in 2014 with the goal of creating a center of excellence in disaster response research and training, in collaboration with a range of local, regional, and international partners.

In order to assist HKJCDPRI in identifying priority areas for research, training and partnerships, the FXB Center for Health and Human Rights at the Harvard T. H. Chan School of Public Health took the lead, in coordination with the Harvard Humanitarian Initiative, the Emergency Medicine Unit at Hong Kong University (HKU), and the Collaborating Centre for Oxford University and CUHK for Disaster and Medical Humanitarian Response (CCOUC), in undertaking an extensive survey of multiple stakeholders in Hong Kong. This Scoping Study was a mixed-methods needs assessment that combined innovative sampling techniques with online surveys and in-depth interviews. The inquiry reached almost 2000 respondents, including 26 senior government officials and healthcare administrators, over 600 frontline responders within relevant agencies, and 200 healthcare professionals. Using a community-cluster randomization technique, the survey included a random sample of 1000 residents of Hong Kong.

The Scoping Study is not an evaluation of Hong Kong's disaster response system. The aim of the Scoping Study was to elicit information on inter-agency coordination, assess communication across agencies and the community, and gauge public attitudes towards preparedness. Accordingly, the Study has highlighted opportunities for skills development, effective communication, and efficient response mechanisms. The Scoping Study, conducted at a time when Hong Kong is strengthening its relationship with the Mainland and seeking to redefine its role in the region, offers unique insights into the strengths and self-identified needs of a range of actors engaged in the city's disaster planning. Having interviewed government officials, responders, and civilians, the Study is able to juxtapose and integrate their multiple viewpoints with the aim of helping authorities and academics chart a course that is most beneficial to the people of Hong Kong.

Background

Asia and the Pacific Rim experience disasters with the highest impact in the world. Predictions indicate that Hong Kong, specifically, faces significant risk of natural disasters.² Measured by size of population affected, vulnerability to intense and intensifying natural hazards, and costs of post-disaster reconstruction; urban centers such as Hong Kong, Manila, and Shanghai are the focus of current international policy concerns relating to population vulnerability and the mounting risks of climate change.³

Hong Kong's geographical position increases its susceptibility to climate-related threats such as cyclones, flooding, extreme temperatures and infectious disease outbreaks.⁴ In concert with the growing environmental

threats, a highly urbanized community, population density, and open border create a suite of hazards that heighten disaster risk. These emerging issues require comprehensive preparedness efforts in order to minimize disaster impacts on the community and city infrastructure. In addition, an increasing number of mass gatherings and demonstrations in Hong Kong, coupled with new developments in mass transportation systems including transportation via air (e.g. a third airport runway), land (e.g. Express Rail Link) and sea (e.g. Kai Tak Cruise Terminal) create the potential for other high-risk mass casualty accidents. The location of the Guangdong Daya Bay Nuclear Power Station (less than 50km from the city center of Hong Kong)⁵ and the global threat of terrorist-related attacks indicate a need for hazardous material (HAZMAT) emergency preparedness.

To address these risks, Hong Kong has developed a dynamic, responsive emergency planning process, consisting of a vast web of inter-linked institutions that have continuously improved their mitigation and response strategies. Recent high profile emergencies including the SARS outbreak, the Lamma Island Ferry Incident, and the Lan Kwai Stampede resulted in the creation of targeted response agencies, state-of-the-art protocols, and new laws to protect the people of Hong Kong from physical, psychosocial, and financial harm.

Despite these efforts, the Hong Kong community has low disaster awareness. A 2012 assessment of Hong Kong community perceptions found that the majority of respondents (n=940; 87.2%) did not think Hong Kong was vulnerable to disasters.⁶ Disaster risk analysis, however, shows that this is, in fact, a misperception.^{3,7} Hong Kong, like many other major cities in the Asia Pacific, is at risk of a range of large-scale natural disasters and health crises. Modeling indicates that storms endanger more Hong Kong residents than any other natural peril, followed by floods and earthquakes.⁷ These events can affect millions of people and significantly disrupt the economy.

In order to assist HKJCDPRI in identifying priority areas for research, training and partnerships, the FXB Center for Health and Human Rights at the Harvard T. H. Chan School of Public Health took the lead in undertaking an extensive survey of multiple stakeholders in Hong Kong. This effort involved close coordination with the Harvard Humanitarian Initiative at the Harvard-Chan School of Public Health, the Emergency Medicine Unit at Hong Kong University (HKU), and the Collaborating Centre for Oxford University and CUHK for Disaster and Medical Humanitarian Response (CCOUC).

The Scoping Study, conducted at a time when Hong Kong is strengthening its relationship with the Mainland and seeking to redefine its role in the region, offers unique insights into the strengths and self-identified needs of a range of actors engaged in the city's disaster planning. Having interviewed government officials, responders, and civilians, the Study is able to juxtapose and integrate their multiple viewpoints with the aim of helping authorities and academics chart a course that is most beneficial to the people of Hong Kong.

Ethics Approval

All aspects of the scoping study were reviewed and approved by the Harvard T. H. Chan School of Public Health Institutional Review Board. Local approval for the Agency-Personnel Survey and Key Stakeholder Interviews was obtained by the Chinese University of Hong Kong Survey and Behavioral Research Ethics Committee. Local approval for the Community Survey and Hospital Survey was obtained by the Hong Kong University Human Research Ethics Committee.

Study Design

The Scoping Study, designed as a cross-sectional needs assessment, had four complementary components:

- 1) Key Stakeholder Interviews;
- 2) The Agency-Personnel Survey;
- 3) The Healthcare Personnel Survey; and
- 4) The Community Survey.

All online surveys were conducted anonymously. Stakeholder interviews are also reported anonymously. Data are attributed to a specific agency only if the information shared is clearly in the domain of the agency interviewed. For example, a description of the weather warning signals would understandably be attributed to the Hong Kong Observatory.

Key Stakeholder Interviews

Semi-structured interviews were conducted with a wide variety of stakeholders from Hong Kong's disaster preparedness and response systems. A total of 26 senior officials in Hong Kong's key disaster response agencies and institutions were interviewed, including 20 officials from various government institutions and service agencies, and six healthcare professionals from the Hospital Authority. Agencies were selected by Harvard based on their direct or indirect involvement in disaster mitigation, preparedness or response; and on their availability. Harvard personnel, together with senior researchers from HKJCDPRI, CCOUC, and HKU conducted all interviews with response system professionals. Interviews with senior health officials were conducted mainly by HKU.

Agency-Personnel Survey

The Agency Personnel Survey was administered anonymously via a secure online survey form (Survey Monkey) to over 600 responders from the Hong Kong Police Force, Hong Kong Fire Services Department, Auxiliary Medical Service, and the Civil Aid Service. The survey link was distributed to frontline responders by senior officials from the respective agencies. The Survey focused on demonstrable knowledge and needs among front-line responders. The Agency-Personnel Survey consisted of questions about participation in disaster drills and experience, training and communication, and preparedness.

Healthcare Personnel Survey

The Healthcare Personnel Survey included 200 responses from physicians and nurses administered online via Survey Monkey and KoBo Toolbox, a mobile-based survey data collection system that works both online and offline and has opportunistic synchronization capabilities. Ten colleges of the Hong Kong Academy of Medicine agreed to distribute the electronic questionnaire to their fellows and trainees through email (8 Colleges) and newsletter (2 Colleges). For nurses, email invitation was sent to members of the 14 nursing academic colleges through the network of the Provisional Hong Kong Academy of Nursing. The poster of the study and the URL of the questionnaire were posted on the website of the Hong Kong Society of Critical Care Medicine. The Healthcare Personnel Survey consisted of questions about preparedness and disaster drills, communication and information, and training.

Community Survey

The Community Survey intended to assess Hong Kong civil society's perceived and actual preparedness in a variety of disaster scenarios, as well as their preferred modes of communication and information access

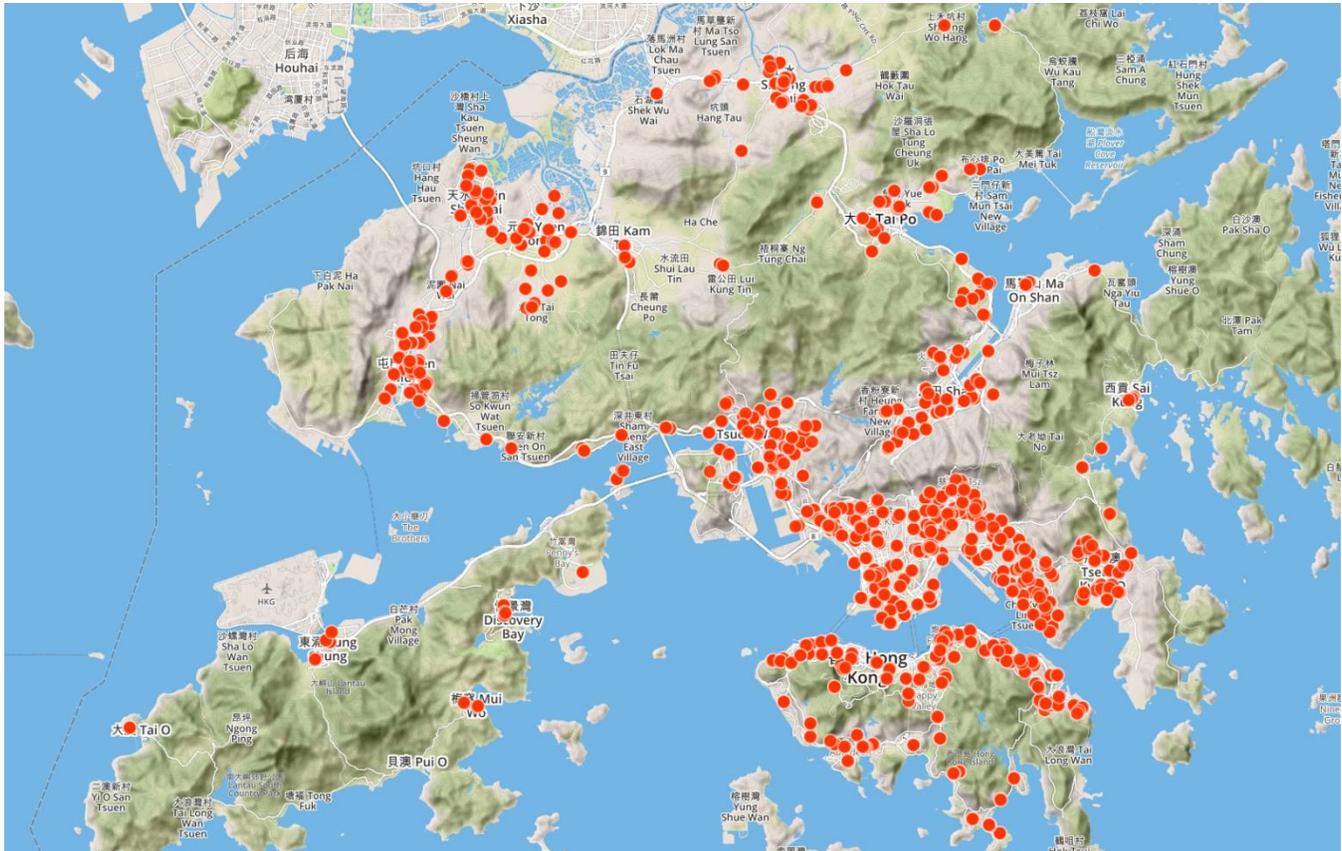
during a disaster. The survey, available in English and Cantonese, was collected via KoBoToolbox and relied on Global Positioning System (GPS) software to randomly sample locations and therefore obtain a representative sample of the population. The randomly generated GPS points included 300% oversampling to accommodate inaccessible or unusable locations (See Table 1). The number of random GPS points surveyed in each district was proportional to the district population.

