Urban disaster preparedness of Hong Kong residents: A territory-wide survey

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ABSTRACT

Objective: To assess the state of community disaster preparedness of Hong Kong residents and to identify factors associated with adequate preparedness behaviors.
Design: A cross-sectional survey using random Global Positioning System (GPS) spatial sampling conducted from the 8 August 2015 to 6 September 2015.
Participants: Hong Kong residents aged 18 years or more.
Method: A 19-item questionnaire was developed to assess respondents' preparedness information acquisition, communication plan, evacuation strategies, first-aid and disaster knowledge, financial resilience, and preparedness behaviors. In total, 1023 residents were interviewed at 516 GPS locations. Multiple logistic regression was used to identify factors associated with preparedness behaviors, defined as having an evacuation kit in our study.
Results: Television remains the key information source, both before and during disaster, with young respondents also favoring social media and the internet and elder residents preferring television and radio. Many respondents did not have adequate first-aid knowledge and few showed correct responses to a typhoon warning signal. Only 39.4% had an evacuation kit. In logistic regression, correct responses to first aid questions and a typhoon warning signal were significantly associated with kit preparation (OR 2.023, 95% CI 1.233 − 3.318, p = 0.005). Residents with elderly household member(s) were significantly less likely to do so (OR 0.554, 95% CI 0.333 − 0.922, p = 0.023).
Conclusions: Community resilience-building programs should tailor information provision to different age groups with a focus on the family caregivers of elderly residents. There is a need to promulgate first-aid training and disaster education in the community.

1. Introduction

Hong Kong is regarded as one of the safest metropolises in the world.[1] Compared with many other major cities, the number of people killed or affected by disasters has remained low [2] but historical figures do not always offer a guide to the future.[3] Hong Kong continues to be under the threat of emerging and re-emerging infectious diseases as exemplified by the Severe Acute Respiratory Syndrome (SARS) in 2003.[4] Given its location in the Pearl River Delta, Hong Kong is particularly at risk of climate-related changes including more frequent or stronger storms and floods.[5] And finally, growing political tensions have resulted in mass protest (the Occupy Central movement) in 2014 [6] and violent civil unrest in 2016.[7] Technical failures and terrorist attacks in places such as New York, [8]

London,[9] Madrid [10] and Tokyo [11] demonstrate that even the most advanced cities in the world remain vulnerable.

Despite these threats, the citizens of Hong Kong have been found not to be particularly worried about disasters. The SARS outbreak is now over 12 years ago, and the last major storm, Typhoon Wanda, was in 1962. A local telephone survey showed that the majority of the respondents (n = 940; 87.2%) did not think Hong Kong was vulnerable to disasters [12] and almost half of them regarded the city as having a lower level of disaster preparedness when compared with other cities. [13] Among elderly people who had installed emergency call service at home, only 22.4% were prepared for disaster.[14] In families with young children, only 9.1% considered themselves adequately prepared. [15].

These local surveys, however, were either telephone surveys or

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Table 1
Distribution of GPS Points by District.

Region	District	Population	Percentage of the total population	Adjusted number of points	Oversample 300%	Number of GPS location visited	Number of respondents interviewed
Hong Kong Island	Central & Western	248,600	3%	18	54	18	37
	Wan Chai	150,400	2%	11	33	10	21
	Eastern	579,400	8%	41	123	41	82
	Southern	270,500	4%	19	57	22	39
Kowloon	Yau Tsim Mong	313,600	4%	22	66	23	42
	Sham Shui Po	388,300	5%	28	84	32	58
	Kowloon City	402,300	6%	29	87	33	62
	Wong Tai Sin	424,500	6%	30	90	31	62
	Kwun Tong	639,900	9%	45	135	45	86
New Territories	Kwai Tsing	501,900	7%	36	108	36	70
	Tsuen Wan	301,600	4%	22	66	24	46
	Tuen Mun	489,000	7%	35	105	37	68
	Yuen Long	595,100	8%	42	126	48	83
	North	303,300	4%	22	66	28	44
	Tai Po	302,300	4%	22	66	24	44
	Sha Tin	648,200	9%	46	138	48	92
	Sai Kung	448,600	6%	32	96	34	65
	Islands	144,500	2%	11	33	11	22
Total		7,152,000	100%	511	1533	545	1023

