

The Singaporean response to the SARS outbreak: knowledge sufficiency versus public trust

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SUMMARY

During the outbreak of severe acute respiratory syndrome (SARS) in Singapore from 1 March to 11 May 2003, various national prevention and control measures were undertaken to control and eliminate the transmission of the infection. During the initial period of the epidemic, public communication was effected through press releases and media coverage of the epidemic. About a month into the epidemic, a public education campaign was mounted to educate Singaporeans on SARS and adoption of appropriate behaviours to prevent the spread of the disease. A survey was conducted in late April 2003 to assess Singaporeans' knowledge about SARS and infection control measures, and their concerns and anxiety in relation to the outbreak. The survey also sought to assess their confidence in the ability of various institutions to deal with SARS and their opinion on the seemingly tough measures enforced. The study involved 853 adults selected from a telephone-sampling frame. Stratified sampling was used to ensure adequate representation from major ethnic groups and age groups. The study showed that the overall knowledge about SARS and control

measures undertaken was low (mean per cent score of $24.5 \pm 8.9\%$). While 82% of respondents expressed confidence in measures undertaken by Tan Tock Seng Hospital (the hospital designated to manage SARS), only 36% had confidence in nursing homes. However, >80% of the public agreed that the preventive and control measures instituted were appropriate. Despite the low knowledge score, the overall mean satisfaction score of the government's response to SARS was 4.47 (out of possible highest score of 5.00), with >93% of adult Singaporeans indicating that they were satisfied or very satisfied with the government's response to SARS. Generally, Singaporeans had a high level of public trust (satisfaction with government, confidence in institutions, deeming government measures appropriate), scoring 11.4 out of possible maximum of 14. The disparity between low knowledge on the one hand and high confidence and trust in the actions of the government on the other suggests that Singaporeans do not require high knowledge sufficiency to be confident in measures undertaken by the government to control the SARS crisis.

Key words: knowledge; response; SARS; Singapore; trust

INTRODUCTION

Severe acute respiratory syndrome (SARS) is the first severe and easily transmissible new disease to emerge in the 21st century (World Health Organization communicable disease surveillance and response, 2003). Between 1 March and 11 May 2003, Singapore experienced the harshness of this outbreak, and the country went into high alert once it was apparent that it was battling an

unknown new infection capable of spreading rapidly in hospitals.

The national prevention and control strategy for SARS focused on: (i) eliminating nosocomial transmission through substantially enhanced infection-control practices in health care institutions; (ii) preventing additional importations of infection through temperature screening, health

declaration cards and travel advisories at the airport and seaports; and (iii) stopping community transmission through education, contact tracing and home quarantine measures. In addition, Tan Tock Seng Hospital (TTSH) was officially designated as the hospital to manage SARS on 22 March 2003, and strict infection control measures were imposed on all hospitals. Schools and other public places were closed where necessary to halt the transmission of the virus (Singapore Ministry of Health, 2003). During the initial stages of the epidemic, public communication was effected mainly through press conferences, media coverage and a website set up by the Ministry of Health. Prominent press and radio advertisements were also placed in the early phase of the epidemic from mid April 2003. As more became known about the infection, and with control measures being put in place, an intensive public education campaign utilizing multiple channels was mounted between 30 April and 13 May 2003. This public education campaign aimed to educate Singapore residents about SARS, to encourage them to adopt appropriate personal hygiene and socially responsible habits to prevent the spread of SARS, to encourage those with suspected SARS infection to seek medical attention at TTSH, and to encourage cooperation with contact tracing and home quarantine orders (HQO) when necessary.

In a heuristic-systematic model (Griffin *et al.*, 1999), the assumption is that relevance of the message is likely to motivate subjects in 'risky and severe' condition to process risk information more systematically and to rely less on superficial cues in the structure and style of the message.

In this paper, the informing seeking and processing mindset of Singaporeans during a severe outbreak situation is assessed by testing the level of knowledge on SARS and its preventive/control measures following the earlier communication efforts and subsequent public education campaign. It seeks to understand the dynamics between knowledge sufficiency and public trust in infection containment measures instituted by the state, and how these in turn affect the general satisfaction with the handling of the SARS outbreak by the state.

SUBJECTS AND METHODS

A telephone survey was conducted from 30 April to 13 May 2003. The sampling frame consisted of

telephone numbers and personal particulars (name, gender and ethnicity) in Singapore. Because of the urgent nature of the survey, the sampling frame was stratified by ethnicity and gender, and quota sampling carried out for each stratum. A total of 863 adults aged 19–69 years were interviewed. There was an over sampling of Indians and Malays to ensure that there were enough subjects from the three major ethnic groups (of which Chinese form the majority) in Singapore (distribution in the general population for Chinese, Malays and Indians is about 76.8, 13.9 and 7.9%, respectively). The results were weighted to reflect the actual distribution in the population during analysis. The study conformed to the principles embodied in the Declaration of Helsinki (World Medical Association, 1996) and was approved by the Ministry of Health, Singapore.