The 1,533 GPS points were mapped to produce a street address or location using a website program called “Find Latitude and Longitude.”⁸ Manual mapping using Google Maps of a small sample of GPS points showed that the locations generated by the mapping program were accurate and reliable. To avoid systematic bias from surveying all points in a district at similar time periods (e.g. only surveying the downtown areas during working hours would systematically bias against office workers) the GPS points within each district were randomly allocated to the available time slots, which varied by time of day and day of the week.

Ten teams of two students each were deployed to every GPS location. The students were given a copy of the implementation protocol which instructed them to approach every passerby and invite them to participate in the survey. Instructions were given to not “cherry pick” the people they approached, and it was explained that this practice would systematically skew the sample. Two people were interviewed at each location. The students surveyed over 1,000 participants in 17 days. Respondents were invited to either complete the survey on the tablets, or have the survey team ask them the questions.

Table 1: Distribution of GPS Points by District

Admin	District	Total	% pop	Number of points with oversample 300%
Hong Kong Island	Central & Western	248,600	3%	54
	Wan Chai	150,400	2%	33
	Eastern	579,400	8%	123
	Southern	270,500	4%	57
Kowloon	Yau Tsim Mong	313,600	4%	66
	Sham Shui Po	388,300	5%	84
	Kowloon City	402,300	6%	87
	Wong Tai Sin	424,500	6%	90
New Territories	Kwun Tong	639,900	9%	135
	Kwai Tsing	501,900	7%	108
	Tsuen Wan	301,600	4%	66
	Tuen Mun	489,000	7%	105
	Yuen Long	595,100	8%	126
	North	303,300	4%	66
	Tai Po	302,300	4%	66
	Sha Tin	648,200	9%	138
	Sai Kung	448,600	6%	96
	Islands	144,500	2%	33
	TOTAL	7,152,000	100%	1533

Figure 1: Map of GPS Coordinates Visited for the Community Survey

Key Findings

SENIOR OFFICIALS AT RESPONSE AGENCIES

The Tableau of Stakeholders

Emergency and disaster management in Hong Kong, while ultimately the purview of the Security Bureau, is a dynamic ecosystem encompassing a large number of actors with well-defined roles in both preparatory and response modes. According to the Security Bureau, a disaster is “a serious disruption of life, probably arising with little or no warning, that causes or threatens death or injury on a scale exceeding the normal response required of the public emergency services.”⁹ Key agencies involved in response include the Police Force, the Fire Services Department (FSD), the Civil Aid Service (CAS), and volunteer-based organizations like the Auxiliary Medical Service (AMS), Hong Kong Red Cross and St. John Ambulance. In addition, oversight is provided by the Security Bureau and coordination of the medical response is provided by the Hospital Authority. Many government agencies play a constant role in upgrading, monitoring, and maintaining the safety of vital services including food and water safety, building integrity, utilities, and transportation. Organizations like MTR Corporation and Towngas, though autonomously run as private enterprises, also provide public services and goods and consequently play important roles in disaster planning and response. Less visible but essential agencies like the Drainage Services Department, Electrical and Mechanical Services Department (EMSD), and the Buildings Department prepare for weather-related events and other crises affecting population life-lines. The mandates of several other agencies coalesce to protect public health. For

instance, entities like the Center for Health Protection (CHP) play key coordination roles across the healthcare system and the community. The Hong Kong Observatory (HKO) enjoys a unique level of independence and trust among government agencies and citizens; its inclement weather warning and signaling systems have bearing on many aspects of Hong Kong's commerce, transportation, and utility services.

Together, these response agencies employ tens of thousands of people: The Hong Kong Police Force has over 33,000 employees; Hong Kong Fire Services Department has over 9,000 employees and an additional 2,350 in the Fire Ambulance Service. The Civil Aid Service has over 3,600 members. Voluntary organizations have large memberships as well: St. John Ambulance has over 6,000 volunteers, and AMS over 4,600. MTR Corporation has 16,000 employees, and Towngas has 2,000 employees in Hong Kong and 30,000 in Mainland China.

Training, Protocols and Contingency Plans

The majority of agencies interviewed had highly developed contingency plans that included some combination of orientation, training, drills, and refresher courses. Skills are commensurate with expected duties. For example, all FSD personnel are trained in first responder skills; the ambulance crew has preliminary Mass Casualty Incident knowledge, the supervisors are conversant in field triage as well, and the officers receive additional training in Incident Command Systems and government response plans. Voluntary crews at St. John's and AMS are often trained in first aid, if not also in CPR, the use of the Automated External Defibrillator (AED), and other skills like suturing and decontamination. CAS personnel undergo as many as 160 hours of training acquiring skills in first aid, basic rescue, Search and Rescue, flood rescue, building collapse rescue, radio operations, crowd management, patrolling, and optional additional training in specialized skills like mountain rescue and quarantine implementation. AMS responders have been called to conduct temperature checks at the airport (during the SARS outbreak), assist with non-emergency ambulance transfers, and offer park-ranger and life-guard services. Agencies like the Electrical and Mechanical Services Department (EMSD), Building Services, and Drainage Services Department have crisis management and emergency response courses tailored to their respective duties during "crises" as defined by their respective organizations.

Cross-institutional training is the norm for some agencies, with FSD often leading the way. The Police Force has multiple contingency plans in place, including for fire, flooding and traffic issues. Law and order events are headed by police commanders in incident command roles, whereas other incidents are often coordinated under the FSD. Most government agencies defer to the Security Bureau's definition of a disaster and follow the Bureau's contingency plans, in addition to their agency specific protocols. However, many senior officials reported a dearth in inter-agency training and expressed the desire to expand the scope of drills to include new kinds of scenarios and multi-hazard drills.

Voluntary organizations are on call and will provide services as required by the recruiting agency, usually the fire, police, or hospital authority or department of health. On request, the Red Cross has the ability to provide a week's supply of non-food items within 24 hours. The HK Red Cross also provides psychological first aid (and training to other agencies in the same). St John's members volunteer at nursing homes, provide (limited) ambulance support at major events, and when needed, can provide as many as 14 ambulances and 60 staff in case of emergencies.

The MTR Corporation and Towngas have business continuity plans built into their mitigation and response planning, in addition to routine contingencies for service disruption. Both agencies have highly sophisticated monitoring and response strategies. Prior notification from HKO to MTR before hoisting warning signals for impending storms allows the agency to ramp up staffing and cars for potential spikes in commuter traffic. Back-up batteries in trains, advanced venting and air circulation mechanics in the underwater tunnels, and floodgates at the entrance to each station are a few examples of engineering solutions built into MTR's infrastructure. MTR follows a three-tier crisis classification system (different from the Security Bureau definition) based on service disruption and rapidity of operations renewal. Towngas follows a detailed Corporate Emergency Plan (CEP) focused on reducing injury, reducing loss and damage to the environment, and resuming operations.

Electric and Mechanical Services Department (EMSD) has agreements with the two larger power companies to link their grids in case of major power failures. In addition to Security Bureau contingency plans, EMSD has plans in place for gas company accidents at Tsing Yi, and for oil supply disruptions.

The Center for Health Protection (CHP) formed as a direct result of the SARS epidemic and subsequent corrective measures, plays a key role in providing technical advice on outbreaks, investigating outbreaks, maintaining constant disease surveillance, and community messaging. Its current training program, modeled along the Epidemic Intelligence Service (EIS) fellowships at the Centers for Disease Control (United States), trains a limited number of fellows every year.

Needs and Concerns

Despite the available trainings discussed above, the need for more training was a uniform request across most government agencies. Officials expressed the need for more field-based training, more training and practice in inter-agency coordination, and skills training in communicating with the public. Stakeholders from voluntary groups were particularly concerned about the lack of training and simulation given the limited opportunity for each member to practice their skills in a 'real-life event.' In addition, the desire for increased community participation in preparedness and training was a recurrent theme in the interviews.

The ambulance distribution system, far improved over the last few years, is still dependent on designated officials at the Hospital Authority calling each hospital every day to get up-to-date information on bed and ICU capacity. Given the high occupancy rates of almost all public hospitals in Hong Kong, surge capacity is limited to a few critical care beds per hospital.