surveys based upon a convenience sample. Telephone surveys are marked by a relatively low response rate [16] and surveys on a convenience sample have limited generalizability. Probabilistic spatial sampling, on the other hand, allows for a representative, random sample to be drawn from the study population. This method is a variant of cluster sampling in which the population is divided into several groups based upon geographical locations and a simple random sample is drawn from each group. This method of sampling can be accomplished using the Global Positioning System (GPS)-based methodology, which has been increasingly used around the world.[17–19] When accompanied by high response rates, surveys conducted at randomly selected GPS locations are likely to be more generalizable than telephone surveys or surveys on a convenience sample.

Apart from the methodological limitations of previous studies, severe knowledge gaps exist in our understanding of Hong Kong's community disaster preparedness. For Hong Kong residents confronting disasters, little is known about their information acquisition; their communication plans; their evacuation strategies; their first-aid and disaster knowledge; their financial resilience; and their preparedness behaviors on a territory-wide basis. Our study addressed these knowledge gaps, and aimed to study the current state of community disaster preparedness and factors associated with preparedness behaviors.

Currently there is no universal definition of personal disaster preparedness, but in the literature, there are two operational constituents of personal preparedness: preparation of an emergency kit and creation of a family emergency plan.[20] The national *Ready* campaign launched by the Federal Emergency Management Agency (FEMA) in 2003 in the United States encourages the public to "get a kit, make a plan, and be informed", [21] and many studies used preparation of an emergency kit and/or plan as an indicator of personal disaster preparedness.[22,23] To our knowledge, having a written household emergency plan is very uncommon in families in Hong Kong. We use the presence of an evacuation kit as one surrogate for community preparedness behavior.

This study was a part of a multi-component *scoping study* on disaster preparedness in Hong Kong that also included in-person interviews of senior government officials and healthcare administrators, and online surveys administered to frontline responders and health care professionals. We report here the findings of the community preparedness component of this larger, three-part *scoping study*.

2. Method

This was a cross-sectional, population-based survey using GPS random spatial sampling conducted from 8 August 2015 to 6 September 2015. The study was approved by the Institution Review Board of Harvard University and the Institutional Review Board of The University of Hong Kong/Hospital Authority Hong Kong West Cluster (HKU/ HA HKW IRB).

2.1. Target population

Hong Kong residents aged 18 years or more were eligible to participate. Exclusion criteria included: 1) overseas visitors holding tourist visas to Hong Kong; and 2) holders of "2-way Exit Permit" (an exit-entry permit for traveling to and from Hong Kong and Macau) from Mainland China. Participation was voluntary and anonymous. All participants provided informed consent prior to administration of the questionnaire.

2.2. Data collection

GPS software was used to randomly generate sample locations across Hong Kong's 18 districts, with oversampling by 300% to accommodate inaccessible or unusable locations. The number of GPS points surveyed in each district was proportional to the district population, based upon the 2014 data of the Census and Statistics Department (Table 1).[24] The GPS coordinates were then mapped to produce street addresses or locations using a website program called "Find Latitude and Longitude." [25] The addresses were then cross-checked manually for accuracy and accessibility. To avoid systemic bias from surveying all points in a district at similar time periods (e.g., surveying the downtown area during working hours would systemically bias against office workers who are not on the street), the GPS points within each district were randomly allocated to different time slots that covered weekdays and weekend days.

Ten trained teams, comprised of two university student interviewers, were deployed to randomly selected GPS locations. They were fluent in both English and Chinese, and proficient in operating the tablet computers for data collection. The students were instructed to approach every passerby they first saw on the street at each GPS location without "cherry-picking". The first two willing residents were interviewed at each location. There was a time limit for each GPS

location. If no eligible participants could be recruited after waiting for an hour or if only one could be recruited after two hours, the students were instructed to move to the next GPS location and revisit the location later.

After obtaining consent, the participants were invited to fill in the electronic questionnaire by themselves, or provided help by the interviewers. The participants were permitted to decline answering a particular question or terminate the survey at any time. Participants were informed that they would receive a HK $50 (USD $6.45) supermarket coupon for their time.

