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Severe Acute Respiratory Syndrome epidemic and change of people's health behavior in China

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Abstract

Severe Acute Respiratory Syndrome (SARS) has become a new worldwide epidemic whose origin was until recently unknown. It is the unpredictable nature of this epidemic that makes people want answers to some important questions about what they can do to protect themselves. This study presents an inquiry into people's knowledge and self-reported changes in behavior in response to the epidemic. Respondents were drawn from seven major occupational groups in the large central city of Wuhan. Although most respondents knew of SARS, there was still 8.4% who did not know about it. Knowledge was lowest among farmers who had come to the city for temporary work. Most respondents took action to avoid being infected by SARS, including, most commonly, efforts to improve indoor ventilation, to disinfect the indoor environment and to increase hand-washing frequency. Self-reported increases in hand-washing frequency were significant; however, among the seven occupational groups, reports of increased hand-washing were consistently greater among commercial service workers, students and farmers. While it seems that possible fears induced by the epidemic led to these changes, there are still about one-third of respondents who do not wash their hands as frequently as desired. There is also the challenge of devising strategies for maintaining the desired frequency of hand-washing among those who did change.

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Introduction

Severe Acute Respiratory Syndrome (SARS) is a new flu-like disease that made its appearance in late 2002 and spread to over 30 countries by mid-2003. The cause, a coronavirus, was unknown for the first several months, making public health measures difficult and raising concern among the public. Only recently has SARS been identified as a new disease (Anand *et al*., 2003; Anonymous, 2003a,b; Lipsitch *et al*., 2003; Zhao *et al*., 2003; Donnelly *et al*., 2003). Due to the absence of effective vaccines or drugs, and especially due to its rapidly spread via the respiratory route, SARS has frightened the public (Anonymous, 2003c–e; Mei *et al*., 2003; Sun *et al*., 2003).

On 20 April 2003, the Ministry of Health of China announced that the government would require daily notification of SARS infections on the public media and began health promotion activities for the Chinese society, such as disinfection in public places, health education on public media and control of public transmission (Anonymous, 2003f–h; Ashraf, 2003). The adoption of these measures, due to the initially unclear nature of SARS transmission, actually increased panic among the Chinese people who began wearing masks, reducing the chances of outdoor activities, disinfecting the environment and washing their hands. This

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survey attempted in a *post hoc* manner to document the changes in people's behavior that may have resulted from 2 weeks of health promotion activities.

Methodology

As the epidemic took shape quickly, the authors realized that it was necessary to understand how the public viewed the condition in order to recommend appropriate preventive and control measures. Therefore, a 25-item questionnaire was designed that sought information on the public's knowledge, attitudes, beliefs and practices about SARS. The questionnaire was especially concerned about the changes in health behavior people may have undertaken around late April and early May 2003.

The study took place in the city of Wuhan (population of 8.3 million) located in central China. Respondents were drawn from seven occupations including clerks, students, workers, public transportation workers, commercial service workers, retired people and city working farmers (i.e. people who come from rural areas and work in cities temporarily). Postgraduate students of the School of Public Health, Wuhan University interviewed the respondents.

Three multiple-choice questions about SARS knowledge addressed the nature of transmission (whether it was infectious and the route of transmission) and the clinical symptoms. Seven questions about health behavior change in the previous 2 weeks addressed recent preventive measures generally and hand-washing specifically. Responses were categorized as 'Increased', 'No Change' and 'Decreased'. Data were coded, entered into an Access database and analyzed with SPSS software.

Results

The interviewers attempted to reach 1880 respondents and obtained 1807 valid responses, a response rate of 96.1%. The age distribution of the subjects ranged from 12 to 79 years with a mean of 28.29 (±11.29). Males comprised 53.7% of the respondents. Occupations of respondents are presented in Table I, with the largest groups comprising students and commercial service workers.

Table I. *Professional distribution*

Profession	*N*	%
Clerk	206	11.4
Public transportation worker	227	12.6
Worker	116	6.4
Commercial service worker	346	19.1
Student	614	34.0
City working farmers	208	11.5
Retired	90	5.0
Total	1807	100.0

Less than half (46.2%) of respondents could answer all three knowledge questions about SARS, 45.5% could answer some of the questions, while 8.4% knew the answer to none. Comparisons of knowledge and occupation are shown in Table II. Clerks had the best knowledge, with 63.0% answering all three questions correctly. Farmers who had come to the city to work had the lowest, with only 24% being able to answer all questions and 30.3% being able to answer none.

Reported behavior change was recorded in two ways. Respondents first reported on the changes they themselves took. Second, respondents were asked about changes in their hand-washing behavior. Self-reported behavior changes are displayed in Table III, and include improving indoor ventilation, disinfection of the indoor environment and hands, and increasing hand-washing frequency.

The comparative results of self-reported hand-washing behavior at two points during the SARS epidemic are presented in Table IV. People reported significant increases in the frequency with which they washed their hands before meals, washed their hands after returning home from outdoors and washed their hands after coming into contact with public materials, e.g. on public transportation.

Table V compares reported changes by occupation. Three occupational categories in particular, i.e. farmers working in the city, commercial service workers and students, reported significantly greater

Table II. *Distribution of SARS knowledge by occupation*

SARS knowledge (based on three items)	Occupation (%)							Total (%)
	Clerk	Student	Worker	Transport Worker	Service Worker	Retired	Farmer	
All	63.2	45.9	51.7	51.1	43.9	48.9	24.0	46.2
Some	33.9	49.8	39.7	41.0	49.4	45.6	45.7	45.5
None	2.9	4.3	8.6	7.9	6.7	5.3	30.3	8.4
N	206	614	116	227	346	90	208	1807

$\chi^2 = 190.62$; d.f. = 12, $P < 0.0001$.