Regardless of the limitations, most agencies felt adequately prepared to handle emergencies. There were some concerns about the agencies' capacities to respond to multi-hazard events or prolonged crises that persisted for days or weeks.

Communication

There was wide variation in intra-agency communication protocols across the agencies interviewed. During disasters, key agencies like the police, fire, customs, excise, immigration, flying services, Department of Health and AMS use the Unified Communication Portal. Lead agencies use the same radio frequency. Major events are coordinated via the Joint Coordination Center with the Police Force, Fire Service Department and Hospital Authority leading the response. Many officials identified WhatsApp for group messaging, and direct one-on-one SMS text messaging as the preferred means of communication.

Innovations and Change

Past disasters have triggered several policy and operational changes across agencies. The Center for Health Protection was formed as a direct result of SARS. The CHP disease surveillance system collects information from labs, general practice clinics, and hospitals to monitor disease incidence and trends. In case of outbreaks, CHP encourages the hospital to adopt a policy of full disclosure with the media, in order to keep the public informed at all times.

The mid-air disintegration of a China Airlines plane (2003) resulted in marked improvement in Hong Kong's ability to conduct effective Search and Rescue operations. After the Lamma Island Ferry accident (October 1, 2012), all passengers (including children) are required to wear life-vests; ferries are expected to maintain passenger lists; and vessels carrying more than a thousand passengers are required to follow the Automatic Identification System (AIS), an electronic data-sharing system used by ships and traffic services to locate and identify marine vessels. As a result of these events, many organizations have established new best practices to reduce risk.

The qualitative interviews with senior officials that illuminated Hong Kong's disaster preparedness and response organizational structures were augmented by quantitative data obtained from a sample of mid-level agency personnel regarding their perceptions of readiness to respond.

AGENCY-PERSONNEL SURVEY

Sample Characteristics

Analysis was conducted on the sample of 676 participants. Of these, 271 respondents were from the Hong Kong Police Force, 115 from AMS, 192 from CAS, 73 from the Hong Kong Fire and Special Service, and 25 from the Hong Kong Fire Ambulance Service. Respondents had spent an average of 16.8 years with their organization (range 1-44 years, median 15 years). The total number of respondents that the survey was sent to has been requested from the response agencies.

Disaster Drills and Experience

A majority (90.2%) of respondents indicated that their organization conducted disaster drills to amplify training and hands-on experience in disaster response. Forty-three percent of respondents participated in a disaster drill that included multiple agencies. The disaster to which participants most frequently responded was a typhoon (37.6%), followed by an infectious disease outbreak (21.9%), flooding (13.9%), and major fire (10.4%). Almost one third (30.6%) of respondents indicated that they had never responded to a serious disaster in Hong Kong or elsewhere.

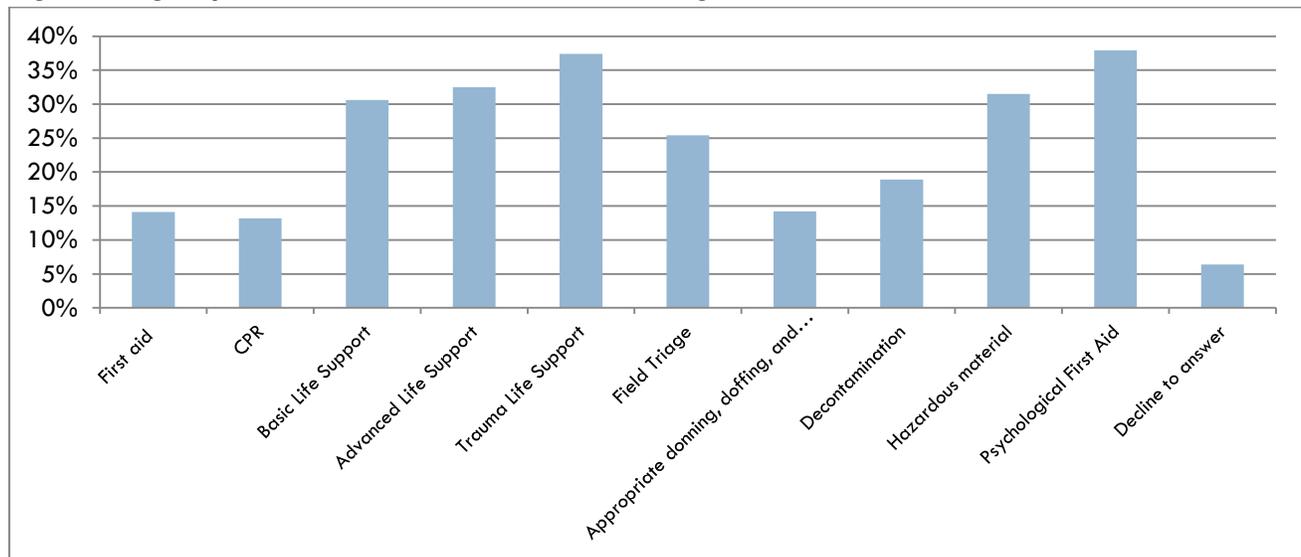
Training and Communication

When asked about modes of communication likely to be used in the event of a disaster, 54% of respondents indicated that their supervisor would contact them via landline phone if the mobile network and internet were not working. A significant number (39.9%) indicated their supervisor would contact them using the radio or television and 18% indicated they were expected to automatically report in person to their office should a disaster occur.

Respondents were asked a knowledge question about Hong Kong's Contingency Plan for Natural Disasters, which is activated under three circumstances: 1) Whenever a Tropical Cyclone Signal No. 8 or higher warning comes into effect; 2) Whenever a Black Rainstorm warning comes into effect; and 3) Whenever a Tsunami warning comes into effect. Only a few respondents were able to identify all of the criteria for activating the Contingency Plan. However, it is acknowledged that many operational procedures are already built into departmental plans for specific situations; a frontline responder fully conversant with their own department's plan may not necessarily be able to articulate the full spectrum of criteria relating to the higher level plan.

While most responders are trained in first aid and CPR, 29.1% reported that they had never administered first aid and 12.5% reported never having performed CPR either in an emergency or in a classroom. There was widespread interest among respondents in gaining more training, especially in psychological first aid, life support (basic, advanced, and trauma), and hazardous materials. The preferred methods for trainings were interactive workshops and disaster drills. There was less interest expressed in written materials and classroom didactics or online trainings.

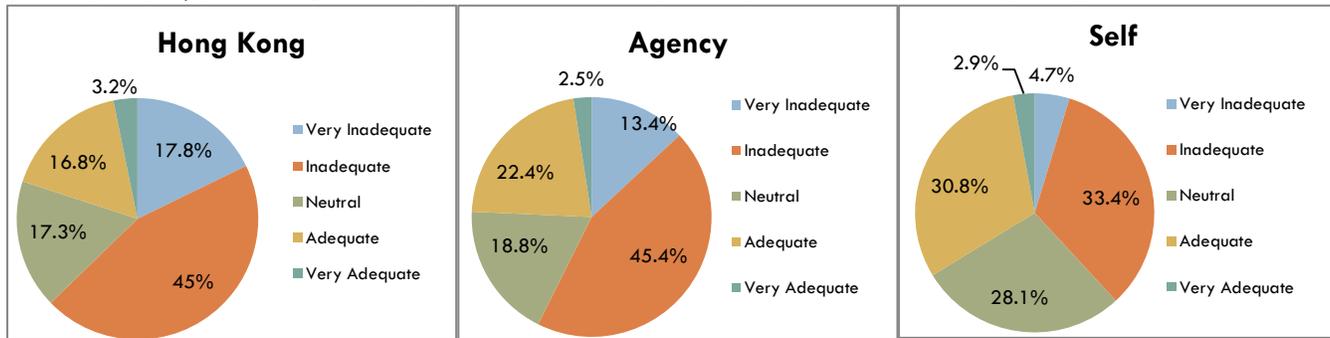
Figure 2: Agency-Personnel's Desire for Future Training (n=676)



Preparedness

Overall, responders had more positive perceptions about their own preparedness than Hong Kong's overall preparedness in responding to a disaster, although the two were correlated. In addition, participants who considered themselves well prepared to respond to disaster held similar views about their organization's level of preparedness.

Figure 3: Agency Personnel’s Perception of 3 Levels of Preparedness: “How would you rate [Hong Kong’s / your agency’s /your own] current preparedness in responding to a disaster in Hong Kong?” (n=676)



SENIOR HEALTHCARE PROFESSIONALS

The medical field plays a critical role in disaster preparedness and response. While initial Search and Rescue operations are conducted by front line responders, hospital staff including nurses, doctors, and other professionals are heavily involved in the response to any disaster, from triaging patients to treating trauma.

Healthcare professionals who participated in the key stakeholder interviews believed that the Hospital Authority was fairly well prepared in responding to disasters and had managed to build on past experiences including SARS, the Lamma Ferry disaster, and the Lan Kwai Fong Stampede. They were, however, more cautious in their endorsement of the system’s adequacy than their counterparts in other agencies. Healthcare administrators acknowledged the existence of well thought-out contingency plans at the Hospital Authority level but expressed a need for more training of all levels of hospital staff.

Desire (and Need) for Increased Disaster Response Training

Many responders noted that most providers, especially emergency department and other critical care professionals, would be competent and comfortable operating under usual circumstances but might not be able to meet the need for improvisation and nimble decision-making during disasters when resources would be limited and the work setting austere and unfamiliar. Interviewees emphasized the need to create competency in disaster response that included not only clinical skills, but also the ability to make quick, on-the-spot decisions under duress. Policies would need to be developed to ensure that clinical responders were protected from liability in their emergency work as in their routine delivery of care.

