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Original Research Article

An online questionnaire study about factors affecting first aid knowledge of citizens in Hong Kong

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ABSTRACT

Background: The study aimed to identify the factors associated with first aid knowledge among Hong Kong citizens.
Methods: This was a questionnaire study that collected demographic data and assessed first aid knowledge. Multiple regressions were used to identify factors associated with first aid knowledge and participation in first aid course.
Results: Better knowledge was associated with participation in first aid course (beta=1.53, 95% confidence interval: 0.98 to 2.08), experience of performing first aid (beta=0.88, 95%CI: 0.19 to 1.57), medical-related course (beta=0.89, 95%CI: 0.21 to 1.58), males (beta=0.67, 95%CI: 0.17 to 1.17) and less years past after first aid course completion (beta=-0.08, 95%CI: -0.15 to 0) (n=230). Respondents with medical-related education background (OR=2.33, 95%CI: 1.03 to 5.27) had more participation in first aid course.
Conclusions: First aid course participation was the most important factor associated with knowledge. Regular refresher courses and promotion towards citizens without medical-related education background were recommended.

Keywords: Knowledge, First aid, Surveys and questionnaires, Education

INTRODUCTION

First aid is the use of human resources and material supplies on the scene to provide initial life rescuing assistance to the casualty. According to the definition stated in the Red cross first aid manual, first aid should comply with three principles, which are preserving life, preventing the injury from worsening, and promoting recovery.[1] On the other hand, incorrect first aid may violate the above principles and cause harmful consequences.[2] From a previous study, 65.8% of the public in Hong Kong had no training in first aid.[3] 85.3% of the public had no training in the use of automatic external defibrillator (AED).[3] For comparison, 90% of the Norwegian population and 80% of the Austria and Germany had first aid training.[4,5] This showed that first aid training in Hong Kong was not prevalent enough. Hence, this study aimed at investigating the first aid knowledge of Hong Kong citizens and explore its associated factors. It was hoped that the result of this study could direct future promotion and education of first aid to the public in Hong Kong.

METHODS

This study was a cross-sectional online survey study, targeting Hong Kong citizens. Data were collected from 11 February to 10 April 2022. The questionnaires were distributed by convenience sampling through online social media. The respondents were encouraged to share the link to their friends and relatives as snowball sampling. The questionnaire consisted of two parts. Demographic data were collected in Part I, followed by first aid knowledge assessment as Part II. All parts were in both Chinese and English. The informed consent was included in the first paragraph of the online questionnaire.

Written informed consents were obtained from the respondents for their anonymized information to be published in this article. Contacts of researchers were provided to allow inquiry from respondents.

Demographic data including age, gender, education level (1=graduated from primary school; 2=graduated from high school; 3=graduated from a diploma of foundation studies; 4=studying post-secondary education; 5=graduated from a higher diploma, associated degree or sub-degree course; 6=undergraduate student; 7=graduated from a bachelor's degree; 8=master degree postgraduate student; 9=graduated from a master's degree; 10=doctoral degree student; 11=graduated from a doctoral degree), working status (either as "in school", "working", "unemployed" or "retired"), participation in a first aid course, the years past after the last first aid course completion (if any), how the respondent had learned first-aid-related knowledge (if any), whether the respondent had used the first aid knowledge to perform first aid for others, whether the respondent had ever been a healthcare professional, whether the respondent had any family member or friend working as healthcare professional, whether the respondent had taken any medical-related course (diploma or above), whether the respondent had studied biology, whether the respondent had participated in any of the Youth Uniformed Groups in Hong Kong (including red cross youth, auxiliary medical service cadet corps, Hong Kong St. John ambulance brigade youth command), and the nationality of respondent were collected in Part I. Contact information, either as phone or email, was also asked in order to identify duplicated response. First aid knowledge was assessed and scored with 12 multiple-choice questions (MCQs) in Part II.