Data were collected via tablet computers on an online data collection tool, KoBo Toolbox. A GPS tracking application was installed in each tablet to cross-check the GPS locations of data collection.

2.3. Study instrument

The 19-item study questionnaire was designed based on literature review and expert input from our study team which composed of scholars from the François-Xavier Bagnoud Center for Health and Human Rights of Harvard University and The University of Hong Kong. It was made available in both Chinese and English. The questionnaire was first written in English by native speakers in our study team. Translation and back translation, undertaken by two bilingual university research staff not directly involved in the survey, were performed. The back-translated version was then cross-checked by native English speakers in our team to ensure accurate translation.

The instrument collected data on responder demographics; information acquisition before and during disasters; communication plans; evacuation strategies; first-aid knowledge; understanding of Honk Kong Observatory's typhoon warning signals; financial resilience; and evacuation kit preparation. Participants' perceptions about the city's disaster preparedness were assessed using a 5-point Likert scale.

The instrument was tested for its clarity and face validity in a small pilot study on 20 Hong Kong residents randomly met one the street in two districts before commencement of the full study. The early feedback resulted in minor syntax amendments.

2.4. Sample size calculation and data analysis

Sample size calculation was based on the assumption of a 50% response distribution, a 3% margin of error, and a 95% confidence interval. The calculated sample size was 1067. The distribution of the responses was described in percentages. Univariate analysis was first conducted to identify factors associated with preparedness behavior. A multiple logistic regression analysis was conducted to identify independent predictors of kit preparation. Variables that had demonstrated significant association with evacuation kit preparation (a surrogate for individual disaster preparedness) in the prior univariate analyses ($p < 0.1$) were then entered into the regression model. Odds Ratio (OR) and the corresponding 95% confidence interval (CI) of each variable in the final model are reported. The Statistical Package for the Social Sciences (SPSS) for Window version 23.0 was used for data analysis. A p value < 0.05 was considered statistically significant.

3. Results

Interviewers were dispatched to 545 random GPS locations over a period of 17 days. No eligible participants could be recruited in 19 locations within the pre-set time limits and 10 locations were inaccessible (most were private properties). Amongst the 1032 eligible residents invited, nine refused to participate. In total, 1023 residents at 516 GPS locations were interviewed, 554 responses on weekdays and 469 during weekends. The distribution of the GPS locations is shown in Fig. 1 and the distribution of responses in different timeslots is shown in Supplemental Table 1.

The demographic characteristics of the respondents, compared with the corresponding 2011 Census data,[26] are shown in Table 2. Direct comparison was difficult since some respondents declined to disclose their exact age (apart from being older than 18 years) and income. Men were slightly over-represented in the sample, and residents that lived alone were under-represented. (Table 3).

3.1. Information acquisition

3.1.1. Disaster preparedness information

We asked participants if and how they would wish to receive information on disaster preparedness. Almost all respondents (99.1%) indicated interest in receiving further information about disaster preparedness. The internet and television were the two most popular information channels, chosen by 47.8% and 40.5% of all respondents, respectively. Respondents aged 65 years or more preferred radio or television to the internet. More respondents preferred accessing online information via their mobile devices (36%) compared to their computers (11.8%). Only a minority (3.4%) reported that they would attend disaster preparedness courses or in-person training. The most cited barrier to better preparedness was not knowing where to seek additional information (34.3%); 24.6% regarded further training as unnecessary because they believed Hong Kong was relatively safe from disasters; and 20.3% said they lacked the time to get themselves prepared.

3.1.2. Information during disasters

In the event of a disaster, more than half of the respondents said they would seek information via television (52%), followed by Facebook (18.9%), WhatsApp messages (9.6%), radio (8.2%), and news agency websites (6.1%). Only 2.9% would visit government websites for information. There were no significant differences across gender. As expected, respondents aged 65 years or more were more likely to seek information via television and radio, while younger respondents were more likely to use social media (Fig. 2). Respondents were asked what information they considered important. Responses were ranked in the following order: 1) where to seek medical assistance (92.2%); 2) evacuation routes (85.2%); 3) shelter information (84.8%); 4) details of the disaster (67.4%); 5) missing persons (65.2%); and 6) casualties (45.2%).