All interviewees commented on the need to mainstream disaster response curriculum into medical and nursing education and to introduce it at an undergraduate level, as is currently being done at HKU. Seminal principles of disaster management including disaster response cycles, field triage, coordination and communication are being taught, albeit in limited measure, during post-graduate fellowship training in emergency medicine. Mass Casualty Incident concepts that are included in Advanced Trauma Life Skills (ATLS) courses are being taught to surgeons and anesthesiologists that are required to take ATLS. Most other specialists do not receive such training, though they may be well-versed in infectious disease outbreaks. “Field-competence” is therefore almost entirely limited to emergency medicine consultants. There is concern that were there a large demand for physicians to be deployed to hospitals as well as to the “community,” there would be an insufficient number of trained disaster responders to meet the need.

There were largely two lines of thought about advancing disaster preparedness and training among healthcare providers. While all agreed on increased competency-based training, some felt that elements of disaster medicine ought to be included at all levels of training. Others favored the development of a cadre of highly trained specialists, while cautioning that the lack of obvious job opportunities for them might become a significant deterrent.

Drills: Scope and Limits

Some officials reported that tabletop or telephone-based exercises involving senior staff are held every one to two years at their institutions. Large-scale drills involving disaster victims are organized every two to three years, but are postponed if the staff had already responded to a real event. Some administrators expressed doubts that their staff would be able to adequately respond in case of a significant event.

Preparedness Perceptions

Healthcare providers expressed confidence in the city's response capabilities. They expressed concern about community preparedness, calling for more community participation in disaster education and drills. Japan and Korea were often cited as good examples of countries with heightened community awareness and participation. Interviewees noted that Hong Kong citizens, although fairly engaged during outbreaks like SARS, quickly return to a level of complacency about the relative safety and insularity of Hong Kong. This view was consistent with the results of the Community Survey (see below).

Gaps in Preparedness

In addition to personnel preparedness, administrators were also concerned about the limits of hospital evacuation plans. Large drills tend to disrupt workflow so most drills are small and contained. The number of personnel trained at each individual drill is therefore not very high. While most hospitals focused on “vertical” and “horizontal” evacuations within the hospital, and as mandated by Hospital Authority contingency plans, none had considered inter-hospital evacuations.

Further, interviewees made specific recommendations for improving field triage and commented on improving the current patient tracking system (which is paper-based) and replacing it with barcode technology already employed in other countries. They also called for preparing for disasters that lasted beyond 24 hours, as most drills (and contingency plans) focused on single-hazard, acute events.

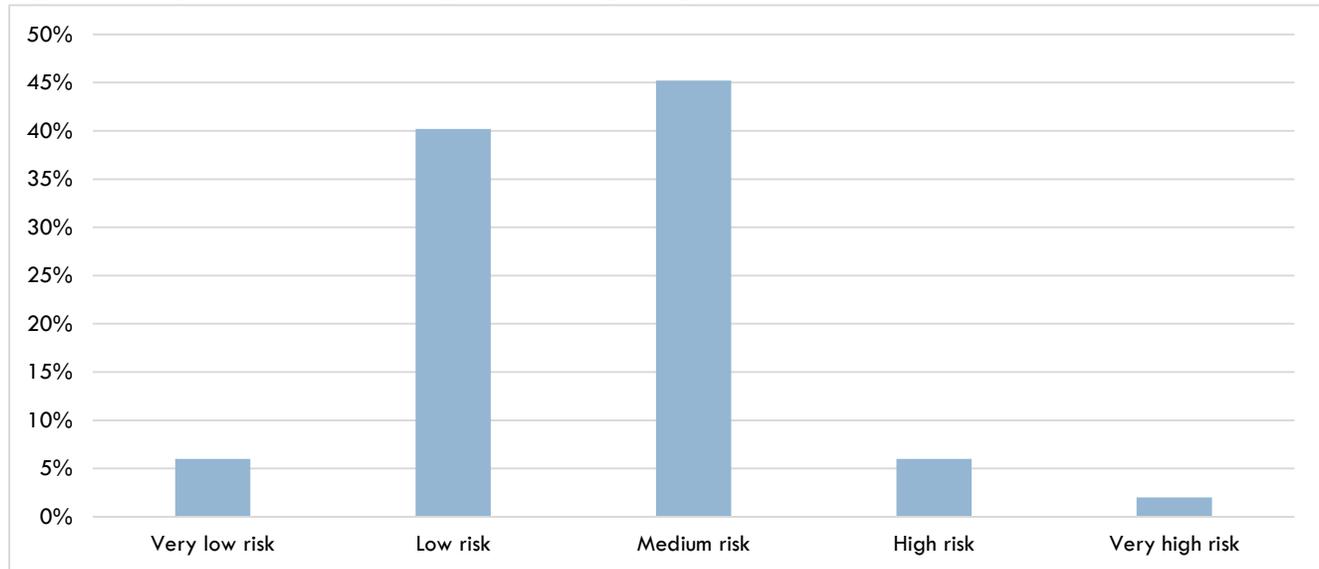
HEALTHCARE PERSONNEL SURVEY

The survey sample consisted of 199 hospital workers. There are a total of 8,946 fellows, trainees, and nurses in the networks in which the survey link was disseminated. The total number of respondents that the survey was sent to has been requested. The response rate was low. The majority of the respondents were full-time staff and more than half were doctors. The majority of the respondents worked in the Hospital Authority (77.4%), with a few from private clinics (10.1%), private hospitals (4.5%), universities (5%), and the Department of Health (4%). More than half (53.8%) of the doctors and nurses specialized in emergency medicine.

Preparedness and Disaster Drills

Healthcare workers were asked to rate their perceptions of the risk of particular disasters that may affect Hong Kong over the next five years. On average, healthcare workers deemed the likelihood of a major disaster in Hong Kong to be a medium-level risk. Only 7.0% of the respondents thought the risk was high. Among possible individual disasters, infectious disease outbreak was considered to be the highest risk for Hong Kong. Forty-eight percent of the respondents thought that Hong Kong was at risk of a disaster due to typhoon; and 40.6% thought the city was at risk of civil unrest. The majority regarded earthquakes to be a low risk and more than half said that nuclear and radiation accidents and bioterrorism were of low risk over the next 5 years.

Figure 4: Hospital Providers' Perception of Hong Kong's Disaster Risk (n=198)



Most (75.9%) respondents were aware of a disaster plan in their workplace, while 16.1% were not certain and 7.5% reported no knowledge of a plan. With regards to evacuation, 64.8% reported an evacuation plan in their workplace but 18.1% were not sure and 16.6% reported none. A majority of healthcare personnel (61.3%) reported that their workplace conducts disaster drills but only 51.3% had participated. Only 25.6% of the respondents had taken part in disaster drills within the previous two years. For those with experience in disaster drills, only 20.6% had participated in drills that involved multiple response agencies. More often disaster drills were conducted within individual hospitals involving the departments in which they worked or several departments within the hospital.

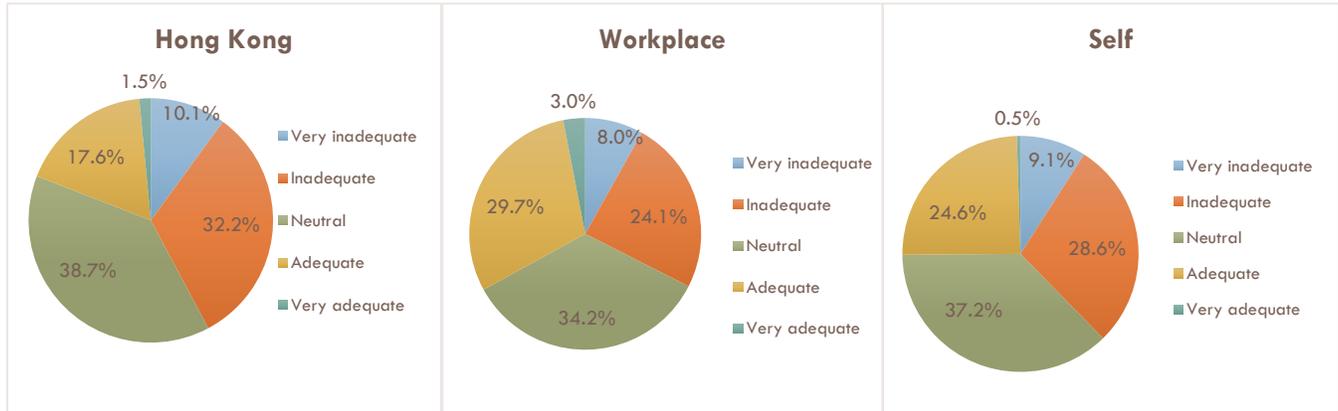
Respondents were asked to rate their personal level of disaster preparedness, level of disaster preparedness of their workplace, and level of disaster preparedness of Hong Kong (See Figure 5).

Training and Experience

The respondents were relatively more experienced in handling infectious disease outbreaks and major fires when compared with other types of natural and man-made disasters like chemical accidents. Almost half reported having previous experience in handling patients during an infectious disease outbreak. Only a few respondents reported experience in responding to earthquakes, nuclear and radiation incidents, or stampedes or air crashes. No respondents reported experience in taking care of victims of bioterrorism.