Knowledge on SARS (symptoms, spread, protective measures, treatment) and infection control measures (measures at TTSH, other health care institutions, immigration check points, special ambulance arrangement for suspects), confidence in institutions to deal with the outbreak, and opinions about measures implemented by the government were assessed by a pre-tested questionnaire (Table 1). In addition, respondents were asked to score their satisfaction level for the measures undertaken by the government. A per cent knowledge score was computed for the knowledge items. An index of 'public trust' was computed using a composite index comprising: (i) an index for overall confidence in ability of public institutions (TTSH, other government hospitals/institutions, private hospitals/institutions, nursing homes, schools, workplaces and the transportation system) to deal with the crisis; (ii) an index for assessing public perception of appropriateness of SARS control measures (Home Quarantine Order, punitive measures for quarantine breakers, infection control measures in hospitals and closing down of affected public places); and (iii) public satisfaction towards the response of the government to the outbreak.

The data were analysed using SPSS version 11.5 for Windows (SPSS Inc., 2001). Demographic differences in knowledge of SARS were assessed using the Kruskal–Wallis test (Siegel, 2000; SPSS Inc., 2001). Stepwise multiple linear regression (SPSS Inc., 2001; Gujarati, 2003) was carried out to assess the impact of demographic variables and overall knowledge about SARS on

Table 1: Overview of indices for knowledge about SARS and infection control measures

Knowledge about SARS	Total possible score
Symptoms of SARS	7
Fever	
Cough	
Chills/shivering spells	
Muscle aches	
Breathing difficulty/ shortness of breath	
Flu-like symptoms	
Diarrhoea	
Spread of SARS	
How is SARS spread?	18
Contact with infected person	
Droplet transmission	
Bodily fluids	
Going to SARS-affected areas	
How long would it take for a person to become sick if he/she is exposed to SARS?	
Incubation period (3–10 days)	
Who is at risk of contracting SARS?	
People sharing same household with a SARS patient	
Health care workers taking care of SARS patients	
People who travelled to SARS-affected countries	
People with contact with SARS patients	
Inpatients	
Visitors to hospitals	
Taxi drivers	
People who had been to Pasir Panjang Wholesale Centre (community area where a significant number of people contracted SARS)	
Where are people likely to get SARS?	
Home	
Health care institutions	
Public transport	
Markets	
SARS affected countries	
Knowledge about protective measures against SARS	11
Personal hygiene	
Healthy lifestyle	
Monitoring of temperature daily	
Avoidance of overseas travel	
Wearing of mask	
Clean environment	
Staying at home if unwell	
Seeking medical attention if unwell	
Avoidance of crowded places	
Staying away from SARS affected areas	
Avoidance of doctor hopping	
Treatment of SARS	3
Is there a cure for SARS?	
Yes/no	
What percentage of SARS patients die in Singapore?	
Mortality (10–12%)	

Table 1: continued

Knowledge about SARS	Total possible score
Do you think early detection and treatment will help a SARS patient to recover?	
Yes/no	
Knowledge of infection control measures	
SARS control measures implemented at TTSH	8
Protective gear for staff	
Monitoring of temperature	
Stringent personal hygiene	
Provision of masks for all patients during SARS screening	
Patients with low risk of SARS seen by different team of doctors	
Patients admitted for observation housed in individual rooms	
‘No Visitor’ rule for patients	
Free transport/ambulance service	
Infection control procedures implemented at other health care institutions	7
Protective gear for staff	
Monitoring of temperature	
Stringent personal hygiene	
‘No Visitor’ rule for patients for all public hospitals	
Separation/isolation of SARS patients	
Directing high fever/sick patients to TTSH	
Health declaration/screening/ protective gear for visitors	
Precautionary measures adopted for air and sea passengers	3
Health Declaration cards for all air and sea travelers to Singapore	
Sending passengers with SARS symptoms to TTSH for examination	
Monitoring of temperature/ thermal scanner	
People who need special ambulance transport arrangements	4
People who have SARS symptoms, have contact with a SARS patient and/or visited a SARS affected country	
Persons on HQO	
Cases identified by doctors	
Cases identified during screenings at entry points to Singapore	

public trust. Variance inflation factors (SPSS Inc., 2001; Gujarati, 2003), Cook–Weisberg test (SPSS Inc., 2001; Gujarati, 2003) and normality plot (SPSS Inc., 2001; Gujarati, 2003) were applied to check for multi-collinearity, heteroscedasticity and non-normality, respectively. All statistical tests were conducted at the 5% significance level.

RESULTS

Of the 853 respondents covered in this paper, 458 were females and 395 were males (Table 2). The mean age of the respondents was 41 years (range: 19–81 years), with no differences between males and females. In terms of educational attainment, significantly more males had tertiary education (36 versus 26%), while more women had primary only or no education (38 versus 28%).