3.2. Communication methods

More than half the respondents (65%) had emergency contact numbers in their mobile phones, but 73.1% of them had password protected phones. Emergency numbers could be accessed in only 22.6% of those phones through the lock-screen. In case the mobile phone network broke down, 37.4% of the respondents stated they would use a landline telephone to contact their family, 32.5% said they would return home, and 4% reported that they had a pre-planned place to meet their family members during a disaster.

3.3. Evacuation strategies

Respondents were asked how they would evacuate Hong Kong in multiple hypothetical scenarios. When asked to leave the city in a major flood caused by a typhoon, most respondents preferred Mainland China as their destination (44.0%), followed by Taiwan (14.6%), and Singapore (7.0%). In the event of a nuclear accident leading to a city evacuation order, most respondents (57.8%) stated they would choose to evacuate by air, followed by train (9.9%), but 12.2% did not know how to evacuate from the city. When the respondents were asked what would prevent them/their families from leaving if asked to evacuate, more than half (58.1%) perceived no barriers to evacuation; 21.6% indicated that they did not know where to go; 13.6% described personal or family disability or mobility problems which would hinder evacuation; and 4.3% stated that they would not evacuate.
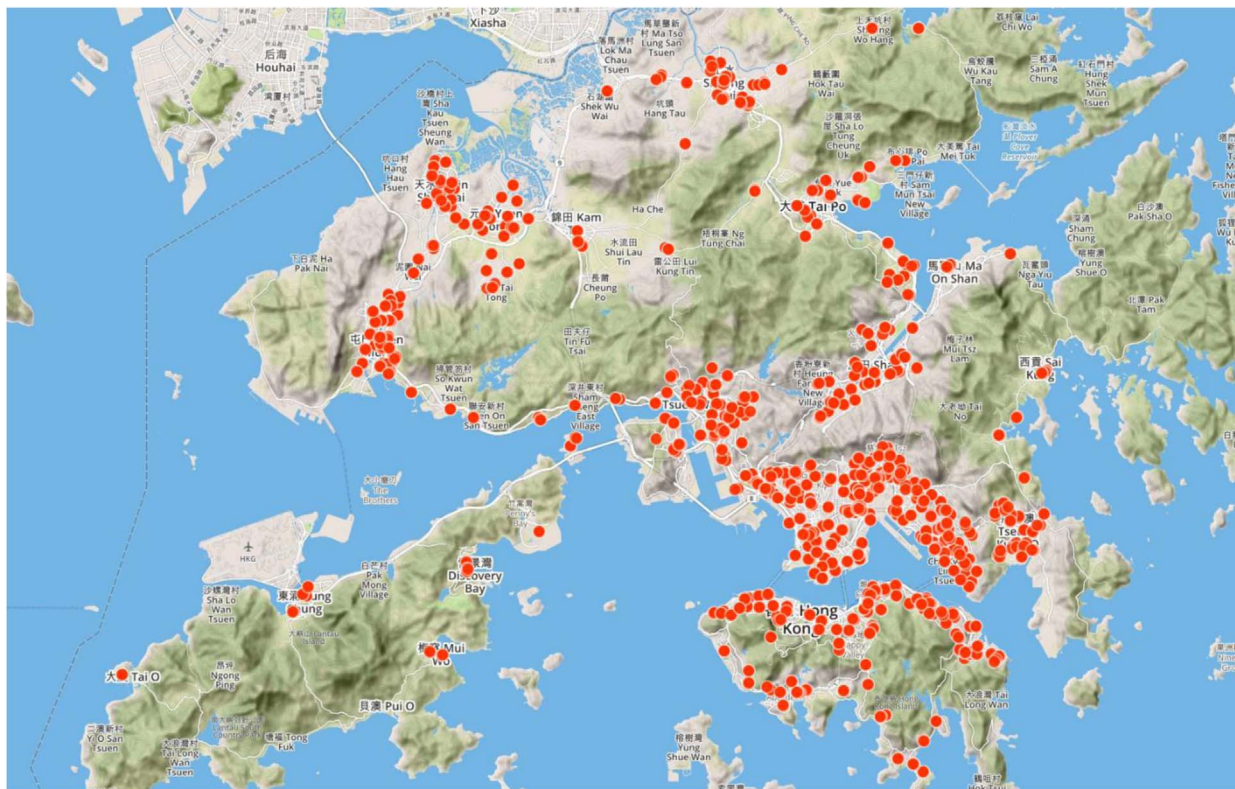
Fig. 1. Map of GPS coordinates visited for the community survey.