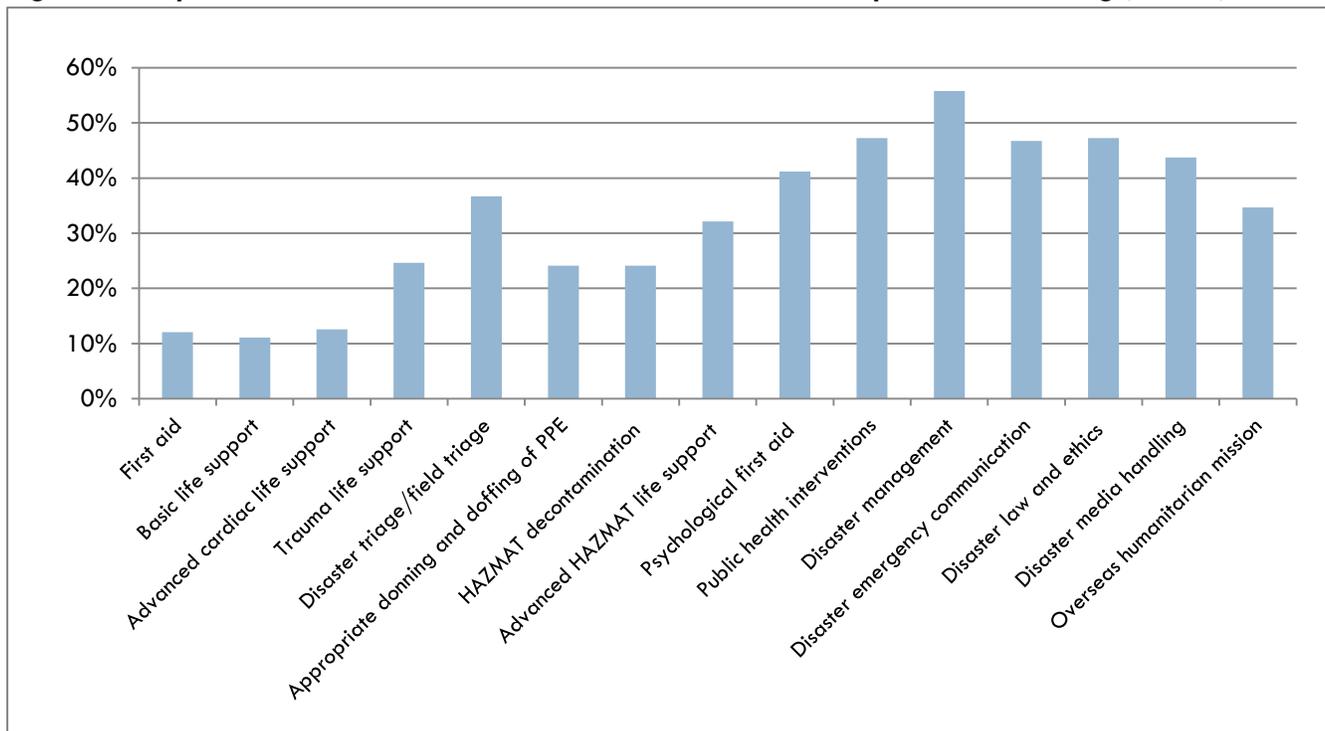
Most respondents had received training in first aid (88.5%), basic life support (96.5%), and advanced cardiac life support (86.4%). Almost 70% of the respondents had training in trauma life support, appropriate use of personal protective equipment, and hazardous material (HAZMAT) decontamination. Among the doctors and nurses surveyed, 20% had received some training in disaster management, communication, or field triage, in the past two years. Half of the respondents had never received any disaster-related training.

Figure 5: Hospital Providers' Preparedness Perceptions (n=199)



Over 40% of respondents expressed interest in receiving more training in each of the following areas: psychological first aid, public health interventions, emergency communication, law and ethics, and media handling in disaster (see Figure 6). As for the training format, hands-on training and skills workshops were the most popular options, followed by simulation-based training and disaster drills.

Figure 6: Hospital Providers' Areas of Interest for Future Disaster Preparedness Training (n=199)



Communication and Information

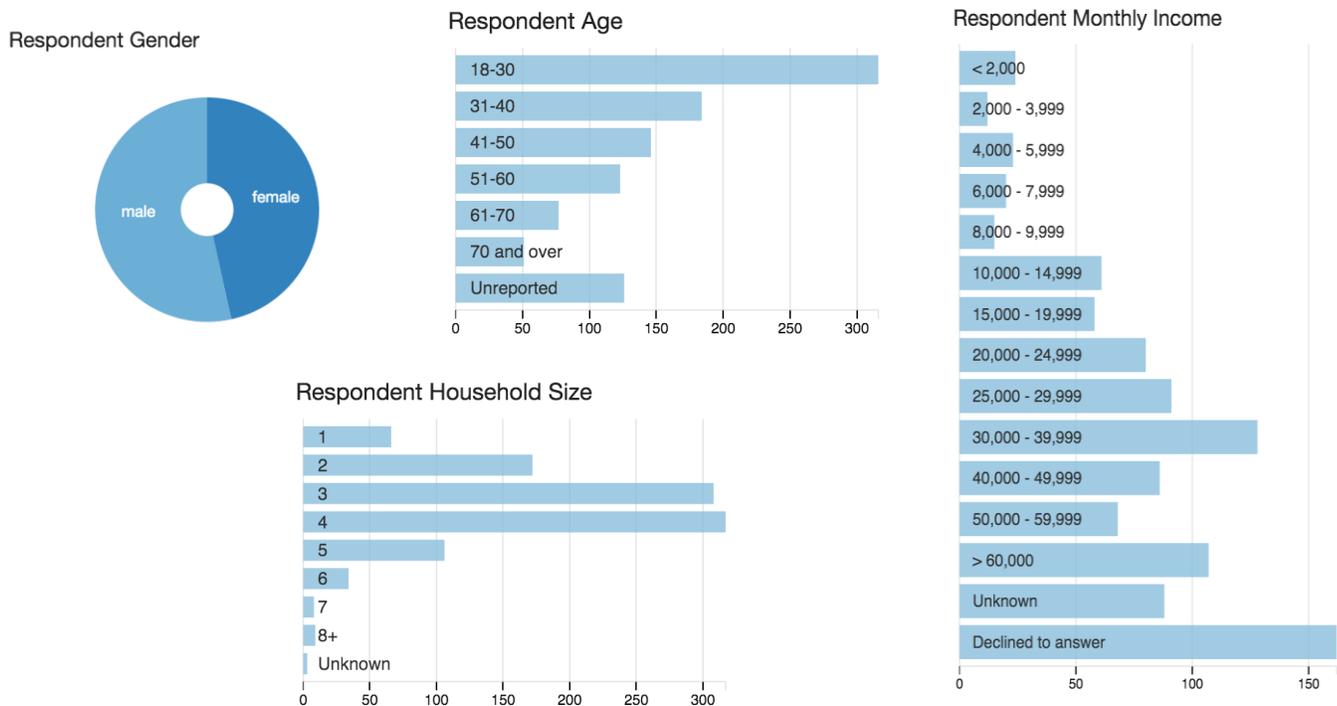
A majority (65.3%) of the respondents stated that they would report to their workplace in a disaster when they were off-duty, even if they were not asked to do so. Many (68.9%) were willing to work overtime without pay (during a disaster event), and 66.8% were willing to be deployed to other departments if necessary. However only 36.7% of the respondents were willing to engage with victims of bioterrorism involving unidentified agents.

Providers reported in the case of a disaster that television would be the most important source of information for them. Social media, radio and government websites were other potential sources of information. In case of mobile network disruption during disasters, providers preferred television announcements over other means of communication to call them to work.

Social support is a key factor in psychological resilience among healthcare workers responding to disaster. Peer colleagues, supervisors, and family members were three groups of people doctors and nurses would likely turn to when facing heightened stress while handling disasters. Over 75% reported that they were not likely (“neutral” or “unlikely”) to seek help from mental health professionals.

COMMUNITY SURVEY**Sample Characteristics**

The community survey was administered to 1,023 Hong Kong Residents, randomly selected by the methodology described above. The median age of the respondents was 38 years (range 18-88 years) with men constituting 53.5% of the total respondents. According to the Hong Kong Census and Statistics Department, in 2014 the median age in Hong Kong was 42.8 and men constituted 46.1% of the total population. The median monthly household income of respondents, reported by 70% of participants, was HKD 30,000 (as compared to 23,500 for Hong Kong overall). The average household size of participants was 3.5 (while that for Hong Kong was 2.9).^{10,11}

Figure 7: Community Survey: Respondent Demographics (n=1023)**Communication and Information about Disasters**

Communication preferences spanned a range of electronic media. In case of a disaster, a majority (52%) of community members would seek information via television, followed by Facebook (18.9%), WhatsApp messages (9.6%), radio (8.2%), and news agency websites (6.1%). Only 2.9% of community members indicated that they would look for information on government websites. There were no significant differences between men and women in information seeking preferences. However, age played a role in choice of information source. Compared to people under the age of 30, people over the age of 65 were more likely to use the radio to find out information in case of a disaster.

In case of mobile network outage, 37.4% of respondents indicated that they would use a landline telephone to contact family members, while 32.5% of people would go directly home to contact their family. In the event of a disaster, information themes that community members rated as very important were 1) Where to seek medical assistance (92.2%); 2) Information about evacuation routes (85.2%); 3) Information about shelter options (84.8%); 4) Details of the disaster (67.4%); 5) Information about missing persons (65.2%); and 6) Information about casualties (45.2%). Rankings were consistent across both genders and all age groups.