The questions were developed by the team based on first aid textbooks by Hong Kong St. John Ambulance and the Hong Kong Red Cross. The questions covered procedure and principle of first aid, and basic human anatomy and physiology. There were three additional control questions with obvious answers being included among the 12 at regular interval to identify uncreditable reply. The 12 MCQs and the three control questions is depicted in (Table 1). Respondents were included if their age was above or equal to 18 years old and living in Hong Kong.

Respondents with invalid or duplicated contact given were excluded. Respondents with any of the control questions answered wrongly were excluded. Cronbach alpha of the first aid knowledge assessment questions was calculated to evaluate the internal reliability of the composite score. Alpha less than 0.6 was regarded as unreliable, followed by exclusion of question(s) to increase the alpha until acceptable. Difficulty index (>0.80 as very easy; 0.61-0.80 as easy; 0.41-0.60 as average; 0.21-0.40 as difficult; <0.21 as very difficult), discriminatory index (<0.21 as poor; 0.21-0.4 as acceptable; >0.4 as good) and distractor efficiency were calculated for the first aid knowledge assessment questions to evaluate the quality of assessment designed. Multiple linear regression was performed to identify factors that associated with the first aid knowledge assessment score.

Table 1: First aid knowledge assessment questions and control questions.

First aid knowledge assessment questions	
Q.1	First-aiders should first consider which of the following before entering the disaster site?
Q.2	How many breaths per minute does an adult normally have?
Q.3	If the injured is choked and awake, which choking treatment should be performed for the injured first?
Q.4	The human respiratory system does not include which of the following organs?
Q.5	When rescuers perform cardiopulmonary resuscitation (CPR) on the injured, the ratio of chest compression to artificial respiration should be which of the following?
Q.6	Which is the correct way to place the electrode pads of the automatic cardiac defibrillator (AED) on an adult patient?
Q.7	During the Lunar New Year holiday, my mother was unfortunately scalded with boiling water on her left hand while preparing food in the kitchen. What should I do to help her?
Q.8	On the way home by bus, a young male suddenly convulsed and fell to the ground. There was a panic in the car, and the driver immediately stopped the car to the side of the road. At this time, how would you help the patient? (You can choose more than one)
Q.9	To check the pulse for an injured or sick infant, which position should be checked?
Q.10	You are in a race, and you find a female contestant lying on the grass. When approaching her, she was unconscious, and her body was hot. What do you think she was suffering from? How should you deal with it?
Q.11	Which is the first step of preliminary examination during first aid for the injured?
Q.12	Generally, how many liters of blood does an adult have?
Control questions	
Q.1	How many fingers does the average person have on a hand?
Q.2	Which organ is used for eating?
Q.3	Which organ of the human body is responsible for maintaining blood flow?

A subgroup regression for respondents that had participated in a first aid course was performed, with the years past after the last first aid course completion as an additional predictor. Multiple logistic regression was performed to identify factors associated with participation in first aid course. Standardized beta values with 95% confidence interval (CI) and p values were calculated for multiple linear regression. Odd ratios (OR) with 95% CI and p values were calculated for multiple logistic regression. Predictors with variance inflation factors (VIF) larger than 2.5 were excluded to avoid multicollinearity, p values smaller than 0.05 were considered as significant. All statistical analyses were performed using SPSS version 25 (Armonk, NY: IBM Corp.). With expected R^2 of 0.3 and 14 predictors, the minimum sample size needed for multiple regression was estimated to be 195.[6]

RESULTS

A total of 363 responses were collected. 34 of them were excluded as they had an invalid contact provided. Four of them were duplicated responses and were excluded. 103 of them were not currently living in Hong Kong. One of them was younger than 18 years old. 14 of them answered at least one control question wrongly. Some respondents fulfilled more than one exclusion criterion. After excluding the above responses, 230 samples were eligible and included. 41.7% of the samples had participated in first aid course, demographic characteristic is depicted in (Table 2). How the respondents had learnt first-aid-related knowledge is summarized in (Table 3). The platform that the most respondents had learnt from was found to be Hong Kong St. John Ambulance (37.8%) (Table 3).