Table 2
Socio-demographic characteristics of the respondents and the general population of Hong Kong based on 2011 census data.

Demographics	Sample (n = 1023)		Hong Kong population 2011 [26]
	n	%	
Age			
15–24 (18–24 in the sample)	191	18.7%	12.4%
25–34	193	18.9%	15.4%
35–44	158	15.4%	16.1%
45–54	147	14.4%	18.2%
55–64	119	11.6%	13.1%
≥65	93	9.1%	13.3%
Decline to answer	122	11.9%	
Gender			
Male	547	53.5%	46.6%
Female	476	46.5%	53.4%
Household size			
1	66	6.5%	17.1%
2	170	16.6%	25.2%
3	309	30.2%	24.3%
4	319	31.2%	21.2%
5	107	10.5%	9.0%
≥6	51	5.0%	3.3%
Decline to answer	1	0.1%	
Monthly household income			
< $10,000	94	9.2%	23.8%
$10,000–29,999	290	28.3%	41.7%
≥$30,000	389	38.0%	34.9%
I don't know	88	8.6%	
Decline to answer	162	15.8%	

Table 3
Multiple logistic regression of factors associated with having an evacuation kit.

Factors	Odds ratio	95% Confidence interval	P value
Correct responses to first-aid questions and typhoon signal	2.023	1.233–3.318	0.005[*]
Having elderly household member(s)	0.554	0.333–0.922	0.023[*]
Age > 65 years old	0.903	0.440–1.851	0.780
Wan Chai	2.289	0.776–6.751	0.133
Eastern	0.443	0.128–1.534	0.199
Southern	1.349	0.388–4.696	0.638
Yau Tsim Mong	1.301	0.489–3.463	0.598
Sham Shui Po	0.829	0.295–2.326	0.721
Kowloon City	0.528	0.171–1.626	0.266
Wong Tai Sin	1.744	0.628–4.844	0.286
Kwun Tong	0.519	0.109–2.467	0.410
Kwai Tsing	1.922	0.691–5.343	0.211
Tsuen Wan	0.532	0.185–1.532	0.243
Tuen Mun	1.146	0.426–3.084	0.787
Yuen Long (Reference)	1	N/A	N/A
North	1.033	0.351–3.040	0.953
Tai Po	0.703	0.237–2.087	0.526
Sha Tin	0.628	0.230–1.711	0.363
Sai Kung	1.744	0.589–5.163	0.316
Islands	1.071	0.361–3.176	0.902
Financial resilience			
< 3 months (Reference)	1	N/A	N/A
3 months − 1 year	0.973	0.636–1.489	0.900
> 1 year	0.706	0.497–1.005	0.053
No barrier to evacuate	0.732	0.532–1.007	0.055

Footnote
  * statistically significant association

3.4. First-aid knowledge and response to warning signal

We employed basic first-aid questions as proxies to useable first-aid knowledge. When asked how to staunch bleeding from a wound in the

leg, 31.3% chose to hold direct pressure over the wound (correct answer). When asked how to respond to a family member who was unconscious at home, 54.9% chose to call an ambulance and then check for a pulse (correct answer). In both scenarios, about 25% of the
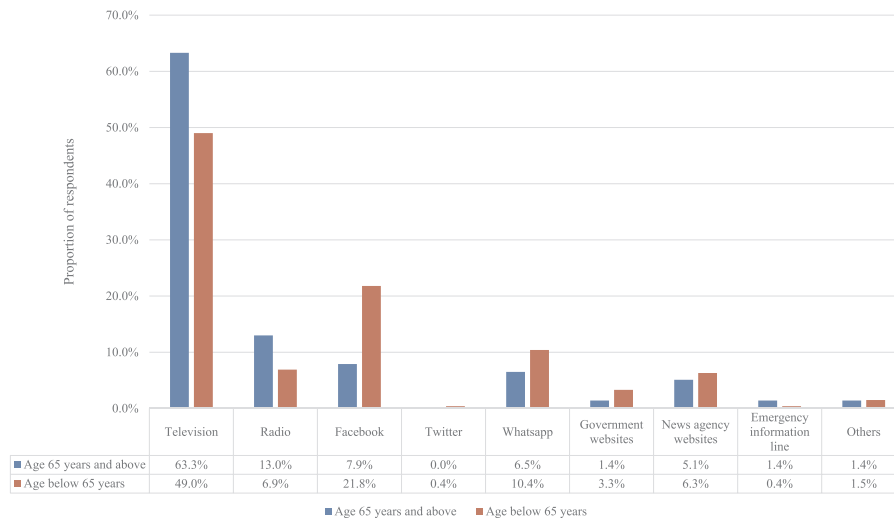
Fig. 2. Information source of different age groups of the respondents if a disaster happens.

