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## Major Article

# To investigate the association between the health literacy and hand hygiene practices of the older adults to help them fight against infectious diseases in Hong Kong

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## Key Words:

Preventive health behaviors  
Aging population  
Health education and promotion

**Background:** Proper hand hygiene helps prevent infectious diseases, while health literacy plays a critical role in preventive health behaviors. It remains unclear as to why proper hand hygiene practices cannot be sustained and what role health literacy plays in older adults fight against infectious diseases.

**Methods:** A convenience sample of 433 old adults aged 65 and above was recruited. Their hygiene practices and health literacy were evaluated using a structured questionnaire adopted from the Centre for Health Protection and the Chinese version of the HLS-Asia-Q questionnaire.

**Results:** The percentage distribution of the hand hygiene performance, from always to never, was 18%–10%. A majority 63.28% (274) of them were classified as having inadequate health literacy (0–25), while a meager 1.62% (7) of them as having excellent health literacy (42.01–50). The Spearman correlation showed a significant positive relationship ( $P < 0.05$ ) between the participants' health literacy and their hand hygiene practices.

**Conclusions:** Health literacy and hand hygiene are positively related in helping the older adults fight against infectious diseases. To sustain proper hand hygiene practices is to provide frequent hand hygiene training to the older adults.

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Proper hand hygiene has been shown to be a helpful measure in containing infectious diseases. As experienced in Hong Kong in 2003, the public awareness of the importance of handwashing had a sudden and significant surge while the severe acute respiratory syndrome (SARS) epidemic was being contained. At the time, a survey showed 93% of the subjects perceived handwashing as an effective hygiene measure to protect themselves.<sup>1</sup> Another survey with similar results held 2 years later in 2005 by the Centre for Health Protection showed 71.7% of the 3,220 subjects still agreed that keeping hands clean and washing hands properly were effective means to prevent infections through direct contacts. However, this public awareness has not been fostered. This is evidenced in a hygiene survey, carried out by the Public Opinion Program of the University of Hong Kong (HKUPOP) in 2013, which found that 65% of the subjects admitted that they had eased off in hand hygiene protection.<sup>2</sup> Since older adults are usually living in old districts or crowded homes with a

poor environment, they are more vulnerable to epidemics and infectious diseases. So, there is an urgent need to study the reasons for the drop, if any, in the awareness and practices of proper hand hygiene of older adults.

To quote another observation, the outbreak that caught international attention was the Middle East respiratory syndrome (MERS) in 2012. According to the World Health Organization (WHO), the fatality rate of MERS cases was 35% and it caused more severe health consequences in old people, and people with weakened immune systems and chronic diseases like diabetes or cancer.<sup>3</sup> In this epidemic, hand hygiene was also found to be one of the effective measures in containing MERS.

SARS and MERS are dreadful infectious diseases that infect victims through droplets or direct contact. Old people are more likely than others to contract them with mortality rates higher than 50%. Seasonal influenza-related diseases, more common but not as widely reported, are also highly infectious, particularly for those aged 65 or older living in overcrowded homes with limited service facilities. From past statistics, about 70%–90% of the seasonal influenza-related deaths were from people of this age group and roughly 50%–70% of seasonal influenza-related hospitalizations also came from these older adults.<sup>4</sup>

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In some critical cases, improper or inadequate hand hygiene technique or forgetting, especially for the older adults, to wash hands had led to death and complications.<sup>5</sup> Further supporting evidence is shown by another survey which found that the effect of age could affect hand hygiene and younger people were noted to show higher hand hygiene awareness.<sup>6</sup>

What role does health literacy play in performing proper hand hygiene? As reported in literature, an adequate level of health literacy is needed to make an appropriate health decision.<sup>7</sup> Public health agencies believed there was a relationship between health literacy and hygiene in children.<sup>8</sup> In a meta-analysis, previous findings suggest that only limited knowledge existed about the effects of hand hygiene education on multiple illness outcomes.<sup>9</sup> Obviously, it is appropriate to undertake an exploratory study on this topic, especially when the older adults in Hong Kong were not targeted in these studies.

Health literacy encompasses people's knowledge and competencies in making judgments and taking decisions in their everyday activities concerning health care, disease prevention, and health promotion to maintain their quality of life.<sup>10</sup> Since health literacy plays a critical role in promoting individuals' preventive health behaviors, low health literacy may mean higher risk of emerging infectious diseases and health conditions. However, there is still an absence of health literacy studies in relation to hand hygiene preventable illnesses accounting for grave clinical, social, and economic burdens.<sup>11</sup> Although in McGuckin, et al's 2011 study<sup>12</sup> health literacy was stated as one of the components of patient empowerment in relation to hand hygiene promotion, the study findings did not use age as a variable. Hence, there is still a gap on how health literacy of the older adults affects their hand hygiene behaviors.