Table 2: Demographic data of respondents (n=230).

Demographic characteristics	All respondents
Age (years old)	
Mean±SD	29.3±13.1
18-39 (%)	187 (81.3)
40-59 (%)	32 (13.9)
60 or above (%)	11 (4.8)
Gender	
Male (%)	83 (36.1)
Female (%)	147 (63.9)
Education level	
Graduated from primary school (%)	6 (2.6)
Graduated from high school (%)	31 (13.5)
Graduated from a diploma of foundation studies (%)	14 (6.1)
Studying post-secondary education (%)	50 (21.7)
Graduated from a higher diploma, associated degree or sub-degree course (%)	30 (13)
Undergraduate student (%)	43 (18.7)
Graduated from a bachelor's degree (%)	44 (19.1)
Master's degree postgraduate student (%)	2 (0.9)
Graduated from a master's degree (%)	9 (3.9)
Doctoral degree student (%)	1 (0.4)
Graduated from a doctoral degree (%)	0 (0)
Working status	
In school (%)	111 (48.3)
Working (%)	98 (42.6)
Unemployed (%)	10 (4.3)
Retired (%)	11 (4.8)
Participation in a first aid course	
Yes (%)	96 (41.7)
No (%)	134 (58.3)
The years past after the last first aid course completed (years)	
Mean±SD, (N=96)	4.1±6.7
Experience of performing first aid for others	
Yes (%)	45 (19.6)
No (%)	185 (80.4)
Healthcare professional	
Yes (%)	15 (6.5)
No (%)	215 (93.5)

Continued.

Demographic characteristics	All respondents
With family member or friend working as healthcare professional	
Yes (%)	107 (46.5)
No (%)	123 (53.5)
Taken any medical-related course (diploma or above)	
Yes (%)	46 (20)
No (%)	184 (80)
Studied biology	
Yes (%)	130 (56.5)
No (%)	100 (43.5)
Participation in Youth Uniformed Groups in Hong Kong*	
Yes (%)	41 (17.8)
No (%)	189 (82.2)

Note: *-Including Red Cross Youth, Auxiliary Medical Service Cadet Corps, Hong Kong St. John Ambulance Brigade Youth Command.

Table 3: How respondents had learnt first-aid-related knowledge (n=230).

Platform of learning first-aid-related knowledge	N (%)
Hong Kong St. John ambulance	87 (37.8)
Hong Kong red cross	44 (19.1)
Occupational safety and health council	8 (3.5)
Auxiliary medical service	8 (3.5)
Hong Kong society of professional medical care	10 (4.3)
Internet	84 (36.5)
School	71 (30.9)
Workplace	24 (10.4)
Friends	38 (16.5)
Book	31 (13.5)
Video	53 (23)
Governmental advertisement on television	1 (0.4)
Civil aid service	1 (0.4)

The Cronbach alpha calculated for the 12 MCQs at Part II was less than 0.6. After exclusion of the 12th question, the alpha value for the remaining 11 MCQs was greater than 0.6. The composite knowledge score of the remaining 11 MCQs were then therefore used for multiple linear regressions.

The average difficulty indexes before and after exclusion of the last question was 0.55 and 0.54 respectively, showing average difficulty of the whole assessment. The discriminatory indexes before and after exclusion of the last question was 0.45 and 0.46 respectively, showing that the assessment could differentiate between stronger and weaker candidates well. The distractor efficiency before and after exclusion of the last question was 65% and 68% respectively, meaning that most of the distractors were functional. When performing multiple regressions, VIF of "being a student or not" was >2.5. After removal of this predictor due to multicollinearity, all the VIF were <2.5. Respondents that had taken a medical-related course (diploma or above) was found to have a higher first aid knowledge score (beta=0.89, 95%CI: 0.21 to 1.58, p<0.05). Experience of performing first aid for others was also associated with a higher score (beta=0.88, 95%CI: 0.19 to1.57, p<0.05). Males were found to have higher score than females (beta=0.67, 95%CI: 0.17 to 1.17, p<0.01). Participation in a first aid course was the strongest factor associated with a higher knowledge score (beta=1.53, 95%CI: 0.98 to 2.08, p<0.001). The associations between demographic data and first aid knowledge score is depicted in (Table 4).