respondents chose to do nothing apart from calling an ambulance.

Respondents were tested on their knowledge of Tropical Cyclone Warnings routinely issued by the Honk Kong Observatory. When major warnings were in force (the Tropical Cyclone Warning Signal No. 8, issued when the wind speed of an approaching storm is 63–117 km/h; [27] and the Black Rainstorm Warning, issued when very heavy rain, 70 mm in an hour, has fallen or is expected to fall generally over Hong Kong [28]), only 20.6% of the respondents chose the correct action to take, i.e. staying in a safe place until the heavy rain has passed.

In total, only 10.0% of the respondents gave correct answers to all three questions.

3.5. Financial resilience

The financial resilience of the respondents were assessed by asking them how many weeks their savings would allow them to support their household in case they were unable to return to work due to a disaster. It is noteworthy that 5% had no savings and 5.2% had savings just enough for one to two weeks to support their household, implying that 10.2% would require immediate financial assistance in such a scenario. Financial resilience was significantly associated with household income (Spearman's r 0.34, p < 0.001) but not with gender. Older age was associated with a lower household income (Spearman's r −0.11, p = 0.004) but a higher financial resilience (Spearman's r 0.23, p < 0.001).

3.6. Perceived city disaster preparedness

When asked to rate Hong Kong's current level of preparedness for dealing a disaster, 28.8% of the respondents rated the level as "adequate" or "very adequate", and an equal proportion thought that Hong Kong was "inadequately" or "very inadequately" prepared (Fig. 3).

3.7. Disaster preparedness behaviors

In our study, only 39.4% of the respondents had an evacuation kit. Commonly reported kit items included copies of important documents (68.5%), set-aside money (63.5%), first-aid equipment (57.9%), usual medications (55.2%), mobile phone charger (43.5%), and a flashlight (34.9%). Univariate analysis showed that those aged > 65 years; having elderly (> 65 years) household member(s); residence in certain geographic districts; correct responses to the first aid questions and typhoon warning signal; financial resilience; no barrier to evacuate were associated with preparation of an evacuation kit. In multiple

logistic regression, correct responses to the first aid questions and typhoon warning signal was significantly associated with preparation of an evacuation kit (OR 2.023, 95% CI 1.233−3.318, p = 0.005). Residents with elderly household member(s) were significantly less likely to have a kit (OR 0.554, 95% CI 0.333−0.922, p = 0.023).

4. Discussion

This is the first territory-wide face-to-face survey using GPS spatial sampling methodology to assess disaster preparedness knowledge and preparedness among the residents of Hong Kong. The results shed important light on a wide range of issues including residents' communication preferences during disasters, evacuation strategies, first-aid and disaster knowledge, financial resilience, and their preparedness behaviors.

Our study showed that most residents indicated interest in receiving additional information about disaster preparedness from the internet using mobile devices and television. Not knowing where to seek information was the most commonly cited barrier to becoming better prepared for a disaster. These findings suggest that in the preparedness phase of the disaster cycle, public education should be delivered from credible sources with high visibility in the community. An example is the Hong Kong Observatory mobile app MyObservatory, which currently has more than 100 million page views per day.[29] Hong Kong has one of the highest mobile phone penetration rates in the world (228.3%).[30] Mobile phone applications have the potential of offering "just-in-time" disaster training to a large population, as demonstrated by the dramatic increase in downloads and usage of the American Red Cross Hurricane Application during Hurricane Sandy in 2012.[31] The success of this Hurricane app indicates that real-time information release oriented to specific impact might have a role in helping community members better prepared for disaster.