Disaster Response Knowledge

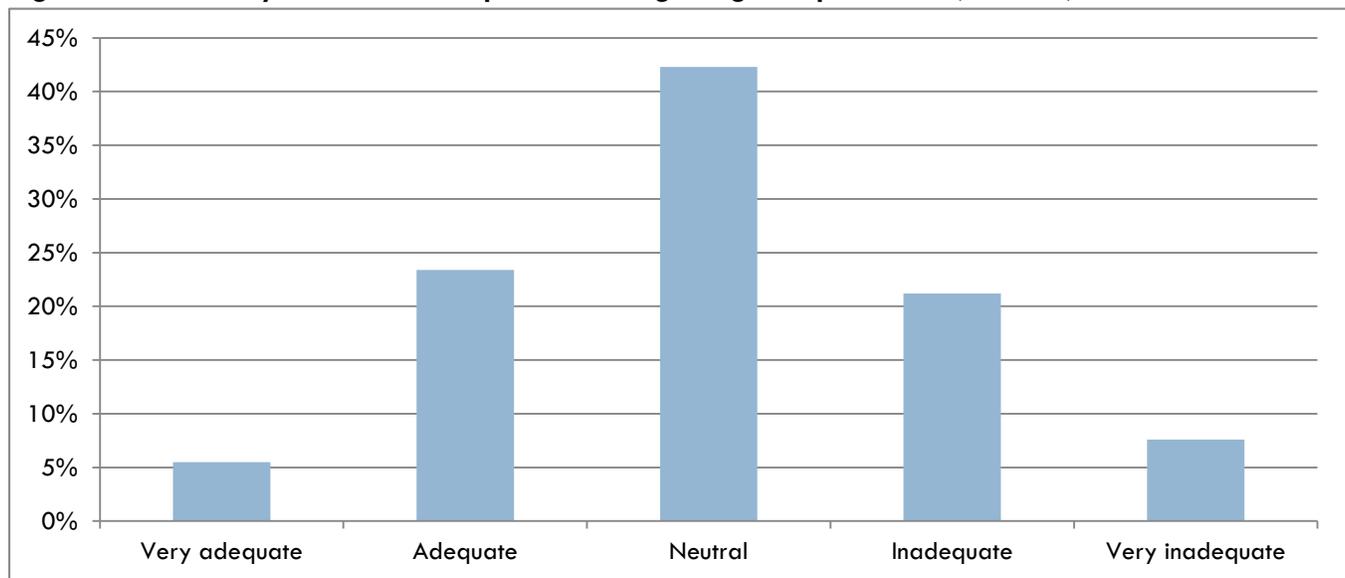
Respondents were asked specific questions to assess their knowledge about Hong Kong's disaster warning terminology and basic principles of first aid and preparedness. Close to half of the community members interviewed did not know the correct response to a Tropical Cyclone Warning Signal No. 8 (which is issued when wind speed of an approaching storm is between 63-117 km/h). First aid knowledge, tested through specific questions, though limited, was positively associated with monthly household income.

Preparedness

Should evacuation be required during an emergency, 58.1% of community members reported no barriers to prevent evacuation. Thirteen percent of community members reported that personal or family-related disability or mobility problems would hinder their ability to leave quickly. Only 4.3% of community members said they would not evacuate if asked. In the event of a nuclear accident, the majority of community members (57.8%) anticipated that they would evacuate by airplane. A small minority (12.2%) reported not knowing by what means they would evacuate.

Regarding the city's level of preparedness, 28.9% of community members thought that Hong Kong is either adequately or very adequately prepared for a disaster. A significant proportion (28.8%) felt that Hong Kong was either inadequately or very inadequately prepared to deal with a disaster (See Figure 8). There were no significant differences by age in respondents' perception of the city's preparedness.

Figure 8: Community Members' Perceptions of Hong Kong's Preparedness (n=1023)



In terms of personal preparedness, only one in ten indicated that they were fully prepared for a disaster. On being asked about an evacuation kit, a majority (63.3%) reported that they did not have one. Among those who did have an evacuation kit, 68.5% reported including important documents, 63.5% had set aside money, 57.9% included first aid equipment, 55.2% had medications, 43.5% had a mobile phone charger, and 34.9% had a flashlight. Younger respondents were more likely to have an evacuation kit.

The most cited barrier to better self-preparedness was not knowing where to seek more information (32%); 20.9% respondents said they lacked the time or money to become better prepared. Virtually all (99.1%) community members indicated interest in gaining further information about disaster preparedness. The preferred modes for accessing such information were the internet (40.5%) and television (40.5%). In Hong Kong, 2.4 million households have multichannel television and 2.3 million households have broadband internet, representing upwards of 85% penetration.¹² According to the Community Survey, more than half (56.7%) of women preferred television as a means to access information, compared to 47.9% of men. People over the age of 65 preferred radio and television compared to the Internet. More community members reported that they would access information about preparing for disasters on the Internet using their mobile device (36%)

than on a computer (11.8%). It is noteworthy that a minority (3.4%) would attend an in-person course or training.

Conclusion

The goal of the Scoping Study was not to evaluate Hong Kong's disaster response system but to assist HKJCDPRI in identifying priority areas in research and training. Based on the analyses from the qualitative and quantitative surveys described above, we have identified the following four recurrent themes:

1. The need for outreach to and engagement of members of the general Hong Kong community to raise awareness of disaster risk, improve preparedness efforts, and provide guidance on where to find information in the event of a disaster;
2. The need to invest more resources in training and professionalization of the Hong Kong response sector, including healthcare personnel;
3. The opportunity to include less familiar and infrequent disasters in training exercises and disaster drills for disaster preparedness and community engagement; and
4. The potential benefit of deploying the capabilities of mobile technologies and the Internet for disaster communication and coordination.

Hong Kong ranks high among Asia's urban cities at risk of serious disasters. Exposure to frequent storms, tropical cyclones and heavy rains contribute substantially to this ranking. However, as officials from the Security Bureau correctly point out, Hong Kong is well prepared and not necessarily vulnerable to these particular events. The city's key institutions have exceptionally detailed contingency plans in place for a variety of disasters. Even agencies that are not at the frontline of response have well laid-out mitigation and response plans. Communication within agencies is well coordinated although the findings indicate that there is room for improvement in cross-agency coordination, public participation, active training, and technological adoption.

In contrast, there are a number of low-risk but high-cost possibilities for which Hong Kong is less prepared. Among these, large-scale industrial accidents, nuclear power plant failures, mass-casualty incidents and bioterrorism are issues that have not been adequately considered. Agency personnel highlighted the need for more comprehensive training in unusual risks, and the findings indicate that the general public is unprepared for a large-scale emergency that would require community-level response. The HKJCDPRI has an opportunity to investigate, highlight and build awareness of potential high-risk disasters in Hong Kong and to facilitate community engagement in preparedness activities.

Community Engagement

The call for greater community engagement was unanimous. Senior officials across agencies expressed a need for improving community outreach, awareness and participation in preparedness planning and response. It is well established that perceived risk and perceptions of protection responsibility (i.e. considering oneself responsible for individual safety in the face of threat) relate to the enactment of preparedness behaviors.¹³ Consequently, inaccurate perceptions of threat and ambiguity in planning combine to place the population at greater risk at the time of response.¹⁴ Leveraging existing portals of engagement like the website and

informational materials produced by CHP or the Hong Kong Observatory may augment community outreach during disasters. HKJCDPRI could also serve as a neutral but authoritative hub for community engagement.

Professionalization and Training

Most senior officials have confidence in the city's ability to respond to disasters. Most front-line personnel echo the same sentiment, although to a lesser degree. Healthcare providers have faith in Hong Kong's healthcare system over all but less confidence in the ability of their otherwise skilled personnel to respond to complex disasters in stressful emergency settings. Senior personnel and healthcare providers were united in their expressed desire for increased disaster medicine training and professionalization of the sector.

Response agencies voiced interest in expanding their future disaster drills to include infrequent but potentially serious mass casualty scenarios, response to multiple-hazards disasters, and exposure to more inter-agency participation. Similarly, healthcare and agency personnel expressed their desire for more interactive training. The complexities of undertaking these sophisticated trainings should not, however, be underestimated. The current large number of people involved in various aspects of emergency response in Hong Kong (tens of thousands) raises questions of design, logistics, and resources in proposing alterations in the current training systems. Most personnel expressed a stronger preference for hands-on training over didactics or online training—a preference that comes with intrinsically higher costs. Internet-based learning may, therefore, not be a simple or obvious solution. Simulation-based training may prove to be a viable alternative in some cases.

The advances in Hong Kong's ability to mitigate and respond to infectious disease outbreaks in the aftermath of SARS have been recognized internationally. A similar degree of preparedness (whether perceived or in reality) is absent in the case of large mass casualty incidents, multi-hazard events, prolonged events, and disasters directly affecting hospitals and requiring large inter-hospital transfers. Senior officials and agency personnel reiterated the need to include more attention to psychosocial care. Accessibility of information and training in psychosocial self-care is especially important given that three-quarters of healthcare personnel stated that they would be unlikely to seek specialist services despite the substantial psychological impacts of disaster response. The need for greater disaster medicine knowledge and skills at all levels of the hospital system was noted in almost all stakeholder interviews. Specific needs identified included periodic refresher training for senior administrators in supervisory and coordinator roles during disasters, as well as frequent in-depth training for front line responders.

Overall, the organizations tasked with emergency response appear to be well prepared, with an enthusiastic and highly skilled workforce. Agency personnel were knowledgeable about the city's disaster protocols and procedures. However, the study findings indicate a need for greater coordination, training and communication (including the development of electronic tracking systems that update in real-time) for healthcare agencies and personnel to respond to complex disasters that involve response efforts from multiple sites. Again, the greatest need appears to be the involvement and education of the general public. Community outreach will be critical to effective response, and training tailored to the community's interests and accessibility (through the Internet and television) will be important.

Regional Leadership

A majority of the key stakeholders also expressed a strong desire for Hong Kong to share its experiences in disaster management with the rest of the region, exchange knowledge with the Mainland, and serve as a conduit of information and knowledge between the Mainland and rest of the world. Many saw the potential

for Hong Kong to serve as a hub of information and knowledge transfer in the region. The survey respondents acknowledged the current inability of Hong Kong healthcare professionals to respond to international disasters in any substantive manner owing to the complexity of political and legal permissions. However, they hoped that Hong Kong would eventually play a larger role in regional disaster response via a cadre of professionally trained disaster and humanitarian aid responders.

The information provided by this Scoping Study raises a number of opportunities for refining emergency response strategies in Hong Kong, and the health professional sector in particular, in order to build upon and strengthen its already impressive profile of competence and experience in disaster management. The establishment of the HKJCDPRI within HKAM offers the potential to provide further training for Hong Kong health professionals in this complex area of disaster response and to expand the reach of Hong Kong as a regional hub of disaster expertise for the Asia-Pacific region.