Hong Kong is a densely populated place with an aging population. The older adults is a population group vulnerable to the negative consequences of infectious diseases. Hence, there is an urgent need to focus more on the older adults as patients. Since past literature mainly studied health care workers, students, and the general public, it is necessary to fill this gap about the older adults' in Hong Kong. Therefore, the purposes of this study are: (1) to explore the older adults' hand hygiene practices and their health literacy in Hong Kong and (2) to investigate the relationship between these two health variables to help them fight against infectious diseases.

## METHODS

With a cross-sectional design, an exploratory study was conducted from January to March 2018 using face-to-face interviews with a structured questionnaire. The first part of the questionnaire was on the demographic characteristics of the participants. The second part included 45 assessment questions that were used to assess the hand hygiene knowledge, attitude, and practices of the participants. The first 29 questions were adopted from the questionnaire of the Centre for Health Protection, while their health literacy was adopted from the Chinese version (HLS-Asia-Q) of the 16-item European health literacy questionnaire (HLS-EU), which covers competencies in understanding, evaluating, and applying health information across the domains of health care, disease prevention, and health promotion.<sup>10</sup> The completed questionnaires were administered by a trained Cantonese-speaking research assistant.

### Target population and sample

From a target population of 1,160,000 people aged 65 or above in Hong Kong,<sup>13</sup> a convenience sample of 433 community-dwelling old adults were selected from different districts in Hong Kong to

participate in this study. Recruitment criteria were: (1) aged 65 or above and (2) able to understand Cantonese. Written consent was obtained before participant's participation. Ethical approval for the study was obtained from the Human Research Ethics Committee of The Education University of Hong Kong.

### Outcome measures

Demographic details such as sex, age, education, and marital status of the participants were collected for analysis. For assessment purposes, the responses to the first 29 questions were for their hand hygiene practices, which were measured with a scale of four levels from good to poor: "always," "often," "sometimes," and "never." Then the responses to the next 16 questions were for their health literacy, which were evaluated by a scale (1 to 4), from inadequate to excellent, for each question. For ease of comparison with other health metrics, a general health literacy index was computed for each participant using the formula:  $\text{Index} = (M - 1) \times (50/3)$ , where Index could be any number from 0 to 50, M being the mean of all responses for each participant (1 to 4), 1 was the minimal possible value of the mean, 3 was the range of the mean, and 50 was the maximum possible value of the index. As a result, a standardized health literacy metric was created with 4 levels: "Excellent (42.01-50)," "Sufficient (33.01-42)," "Problematic (25.01-33)," and "Inadequate (0-25)."

### Data analysis

In the analyses,  $\chi^2$  tests were used to compare the categorical hand hygiene and health literacy choices of the participants from the collected questionnaires, and to ascertain whether or not there was an association between the health literacy and hand hygiene practices. Spearman correlation was performed to determine the relationship between the health literacy and hand hygiene practices. The statistical significance level for this study was set at  $P < 0.05$ .

## RESULTS

### Demographic characteristics

Participants (N = 433) aged from 65 to 93 completed the questionnaires. The sex distribution of the sample was nearly equal (49.4% male). The age distribution was rather skewed toward higher ages, with 39% aged from 65 to 70, 29% from 71 to 75, 21% from 76 to 80, and 11% for 81 or over. The marital status of the participants was varied: 58% married, 11% single, 3% never married, and 28% widowed, divorced or separated. Their educational level was generally low, with 65% having no formal or only primary education. Most of them came from the lower income group, with 61% living in rented places and around 10% in privately owned government-subsidized housing.

### Hand hygiene practices

As shown in Table 1, out of the 8 questions on hand hygiene practices, 7 had  $\chi^2$  P-values  $< 0.05$ , which show that there were significant differences for the levels of the hand hygiene performance of the participants for most of the practices, with the exception of Q6. Discarding the responses to Q6, the percentage distribution of the hand hygiene performance, from good to poor, was 18%, 22%, 40%, and 10%, with most participants achieving the lower ("sometimes") level of hand hygiene performance.