During disasters, different age groups had different preferences regarding the sources of information, with elder residents preferring television and radio and younger people favoring social media. This finding indicates a need to tailor the way information is disseminated to different age groups in the response phase of the disaster cycle. Social media, which enables real-time updates and information exchange between different response agencies and the community, [32–34] has consistently been identified as a popular way of obtaining information among city dwellers in similar surveys.[35] However, its misuse can result in the dissemination of incorrect information.[36,37] Abandoning traditional sources of information dissemination such as television and radio may preclude the authorities from reaching vulnerable populations including the elderly and disenfranchised.
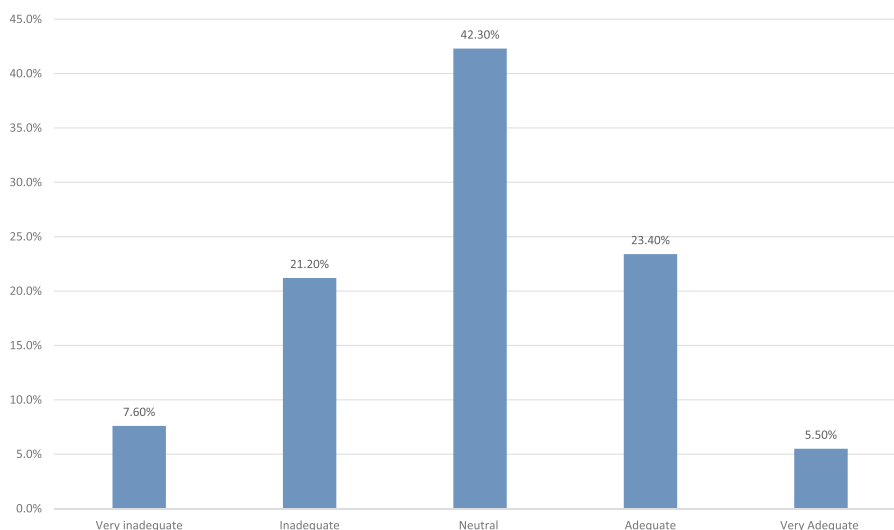
Fig. 3. Respondents' rating of the level of disaster preparedness of Hong Kong.

Over-reliance on mobile phone networks for information acquisition and communication will be an impediment in the face of cellular network failure. For instance, prolonged power outages after Hurricane Sandy paralyzed mobile phone and internet networks in New Jersey. [38] It is therefore important to maintain redundancies across a variety of communication channels. This would be particularly important in case of the most vulnerable - the elderly, and those in remote locations. Continuing to maintain public fixed line phones, as also required by the Telecommunications Ordinance, is highly advisable despite their decreasing use.[39].

In our study, only a few respondents reported having agreed on pre-planned meeting places to contact their family members in case of a disaster. Clearly, there is a need to educate the public on developing family communication plans for emergencies, taking into account possible power outages and mobile phone network breakdown. One of the lessons from the London Bombings in 2005 is that having difficulty contacting loved ones by mobile phones was associated with substantial emotional stress.[40] A family communication plan is considered an essential part of the "Basic Preparedness" advocated by FEMA, [41] and should be emphasized in future disaster education.

Several deficits in community disaster preparedness identified in the present study should be factored into the government's disaster planning. First, a sizable portion (13.6%) of Hong Kong residents reported mobility or disability problems of their own or family members as barriers to evacuation. While evacuating the entire city may not be a realistic contingency plan, these numbers draw attention to the needs of the frail, the elderly or the disabled while planning temporary shelters or targeted evacuations. Second, 5% of the respondents had no savings at all and 5.2% had savings only enough to support their family for a period of one to two weeks. In the event of a devastating disaster that puts everyone out of a job, the government should be prepared to provide immediate financial assistance to approximately 10% of the residents. Third, the likely lack of first-aid competence and familiarity with warning signals warrants further community-focused disaster preparedness education and impact-based warning.