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Appendix A**SCOPING STUDY: AGENCY PERSONNEL**

Agency code (filled in by interviewer): _____

ORGANIZATIONAL / INSTITUTIONAL PREPAREDNESS

1. Agency or organization
 - a. Auxiliary Medical Services
 - b. Civil Aid Service
 - c. Hong Kong Fire Service (Fire and Special Service)
 - d. Hone Kong Fire Service (Ambulance Service)
 - e. Hong Kong Police Force
 - f. Hong Kong Red Cross
 - g. St. John Ambulance Service
2. What is your rank or position within this organization? _____
3. For how many years have you been with this organization? _____
4. Does your organization have any disaster drills?
 - A. Yes
 - B. No
 - C. I don't know
 - D. Decline to answer
5. How many drills have you participated in during the last year? _____
 - I don't know
6. What was the scale of the largest disaster drill / exercise in which you have been involved?
 - A. Department level
 - B. Agency / Institution level
 - C. Multiple agencies (inter-agency)
 - D. Other, please specify: _____
 - E. I don't know
 - F. Decline to answer
7. If a disaster occurs in Hong Kong and you are off duty, how will your supervisors contact you for your assistance if the phone and internet are not working? (**select all that apply**)
 - Via landline phone
 - Via radio or TV announcements
 - They won't. I am expected to automatically report in person to my office or headquarters
 - I don't know
 - Other
 - Decline to answer

8. What are your organization's roles and responsibilities during a disaster? (*select all that apply*)

- Control and direct traffic at the site of a disaster
- Collate and disseminate data on casualties arising due to the disaster
- Extinguish fires and protect life and property in case of fires
- Assist people in need of immediate medical assistance and transporting them to the hospital
- Reinforce regular ambulance personnel
- Deploy volunteers to assist in operations such as search and rescue, crowd control, registration of victims, casualty handling, evacuation and feeding of disaster victims, clearance of roadways blocked by fallen trees or landslips
- Supply temporary toilets and dustbins, collection of refuse and maintenance of hygiene in relief centres
- Clearance of dangerous or fallen trees and refuse from open/surface drains
- Arrange carrying out of autopsies
- Provide food, blankets and other emergency items
- Decide if schools and kindergartens will be closed
- Provide advice and arrangements for the supply of explosives for clearance work involving rocks and dangerous boulders
- Other. Please specify: _____
- I don't know
- Decline to answer

9. Who is responsible for the overall coordination of all agencies operating at the scene of a disaster during rescue and recovery phases?

- A. First emergency responder to arrive at the scene
- B. The senior police officer on site (Police Field Commander)
- C. The highest ranking person of all agencies present at the scene
- D. The senior fire officer on site (Fire Rescue Commander)
- E. I don't know
- F. Decline to answer

10. According to the Hong Kong Contingency Plan for Natural Disasters, under which circumstances will the Emergency Monitoring and Support Center (*national coordination center for large-scale emergencies*) be activated? (*select all that apply*)

- Whenever a Tropical Cyclone Signal No. 8 or higher warning comes into effect
- Whenever a Black Rainstorm warning comes into effect
- Whenever a Tsunami warning comes into effect
- Whenever the District Officers of the Home Affairs Department deems necessary
- I don't know
- Decline to answer

11. How would you rate your agency's or organization's current preparedness in responding to a disaster in Hong Kong?

- A. Very adequate
- B. Adequate
- C. Neutral

- D. Inadequate
- E. Very inadequate

12. How would you rate **Hong Kong's** current preparedness in responding to a disaster in Hong Kong?

- A. Very adequate
- B. Adequate
- C. Neutral
- D. Inadequate
- E. Very inadequate

INDIVIDUAL / PERSONAL PREPAREDNESS

13. I have received training in: (*select all that apply*)

- First aid
- CPR (certified)
- Basic life support
- Advanced life support
- Trauma life support
- Disaster triage
- Appropriate donning, doffing, and disposal of level C personal protective equipment
- Decontamination
- Hazardous material medical response, involving chemical, biological, radioactive, and nuclear substances
- Psychological first aid
- Other, please specify: _____
- None of the above
- Decline to answer

14. When was the last time you provided first aid to anyone?

- A. 2015
- B. 2014
- C. 2013
- D. 2012
- E. 2011
- F. 2010
- G. Before 2010
- H. I have never performed first aid on anyone
- I. Decline to answer

15. When was the last time you practiced CPR (either in a class or real emergency)?

- A. 2015
- B. 2014
- C. 2013

- D. 2012
- E. 2011
- F. 2010
- G. Before 2010
- H. I have never performed CPR on a person or in class
- I. Decline to answer

16. Have you ever responded to any of the following emergency or disaster events in Hong Kong or elsewhere? (***select all that apply***)

- Earthquake
- Typhoon or Cyclone
- Flooding
- Major Fire
- Infectious disease outbreak
- Radiation emergencies
- Bioterrorism
- Chemical terrorism
- Conventional bombing
- Mass shooting
- Stampede
- Civil unrest
- Air crash
- Others, please specify: _____
- None
- Decline to answer

17. Do you want to receive more training in: (***select all that apply***)

- First aid
- CPR (certified)
- Basic life support
- Advanced life support
- Trauma life support
- Field triage
- Appropriate donning, doffing, and disposal of level C personal protective equipment
- Decontamination
- Hazardous material medical response, involving chemical, biological, radioactive, nuclear and explosive substances
- Psychological first aid
- Other, please specify: _____
- I don't know what most of these terms mean
- Decline to answer

18. Your preference on training formats are: (**select top 2 choices**)

- Written material
- Classroom based short lectures (1-2 hour session)
- Hands-on training and workshops (1-2 days)
- Online learning and online simulations
- Disaster drills
- Other
- Decline to answer

19. As a responder, how do you rate your current preparedness in responding to a disaster?

- A. Very adequate
- B. Adequate
- C. Neutral
- D. Inadequate
- E. Very inadequate

Appendix B

SCOPING STUDY: COMMUNITY MEMBERS

GPS coordinates (*filled in by interviewer*): _____

1. Are you currently a resident of Hong Kong?

- A. Yes
- B. No

2. Age: _____

Decline to answer

3. Gender:

- A. Male
- B. Female

4. How many family members are there in your household, including yourself?

5. List the ages of all the family members in your household

(Example: 40, 44, 3, 7, and 90) Use approximate ages if exact unknown.

6. In case of a disaster, where are you most likely to look for information?

- A. TV
- B. Radio
- C. Facebook
- D. Twitter
- E. Whatsapp
- F. Government websites
- G. News agency websites
- H. Emergency information line
- I. Other, please specify: _____

7. If the mobile phone network stopped working, how would you contact your family in case of disaster?

- A. Go home
- B. Go to children's school
- C. Via landline telephone
- D. Use the Internet, Facebook, or email when Wifi available
- E. Meet at pre-planned meeting place
- F. I don't know

8A. Does your cell phone have an emergency contact number in it?

- A. Yes

B. No

8B. If your cell phone has a password, can the emergency contact number be accessed without knowing the password to your phone?

- A. Yes
- B. No
- C. My phone does not have a password lock

9. What information would you most like to know in case of a disaster?

	Very important	Somewhat important	Not important
Evacuation			
Shelter			
Missing person			
Casualties			
Medical assistance			
Details of disaster			

10. If you were asked to evacuate Hong Kong in the event of a severe Typhoon that was expected to cause major flooding, where would you go (name of town or region)? If the region lies outside of Hong Kong or Mainland China, please specify country.

11. What would prevent you/your family from leaving, if asked to evacuate?

- A. Disability / mobility issues
- B. Fear of theft / damage / looting of the possessions you would leave behind
- C. Don't know where to go
- D. I won't evacuate even if asked to
- E. There are no barriers
- F. Other, please specify: _____

12. If you were asked to evacuate Hong Kong in case of a nuclear accident, how would you evacuate?

- A. Private car
- B. Taxi
- C. Boat
- D. Train
- E. Bus
- F. Airplane
- G. On foot
- H. Don't know
- I. Other, please specify: _____

13. Do you have these items in your evacuation kit? (*select all that apply*)

- I do not have an evacuation kit
- Copy of your important legal documents (identity card, bank accounts)
- List of medications
- First aid kit
- Money
- Mobile phone charger
- Flashlight
- Other, please specify: _____

14. In case you were unable to return to work due to a disaster, how many weeks would your savings allow you to support your household?

- A. I do not have savings
- B. 1-2 weeks
- C. 2-6 weeks
- D. 6-12 weeks
- E. 3 months
- F. 6 months
- G. 9 months
- H. 12 months
- I. 24 months
- J. More than 24 months
- K. Decline to answer

15. What is your **monthly** household income?

- A. < 2,000
- B. 2,000 - 3,999
- C. 4,000 - 5,999
- D. 6,000 - 7,999
- E. 8,000 - 9,999
- F. 10,000 - 14,999
- G. 15,000 - 19,999
- H. 20,000 - 24,999
- I. 25,000 - 29,999
- J. 30,000 - 39,999
- K. 40,000 - 49,999
- L. 50,000 - 59,999
- M. \geq 60,000

16.1 Your friend was injured during the disaster and has a laceration on her leg that is profusely bleeding. What will you do?

- A. Tie a tourniquet above the wound
- B. Tie a tourniquet below the wound
- C. Hold direct pressure over the wound with a clean dressing

- D. Run under cold water
- E. Do nothing, call 999

16.2 You arrive home to find a family member unconscious (unresponsive) on the floor. What would you do next?

- A. Immediately call 999 for an ambulance, then check for a pulse.
- B. Immediately call 999 for an ambulance, pinch their nose and start breathing into their mouth
- C. Try to sit the person up, and splash water on their face, to see if they regain consciousness
- D. Place a pillow under their head so they can breathe better. Then begin chest compressions.
- E. Do nothing and call 999

17. What should you do when a “Tropical Cyclone Warning Signal No.8” is issued by the Government?

- A. Return home immediately under any circumstance
- B. Return home immediately unless a Black Rainstorm warning is in force
- C. Stay where you are as all public transportation will be shut down
- D. Do nothing, but be on alert; this is a precautionary early warning signal
- E. I don't know what that means

18. What are the major barriers you face in becoming more prepared for a disaster? (**Select all that apply**):

- I don't know where to get further information
- I don't have time
- I don't have money for it
- I don't think I need more training because Hong Kong is relatively safe from disasters
- I have looked for learning opportunities but haven't found any
- I am already fully prepared
- Other _____

19. If information about preparing for disasters were to be provided for you, where are you most likely to access it?

- A. TV
- B. Radio
- C. Internet via phone
- D. Internet via computer
- E. In-person course
- F. Unlikely to want to access further information about disaster preparedness

20. How would you rate Hong Kong's current level of preparedness for dealing with a disaster?

- F. Very adequate
- G. Adequate
- H. Neutral
- I. Inadequate
- J. Very inadequate

21.