Table 4: Association between demographic data and first aid knowledge score (n=230).

Demographic characteristics	Coefficient (beta)	95% CI
Age	0.01	-0.02 to 0.04
Gender (male)	0.67	0.17 to 1.17 **
Educational level	0.10	-0.04 to 0.23
Working status		
Working	-0.43	-1.03 to 0.18
Unemployed	-0.15	-1.42 to 1.11
Retired	-1.01	-2.55 to 0.52
Participation in a first aid course	1.53	0.98 to 2.08 ***
Experience of performing first aid for others	0.88	0.19 to 1.57 *
Healthcare professional	-0.50	-1.61 to 0.61
With family member or friend working as healthcare professional	0.30	-0.19 to 0.79
Taken any medical-related course (diploma or above)	0.89	0.21 to 1.58 *
Studied biology	0.23	-0.28 to 0.73
Participation in youth uniformed groups in Hong Kong	-0.19	-0.88 to 0.49

*p<0.05, **p<0.01, ***p<0.001

Table 5: Association between demographic data and first aid knowledge score for respondents who had participated in first aid course (n=96).

Demographic characteristics	Coefficient (beta)	95% CI
Age	0.03	-0.03 to 0.08
Gender (male)	0.28	-0.61 to 1.18
Educational level	0.09	-0.16 to 0.33
Working status		
Working	-0.83	-1.98 to 0.31
Unemployed	0.47	-1.72 to 2.67
Retired	-1.94	-6.51 to 2.62
Years past after the last first aid course completion	-0.08	-0.15 to 0.00 *
Experience of performing first aid for others	1.34	0.41 to 2.27 **
Healthcare professional	0.24	-1.34 to 1.83
With family member or friend working as healthcare professional	0.10	-0.78 to 0.99
Taken any medical-related course (diploma or above)	0.54	-0.54 to 1.63
Studied biology	0.41	-0.56 to 1.39
Participation in youth uniformed groups in Hong Kong	-0.31	-1.29 to 0.67

*p<0.05, **p<0.01

Table 6: Association between demographic data and participation in first aid course (n=230).

Demographic characteristics	Odd ratios (OR)	95% CI
Age	1.02	0.99 to 1.05
Gender (male)	1.15	0.62 to 2.11
Educational level	1.11	0.95 to 1.31
Working status		
Working	0.98	0.47 to 2.06
Unemployed	0.78	0.18 to 3.43
Retired	0.10	0.01 to 1.17
Healthcare professional	3.59	0.74 to 17.47
With family member or friend working as healthcare professional	1.26	0.70 to 2.29
Taken any medical-related course (diploma or above)	2.33	1.03 to 5.27*
Studied biology	1.15	0.62 to 2.14
Participation in youth uniformed groups in Hong Kong	5.05	2.25 to 11.34***

*p<0.05, **p<0.01, ***p<0.001

In the subgroup analysis for respondents who had participated in first aid course (N=96), the smaller number of years past after the last first aid course completion (beta=-0.08; 95%CI: -0.15 to 0.00, p<0.05) and experience of performing first aid for others (beta=1.34; 95%CI: 0.41 to 2.27, p<0.01) were the only two factors that significantly associated with a higher knowledge score. The result of the subgroup regression is depicted in (Table 5). Meanwhile, respondents who participated in Youth Uniformed Groups (OR: 5.05; 95%CI: 2.25 to 11.34, p<0.001) and had taken any medical-related course (diploma or above) (OR: 2.33; 95%CI: 1.03 to 5.27, p<0.05) were associated with participation in first aid course. Table 6 summarizes the association between demographic factors and participation in first aid course (Table 6).