Our study showed that 39.4% of the respondents had prepared an evacuation kit. Residents with correct responses to first aid questions and typhoon warning signal were more likely to have a kit. This finding is consistent with that reported from other studies that persons with more preparedness knowledge are more likely to have assembled an emergency kit.[42] Community disaster education programs may improve disaster knowledge, which in turn may influence preparedness behaviors. The UK Government distributed the *Preparing for Emergencies* booklet to each household in 2004. A survey conducted after the London Bombings in 2005 showed that those who recalled having

received the booklet were more likely to have gathered emergency supplies, but the association was not significant for those who recalled reading it.[43] Only less than half of the respondents recalled having read the booklet, indicating the difficulty in delivering disaster education to the public. Therefore, multiple means of disaster education and repeated education are needed.

It is noteworthy in our study that respondents with elderly household member(s) at home were less likely to have an evacuation kit. The elderly population is vulnerable to disasters with a disproportionally high morbidity and mortality rate.[44–46] A decline in physical and cognitive functions, and chronic disease burden limit their mobility and accessibility to resources for emergency preparedness and recovery. [47] Many elderly residents are not able or willing to evacuate during emergencies.[48] Elder adults may also have multiple medical and non-medical needs, such as medication, medical equipment that require electricity, and help with activities of daily living during evacuation. [49,50] It has been shown that their family caregivers are often not well prepared for disasters.[51] Hence, future community preparedness effort should focus upon the family caregivers of the elderly population.

Based on the gaps in community disaster preparedness identified in the current study, we make the following recommendations to disaster response planners in the region:

1. Be cognizant of the varying preferences for receiving or initiating communication across different age groups;
2. The elderly prefer receiving information about disasters via television or radio while the rest are more likely to access a known and trusted source of information on the internet (for news and updates) via their smartphones;
3. Hong Kong citizens who voiced interest in receiving more information on disaster preparedness often did not know where to get it, would like to access it via the internet or television, and stated having little interest in any in-class or hands-on training;
4. Community focused disaster preparedness training in Hong Kong must include basic disaster first-aid, impact-oriented warning messaging, and guidelines on communication strategies during disasters;
5. The government must ensure substantial redundancy in communication infrastructure including additional cellular phone towers and maintaining of fixed phones lines, some in public spaces as well;
6. While planning limited, targeted evacuation, be cognizant of the vulnerable, frail, elderly and disenfranchised who may not receive messages on time, or who may need help in moving far or fast;
7. Provide early financial support to those in the lowest social economic strata as they are likely to have no buffer savings in the

event of being unable to work in the event of a disaster.

This study has a number of important limitations. First, the sample was over-represented by younger male residents despite efforts to randomize interview sites and times. The lower representation of elderly and female residents, and those who lived alone in the sample might indicate that they are less likely to appear on the street for various reasons, including mobility problems and family roles. Also this study did not reach institutionalized or homebound residents, who are more likely to be vulnerable to disasters.[52] s, due to the limitations on survey length (designed to improve accessibility and usability), this study could not include questions on ethnicity, disabilities, burden of chronic diseases, educational attainment, previous disaster experience, perceived disaster risk, financial protection by insurance, and social capital. Further studies are warranted to investigate how these factors would affect community disaster preparedness in Hong Kong. Third, survey data were self-reported and may not accurately reflect actual preparedness behaviors.

Despite these limitations, the current study provides comprehensive information about the state of community disaster preparedness in Hong Kong. This information has important implications for disaster planning and future efforts in improving community disaster preparedness.

5. Conclusion

Hong Kong is better prepared for emergencies than most cities of its size and density elsewhere in Asia. Yet, its government recognizes the need for better community engagement in mitigation, preparedness and response. Our study sheds light on the knowledge gaps in disaster preparedness among Hong Kong's residents. It also draws attention to the wide range of financial resilience among different sections of society, as well as the varying modes of preferred communication and information dissemination across different age groups. These variations must be considered while the Hong Kong government (and others embarking on the same mission) plans its community engagement initiatives. There is a need to promulgate first-aid training, disaster education, and the development of family communication plans during emergencies in the community. In particular, future effort should focus upon the family caregivers of the elderly population.

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at http://dx.doi.org/10.1016/j.ijdrr.2017.04.008.

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