	Not at all true	Hardly true	Moderately true	Exactly true
I can always manage to solve difficult problems if I try hard enough.				
If someone opposes me, I can find the means and ways to get what I want.				
It is easy for me to stick to my aims and accomplish my goals.				
I am confident that I could deal efficiently with unexpected events.				
Thanks to my resourcefulness, I know how to handle unforeseen situations.				
I can solve most problems if I invest the necessary effort.				
I can remain calm when facing difficulties because I can rely on my coping abilities.				
When I am confronted with a problem, I can usually find several solutions.				
If I am in trouble, I can usually think of a solution.				
I can usually handle whatever comes my way.				

Appendix C

**Disaster Preparedness of Acute Hospital Care Providers
Survey Questionnaire**

CONFIDENTIAL

Definitions of disaster: Disaster is defined as a serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources (UNISDR definition)

Please click in the boxes to indicate your responses.

Section A. Disaster Risk

A1. On a scale of 1 to 5, how would you rate the overall level of risk of a disaster in Hong Kong **over the next 5 years?**

<input type="checkbox"/>				
1	2	3	4	5
Very low risk	Low risk	Medium risk	High risk	Very high risk

A2. On a scale of 1 to 5, how likely are the following hazards in causing a disaster in Hong Kong **over the next 5 years?**

	Very unlikely 1	Not likely 2	Possible 3	Likely 4	Very likely 5
a) Earthquakes	<input type="checkbox"/>				
b) Typhoon	<input type="checkbox"/>				
c) Flooding	<input type="checkbox"/>				
d) Major Fire	<input type="checkbox"/>				
e) Infectious disease outbreak	<input type="checkbox"/>				
f) Nuclear and radiation incident	<input type="checkbox"/>				
g) Bioterrorism	<input type="checkbox"/>				
h) Chemical accident	<input type="checkbox"/>				
i) Stampede	<input type="checkbox"/>				
j) Civil unrest	<input type="checkbox"/>				
k) Air crash	<input type="checkbox"/>				
l) Maritime disaster	<input type="checkbox"/>				

Section B. Disaster experience, training and drills

B1. Have you ever provided care to victims of any of the following events in Hong Kong or elsewhere? (**select all that apply**)

	If yes,	In Hong Kong	Outside Hong Kong
<input type="checkbox"/> Earthquakes		<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Typhoon		<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Flooding		<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Major Fire		<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Infectious disease outbreak		<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Nuclear and radiation incident		<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Bioterrorism		<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Chemical accident		<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Stampede		<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Civil unrest		<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Air crash		<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Maritime disaster		<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Other, please specify: _____		<input type="checkbox"/>	<input type="checkbox"/>

B2. I have received training in: (select all that apply)

Definition: Hazardous materials (HAZMAT) refer to substances or agents (biological, chemical, radioactive) which have the potential to cause harm to humans or the environment. PPE stands for personal protective equipment.

	If yes, Within 2 years	2-5 years ago	More than 5 years ago	I can't remember
<input type="checkbox"/> First aid	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Basic life support	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Advanced cardiac life support	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Trauma life support	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Disaster triage/ field triage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Appropriate donning and doffing of PPE for HAZMAT incidents	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> HAZMAT Decontamination	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Advanced HAZMAT life support	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Psychological first aid	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Public health interventions in disaster	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Disaster management (including organization and management of resources and responsibilities)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Disaster emergency communications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Disaster law and ethics	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Media handling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Overseas humanitarian mission	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Other, please specify _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

B3. I want to receive more training in: (select all that apply)

- First aid
- Basic life support

- Advanced cardiac life support
- Trauma life support
- Disaster triage/ field triage
- Appropriate donning and doffing of PPE for HAZMAT incidents
- HAZMAT Decontamination
- Advanced HAZMAT life support
- Psychological first aid
- Public health interventions in disaster
- Disaster management, which includes organization and management of resources and responsibilities
- Disaster emergency communications
- Disaster law and ethics
- Media handling
- Overseas humanitarian mission
- Other, please specify _____

B4. Which of the following formats of training would you prefer? *Please rank your top 3 options* (1 – most preferred; 2 – second most preferred; 3 – third most preferred)

- Online learning
- Classroom-based short lectures
- Hands-on training and skills workshops
- Simulation-based training
- Disaster drills
- Other, please specify: _____

B5. Does your workplace have any disaster drills? Yes No

If yes, when was the last time a drill was held in your hospital?

- | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|
| Within 2 years | 2 -5 years ago | More than 5 years | I can't remember |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

B6. Have you participated in any disaster drills? Yes No

If yes, when was the last time you participated in a drill?

- | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|
| Within 2 years | 2 -5 years ago | More than 5 years | I can't remember |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

B7. What was the scale of the largest disaster drill you have been involved?

- Department level
- Hospital level
- Cluster level

- Inter-agency level, such as involving other government departments or non-governmental organizations
- Other, please specify: _____

Section C. Disaster plan

C1. Does your workplace has a disaster plan?

- Yes No I don't know

C2. Are you aware of any evacuation plan in your workplace?

- Yes No I don't know

Section D. Disaster response

D1. In the following questions, please check the box that best corresponds to your views:

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
A) I should report duty to my workplace in a disaster when I am off-duty even if I am not asked to do so.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B) I am willing to work overtime without payment in a disaster.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C) I am willing to take uncertain health risks in taking care of victims of bioterrorism involving unidentified agents.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
D) I am willing to be deployed to other departments when assistance is required in the event of a disaster.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

D2. Using the following scale, please indicate how important each of the following sources is when you obtain information about a local disaster?

	Not at all important	Not very important	Moderately important	Very important	Extremely important
	1	2	3	4	5
a) Radio	<input type="checkbox"/>				
b) TV	<input type="checkbox"/>				
c) Newspapers	<input type="checkbox"/>				
d) Magazines	<input type="checkbox"/>				
e) News websites	<input type="checkbox"/>				
f) Government	<input type="checkbox"/>				

- websites
g) Social media

D3. Assuming that both landline telephones and mobile phones are **not** working in the event of a disaster in Hong Kong, your supervisors need to call you back to your workplace for assistance when you are **off duty**. Using the following scale, please indicate how effective each of the following communication methods is in reaching you:

	Not at all effective	Not very effective	Moderately effective	Very Effective	Most effective
	1	2	3	4	5
a) Radio announcement	<input type="checkbox"/>				
b) TV announcement	<input type="checkbox"/>				
c) Email/ internet announcement	<input type="checkbox"/>				
d) Social media	<input type="checkbox"/>				

D4. Using the following scale, please indicate how likely you would seek support from the following people when you face enormous stress in handling a disaster:

	Very unlikely	Unlikely	Possible	Likely	Very likely
	1	2	3	4	5
a) Your peer colleagues	<input type="checkbox"/>				
b) Your supervisors	<input type="checkbox"/>				
c) Your family members	<input type="checkbox"/>				
d) Your friends outside your workplace	<input type="checkbox"/>				
e) Clinical psychologists	<input type="checkbox"/>				

Section E. Overall rating

E1. As a hospital care provider, on a scale of 1 to 5, how would you rate **your personal level** of disaster preparedness?

Very inadequate	Inadequate	Neutral	Adequate	Very adequate
1	2	3	4	5
<input type="checkbox"/>				

E2. On a scale of 1 to 5, how would you rate the current level of disaster preparedness of **your workplace**?

Very inadequate	Inadequate	Neutral	Adequate	Very adequate
1	2	3	4	5
<input type="checkbox"/>				

E3. On a scale of 1 to 5, how would you rate the current level of disaster preparedness of **Hong Kong as a whole?**

Very inadequate	Inadequate	Neutral	Adequate	Very adequate
1	2	3	4	5
<input type="checkbox"/>				

Section F. Demographic data

F1. What is your gender? Male Female

F2. Which of the following age groups do you belong to?

<input type="checkbox"/>				
18 -24	25 - 34	35 - 44	45 – 54	More than 55

F3. What is your profession?

<input type="checkbox"/> Doctor	If yes, are you a fellow or a member?	<input type="checkbox"/> Fellow	<input type="checkbox"/> Member
<input type="checkbox"/> Nurse	If yes, are you a registered nurse or an enrolled nurse?	<input type="checkbox"/> Registered Nurse	<input type="checkbox"/> Enrolled Nurse

F4. What is your employment status? Full time Part time

F5. What is the main setting of your current practice? (*select all that apply*)

- Private clinic
- Private hospital
- Hospital Authority
- Department of Health
- University
- Other, please specify: _____

F6. What is your main area of practice?

- Anaesthesiology
- Community Medicine
- Dental Surgery
- Emergency Medicine
- Family Medicine
- Obstetrics and Gynaecology
- Intensive Care/ Critical Care Medicine
- Internal Medicine
- Ophthalmology
- Orthopaedics & Traumatology
- Otorhinolaryngology
- Paediatrics
- Pathology
- Psychiatry

- Radiology
- Surgery
- Other, please specify _____

F7. How long have you been in practice?

- 1-5 years
- 6 -10 years
- 11-15 years
- 16-20 years
- More than 20 years

End of questionnaire
Thank you for your participation and your time.