Table III. *Self-reported behavior changes in response to SARS*

Self-reported change	*N*	%
Improvement on ventilation	1588	87.9
Indoor air and hands disinfected[a]	1484	82.1
Improvement on hand-washing	1447	80.1
Reduction of outdoor activities	1278	70.7
Mask-wearing	1034	572
Increase physical activities	956	52.9
Health care medications[b]	604	33.4
Other measures	25	1.4
No change	38	2.1
Total *N*	1807	

[a]Indoor air and hands disinfected means to use the chemicals for hand and indoor air disinfections.
[b]Health care medications means to take some Chinese medications and herbs which could prevent diseases.

Table IV. *Hand-washing change between SARS epidemics*

Hand-washing activity and frequency	Two weeks ago (%)	Today (%)[a]
Hand-washing before meal		
each time	29.4	64.6
frequent	48.6	32.0
occasional	20.2	2.8
never	1.8	0.6
$\chi^2 = 551.59$; d.f. = 3; $P < 0.0001$		
Hand-washing when back home from outdoors		
each time	25.9	63.6
frequent	47.4	32.3
occasional	23.5	3.7
never	3.2	0.4
$\chi^2 = 638.55$, d.f. = 3; $P < 0.0001$		
Hand-washing after contact with public materials		
each time	19.0	52.4
frequent	44.3	39.6
occasional	0.32	7.1
never	4.6	1.0
$\chi^2 = 617.37$; d.f. = 3; $P < 0.0001$		
N	1807	1807

[a]The survey was conducted approximately 2 weeks after the Chinese government noticed the SARS situation as a daily occurrence.

increases in hand-washing than other groups. Responses were compared by gender, but were not significantly different.

Discussion

SARS, an atypical pneumonia of unknown etiology, was recognized at the end of February 2003 (Bloom, 2003; Bonn, 2003; Cai, 2003; Cameron *et al.*, 2003; Gillissen and Ruf, 2003; Li and Zhang, 2003). Numerous scientists have been working in the affected countries to provide epidemiological, clinical and logistical support as required. In almost all documented cases, SARS is spread through close face-to-face contact with infected droplets when a patient sneezes or coughs. Some of the epidemic's origins remain unclear. For SARS, three activities—case detection, patient isolation and contact tracing—can reduce the number of people exposed to each infectious case and eventually break the chain of transmission. In the absence of

Table V. *Hand-washing changes and occupation*

Hand-washing activity	Occupation (%)							
	Clerk	Transport worker	Worker	Service worker	Student	Farmer	Retired	Total
Before meal								
increase	40.3	42.7	44.0	52.9	54.9	53.4	46.7	50.1
same	57.3	54.2	52.6	40.8	41.9	44.7	51.1	46.4
decrease	2.4	3.1	3.4	6.4	3.2	1.9	2.2	3.5
$\chi^2 = 36.870$; d.f. = 12; $P < 0.001$								
When back home								
increase	41.7	43.6	46.6	56.4	63.2	49.0	44.4	53.3
same	56.8	54.2	50.9	38.7	34.4	49.0	54.4	44.0
decrease	1.5	2.2	2.6	4.9	2.4	1.9	1.1	2.7
$\chi^2 = 66.136$; d.f. = 12; $P < 0.0001$								
After contact with public materials								
increase	49.1	41.9	47.4	56.9	62.2	54.8	47.8	54.6
same	48.5	57.3	50.9	37.6	34.3	43.8	51.1	42.9
decrease	2.4	0.9	1.7	5.5	1.9	1.4	1.1	2.4
$\chi^2 = 59.526$; d.f. = 12, $P < 0.0001$								
N	206	227	116	346	614	208	90	1807

a vaccine, the most effective way to control a new disease such as SARS is to break the chain of transmission from infected to healthy persons (Buckley, 2003; Donnelly *et al*., 2003; Eaton, 2003; Kontoyiannis *et al*., 2003; Mackay, 2003; Mandavilli, 2003). Unfortunately, these activities brought panic to ordinary citizens and did not show there is any gender difference, especially during the early days when the Chinese government decided that SARS was a real public health problem.

The panic, in part, arose because people did not know how to protect themselves. A full 2 weeks into major informational and control measures, many people still did not have complete knowledge about the epidemic. This study documented that even without thorough knowledge following health promotion and information efforts, most persons changed their health behaviors to avoid SARS infection. The example of farmers, who had low knowledge and yet still reported behavior change, is illustrative of people's desire to protect themselves.

The results show that when people perceive a health problem as serious they will take some kind of action. It is therefore incumbent on public health officials to learn quickly what people believe and provide information that will allay their fears in a timely manner. SARS is unlikely to be the last emerging epidemic of our times and so the lessons learned here will be of value in anticipation of future disease outbreaks. The results also imply that the provision of health information on SARS should be adapted to the various sociodemographic groups, such as those based on occupation/work settings, in order to increase access and understanding.

In conclusion, SARS has had a great influence on ordinary people in the city and has influenced motivation to practice more healthy behaviors, such as hand-washing. These changes are probably based on the immediate fear of SARS and more time is needed to observe whether they will be sustained. The results presented here can be applied to planning communication about future emerging infectious diseases. Follow-up is needed to determine how best to reinforce the maintenance of these new behaviors.

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