DISCUSSION

Our study showed that having first aid training was the most important factor that associated with a better first aid knowledge. This finding was consistent with previous studies from both Hong Kong and overseas.[7-17]

The number of years past after the completion of last first aid training was found to be significantly associated with a lower first aid knowledge. This finding was like another study on burn first aid that, among those had attended a first aid course, the knowledge was better if the course was undertaken within the previous five years.[12] This implied that first aid training was essential for citizens, and regular refresher courses were recommended to reinforce the memory and update the knowledge.

Our study showed that taking a medical-related course (diploma or above) was associated with a better knowledge of first aid, regardless of whether the respondent had participated in a first aid course or as a healthcare professional or not. This result was like a previous study on Hong Kong undergraduate, which showed that students with a medical-related degrees was significantly associated with a greater likelihood of having good first aid knowledge.[7] Our study also showed

that citizens participating in medical-related course (diploma or above) were more likely than citizens without medical background to have first aid training. These results lead to a recommendation of promoting first aid training among citizens without background of medical-related education.

It was discovered that, citizens with experience of performing first aid for others were having better first aid knowledge. There were explanations of this observation. Firstly, experience of first aid practice in real life could reinforce the learning in first aid, leading to better first aid knowledge. On the other hand, those with better first aid knowledge might be more confident to perform first aid when victim appeared. Since those with first aid experience had better knowledge, first aid courses were recommended to invite those with first aid experience for sharing or as trainer to better enhance the knowledge of participants. This study showed a different result about the association between gender and first aid knowledge than previous studies. In this study, males were found to have better first aid knowledge than females. Nevertheless, previous studies found that females were having better knowledge of burn first aid among members of sporting and recreation clubs[12]; better first aid knowledge among university students in Jordan[16] and health sciences university students in Malaysia[17]. The difference of results might be due to the differences in designs of study and statistical analyses, as this study targeted all citizens at Hong Kong and used multiple regression. The association between gender and first aid knowledge requires further studies in the future to confirm.

This study did not show significant associations between first aid knowledge and working as medical professionals, educational level and working status, which were found to be significant factors in other studies.[11, 13, 14, 15, 18] This difference in results could be due to adjustment with the effect of "participation in medical-related course (diploma or above)" using multiple regression in this study, but not the others. This implied that, a medical-related education background might already explain the better first aid knowledge for those working as medical professionals, with higher education and the working status. Previous studies showed significant association between first aid knowledge and age. Population in New South Wales with age <65 years old and younger mothers in Egypt were found to have better first aid knowledge.[9,15] On the other hand, kindergarten teachers with age ≥35 years old and older hospital staffs were associated with better knowledge. Another study found a bell shape relationship, that respondents with age ≤25 and ≥65 years old were associated with lower level of burn first aid knowledge.[10,12,18] To summarize, the association between age and first aid knowledge was mixed. Nevertheless, our study failed to identify a significant association between age and knowledge, which might be due to the skewed distribution of age in this study, with insufficient samples from middle-aged (40-59 years old) and elderly (≥65 years old).

Limitations

This study faced several limitations. Since convenience sampling was used instead of random sampling, the result may have limited generalizability, and with self-selection bias when social media were used. In addition, the recruitment method caused a tilt towards younger respondents, which could result in difficulty in identifying the effect of age on first aid knowledge. It was hoped that future studies could consider random sampling and face-to-face survey to reach more elderly and improve the generalizability.

CONCLUSION

This study revealed that participation in first aid course, experience of performing first aid for others, males, and having a medical-related education background (diploma or above) were associated with better first aid knowledge. For those with first aid training, first aid experience and smaller number of years past after the last first aid course completion were associated with better knowledge. Participation in youth uniformed groups in Hong Kong and with a medical-related education background were associated with participation in first aid course. The government and first aid-training organizations were recommended to have more first aid training promotion towards citizens without medical-related education background. Regular refresher courses were recommended to maintain a better first aid knowledge.

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