### Health literacy

As shown in Table 2, of the 433 old people in the sample, 63.28% (274) of them were classified as having inadequate health literacy (0-

**Table 1**  
Hand hygiene practices of participants

Question	Always	Often	Sometimes	Never	Don't remember	$\chi^2$ statistics	df	P-value
1 In the past 3 days, did you wash hands after coughing or sneezing?	15%	23%	42%	16%	4%	22.116	15	0.036
2 In the past 3 days, did you wash hands after going to toilet?	33%	30%	32%	5%	0	44.0620	15	0.001
3 In the past 3 days, did you wash hands after handling diapers or items with excreta?	19%	16%	37%	12%	16%	35.052	15	0.001
4 In the past 3 days, did you wash hands after handling rubbish?	17%	24%	46%	9%	4%	27.276	15	0.007
5 In the past 3 days, did you wash hands after touching public installations (such as escalator handrails, lift buttons or handles)?	10%	13%	40%	32%	5%	12.194	15	0.430
6 In the past 3 days, did you use liquid soap when washing hands?	12%	21%	53%	12%	2%	38.029	15	0.001
7 In the past 3 days, did you avoid using public towels?	24%	21%	32%	15%	8%	43.418	15	0.001
8 In the past three days, did you wash hands before eating or handling food?	13%	24%	51%	10%	2%	21.204	15	0.047

**Table 2**  
Health literacy levels of participants

Health literacy levels (Health literacy index)	n	%
Inadequate (0-25)	274	63.28
Problematic (25.01-33)	96	22.17
Sufficient (33.01-42)	56	12.93
Excellent (42.01-50)	7	1.62
Total	433	100

25) with poorest health literacy, while a meager 1.62% (7) of them were assessed as having excellent health literacy (42.01-50). The health literacy distribution of the participants from good to poor is asymmetrical with the greatest frequencies of the index scores piled toward the poorer end of the distribution, while the smaller frequencies tapered toward the better end of the distribution. This indicates that the level of health literacy was mostly low for the participants.

#### Health literacy and hand hygiene practices

As shown in Table 3, when  $\chi^2$  tests were applied to investigate the association between the hand hygiene practices and health literacy of the participants, all 8 hand hygiene practices of the participants were significantly ( $P < 0.05$ ) related to their level of health literacy.

The Spearman correlation analysis showed a strong positive relationship between the hand hygiene practices of the participants and their level of health literacy, with  $r_s = 0.68$  and  $P = 0.001$ .

**Table 3**  
Health literacy and hand hygiene practices of participants

Question	Health literacy level				$\chi^2$ statistics	df	P-value
	Inadequate (0-25)	Problematic (25.01-33)	Sufficient (33.01-42)	Excellent (42.01-50)			
1 In the past 3 days, did you wash hands after coughing or sneezing?	276	97	56	4	27.449	12	0.025
2 In the past 3 days, did you wash hands after going to toilet?	276	95	57	5	30.444	12	0.002
3 In the past 3 days, did you wash hands after handling diapers or items with excreta?	276	94	57	6	40.349	12	0.001
4 In the past 3 days, did you wash hands after handling rubbish?	270	93	60	10	62.022	12	0.001
5 In the past 3 days, did you wash hands after touching public installations (such as escalator handrails, lift buttons or handles)?	274	96	58	5	34.788	12	0.003
6 In the past 3 days, did you use liquid soap when washing hands?	272	96	59	6	36.241	12	0.002
7 In the past 3 days, did you avoid using public towel?	272	96	58	7	44.597	12	0.001
8 In the past 3 days, did you wash hands before eating or handling food?	271	96	59	7	42.927	12	0.001

## DISCUSSION

In general, there is a decline in an old adult's cognitive ability which hampers one's ability to comprehend and/or recall new health information. With physical impairments such as hearing and vision loss, one may also suffer from a decreased ability to process health information correctly in a timely manner. Hence, declining cognitive ability and increasing physical impairments will have negative effects on their health literacy. The above weaknesses are evident in our findings shown in Table 1. The above is also consistent with our findings in Table 2, in which a majority (63.28%) of the participants had an inadequate level of health literacy and a sizable group (22.17%) had a problematic level of health literacy. In view of the above observations, it is advisable to strengthen the health literacy of the older adults so as to better protect them against infectious diseases.

People with less education and income are more inclined to trust their families and friends for health information because they believe they may not have the necessary knowledge and information for health related decisions. On the other hand, those with higher education and income are inclined to consult more external independent sources such as health professionals, the internet, and newspapers. Our findings that most of the participants had little or no primary education may have been a key contributing factor to the high percentage of low health literate participants in this study (85.45%). They knew what to do for proper hand hygiene but did not consistently practice it and had difficulty in understanding health information sufficiently to make informed decisions due to low health

literacy. Under these circumstances, the participants were unable to clearly identify or handle certain health information confidently, causing them to have difficulties in interpreting, judging, and evaluating health-related information. This observation is in sync with that of another study which explained that there was a lack of proper health information and that old adults were unaware of the types of vaccination recommended to them.<sup>15</sup> This calls for simplified and standardized health information which could more effectively improve old people's health literacy.

From our findings in Table 1, the participants' hand hygiene awareness (62% with improper hand hygiene practices) after the 2003 SARS outbreak was unsatisfactory. These findings are consistent with Manning 2011's study<sup>14</sup> which showed that the regular use of hand sanitizer remained significantly lower than during the flu pandemic in 2009. During SARS, hand hygiene practices could be attributed to people's raised awareness by the ubiquitous promotion of proper hand hygiene techniques in handling communicable diseases through various media in Hong Kong during that period. Ever since SARS, the Hong Kong Government has stepped up territory-wide health education and promotion to maintain proper hand hygiene practices among health care workers and the general public, for example, education materials like banners and DVDs on hand hygiene have been delivered to the public, private hospitals, and clinics.<sup>16</sup> However, the awareness seems to have tapered off. More than 50% of the participants did not carry out proper hand hygiene practices, thus rendering them more vulnerable to infectious diseases. Proper hand hygiene has been shown to significantly reduce the spread of common cold and flu, especially in the older adults. As shown in Q6 of Table 1, 63% of the participants were unsatisfactory in using liquid soap to wash their hands. This means the participants had lower protection against infectious diseases; as shown in previous studies nonantibacterial soap combined with hand-hygiene education could have the strongest protective effect against gastrointestinal illnesses.<sup>9</sup> So, it is necessary to encourage old adults to form the habits of using soap to wash hands to safeguard themselves against such illnesses. One plausible suggestion from these findings is that the government can initiate and support frequent proper hand hygiene training for the older adults as a short-term measure against infectious diseases, especially at the homes for the aged.

From the responses to the 16 health literacy survey questions, it was found that if the questions contained direct messages with the key words of how/when/where/what to seek opinions from health professionals, a higher percentage of the participants would find the questions relatively easy. On the other hand, if the questions contained complicated messages involving decision making, second opinion seeking, or mental health related, the participants would regard the questions as relatively difficult. This observation has a health policy implication in the enhancement of the older adults' health literacy. Instead of investing huge sums of money to improve their health literacy, it is more worthwhile and cost effective to invest in simplifying and standardizing health information to enhance old adults' comprehension. This observation was similar to the results of Stevens's study,<sup>17</sup> which pointed out that a good understanding of the learning capacity of old adults has direct, practical implications for professionals trying to educate old people about health care services and benefits. Another study also suggested that the health literacy of old adults will greatly improve if familiar examples built on individuals' previous life experiences are used.<sup>18</sup> Besides, using video or audio (rather than textual) health information can also enhance our older adults' health literacy since most of our participants came from the lower income group and had no formal or only primary education.

From the 2003 SARS experience in Hong Kong, promoting proper hand hygiene to the public helped in containing the epidemic. The effect, however, was only short term and has not sustained. As shown by our findings, a significant and positive relationship existed between the health literacy and hand hygiene practices of the participants. Indeed, the initial rapid spread of SARS in Hong Kong in 2003 was due to people's improper hand hygiene practices and their low-health literacy. Since health literacy can only be improved through education, this will have two implications for guarding the older adults against infectious diseases and that is to provide them with frequent refreshers on (1) training on proper hand hygiene and (2) courses to retain their health literacy.

One limitation of this study was that it did not investigate the relationships between either health literacy or hand hygiene and the participants' infection of different diseases. Knowing that improving old adults' health literacy can reduce their perceived difficulties in processing information for health decisions, we suggest further studies can enrich existing literature by undertaking research on the relationships between health literacy education or hand hygiene training with different types of infectious diseases, thus helping people survive these illnesses.

## CONCLUSIONS

Attaining good health literacy and sustaining proper hand hygiene practices are vital to protect the older adults against infectious diseases. Health literacy and hand hygiene are positively related in helping them to control the spread of infectious diseases. We would suggest enhancing their health awareness by providing them with frequent proper hand hygiene training as a short-term solution. From a longer term perspective, educational health literacy programs based on daily experiences and recreational health activities would need to be organized to help maintain their mental agility.

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