The mean \pm standard deviation per cent score for knowledge of SARS was $26 \pm 8\%$. Of the four key domains under knowledge of SARS, knowledge about treatment of SARS was highest (mean score of $62 \pm 24\%$) and knowledge about the protective measures against SARS was lowest (mean score of $17 \pm 11\%$). While 58% of the respondents were able to cite personal hygiene as a protective measure against SARS, comparatively fewer of them mentioned temperature taking on a daily basis (21%) and wearing of a mask (23%). The mean per cent score for knowledge about the symptoms of SARS was $40 \pm 15\%$. Most subjects (94%) were able to cite fever as a symptom, a key message of the campaign. Generally, the Indian respondents had a significantly higher mean per cent score for knowledge of SARS ($29 \pm 10\%$) compared with the Chinese ($25 \pm 8\%$) and Malays ($26 \pm 8\%$). Younger respondents fared significantly better compared with those aged ≥ 50 years ($27 \pm 8\%$ for those below 49 years of age versus $24 \pm 9\%$ for those aged 50 years and above). Likewise, respondents with tertiary education had significantly higher knowledge scores ($29 \pm 7\%$) compared with those

with primary or no formal education ($23 \pm 9\%$). No gender difference was found.

The mean per cent score for knowledge of SARS infection control measures was $22 \pm 13\%$. Of the four key knowledge domains, knowledge about precautionary measures for air and sea passengers (mean score of $30 \pm 21\%$) and types of people who needed special ambulance arrangement (mean score of $29 \pm 16\%$) was higher. Knowledge about the SARS control measures implemented at TTSH and other health care institutions lagged behind (mean scores of $20 \pm 16\%$ and $17 \pm 14\%$, respectively). The Indians and those with higher educational attainment had significantly higher scores for knowledge about the control measures. Age and gender did not have a significant impact in this area.

The mean per cent score for overall knowledge was $25 \pm 9\%$. Knowledge of SARS was slightly higher compared with knowledge about infection control measures. Indian respondents performed significantly better than their Chinese and Malay counterparts. Younger respondents had higher knowledge scores compared with those aged 50 years and above, but the difference was not significant. On the other hand, respondents with tertiary education fared significantly better than those with lower educational attainment.

Respondents were also asked to rate their confidence in the ability of various institutions in dealing with SARS. The proportion of respondents citing confidence in the ability of TTSH to deal with SARS was highest (82%) followed by confidence in schools (63%). Confidence in the ability of nursing homes to handle SARS was lowest (36%). The proportions of respondents citing confidence in restructured hospitals/institutions, private hospitals/institutions, workplaces and transport system were comparable, ranging from 48 to 56%. Males were more likely to express confidence in the ability of these institutions to deal with SARS. A similar pattern was seen among the older respondents. Conversely, the proportion of respondents with tertiary education expressing confidence in these institutions was smaller compared with their counterparts with lower educational attainment, with confidence in TTSH being the only exception.

The majority of the respondents, regardless of gender, race, age and educational attainment, found the SARS control measures undertaken by the government appropriate. More than nine out of 10 respondents thought that infection control measures undertaken at hospitals were

Table 2: Profile of respondents ($n = 853$)

	Female ($n = 458$)	Male ($n = 395$)
Race		
Chinese	274 (60%)	229 (58%)
Malay	83 (18%)	74 (19%)
Indian	101 (22%)	92 (23%)
Age group (years)		
19–29	72 (16%)	65 (17%)
30–39	145 (32%)	109 (28%)
40–49	148 (32%)	135 (34%)
≥ 50	93 (20%)	86 (22%)
Education		
Primary and below ^a	129 (28%)	72 (19%)
Secondary	206 (45%)	176 (45%)
Tertiary ^a	119 (26%)	141 (36%)

^aSignificant differences between females and males.

Table 3: Stepwise multiple regression with public trust index as dependent variable^a

Model	Knowledge of SARS		Age (years)		Constant			
	β	SE	β	SE	β	SE	SEE	R^2
1	0.14	0.02	–	–	10.0	0.2	1.9	0.05
2	0.67	0.27	0.11	0.05	16.3	0.5	3.9	0.03

^aVariables offered in the equation: knowledge of SARS control measures, gender (female = 0 and male = 1) and knowledge of SARS.

β , regression coefficient; SE, standard error; SEE, standard error of estimate; R^2 , adjusted explained variance.

Public trust index = satisfaction score + overall confidence score in institutional measures + opinion about appropriateness of government measures.

appropriate. Comparatively fewer respondents felt that punitive measures imposed on people breaking the HQO were appropriate (82%).

Overall, the public trust index was high at 11.4 out of a maximum score of 14, with no significant difference between gender, age groups and educational levels. There was a slight but significant correlation with knowledge of SARS ($r = 0.23$, $p < 0.001$), knowledge of control measures ($r = 0.18$, $p < 0.001$) and overall knowledge score ($r = 0.23$, $p < 0.001$).

A stepwise multiple linear regression model to predict public trust showed that knowledge scores for SARS was significantly associated with a higher public trust index, controlling for other variables. Among the demographic variables, only age turned out to be a significant predictor. In total, the covariates explained slightly >5% of variations in the public trust index (Table 3).

DISCUSSION

The study shows that the overall knowledge about SARS and control measures undertaken to control the virus was not high (mean per cent score of 25%). Respondents' confidence in the ability of various institutions' ability to deal with SARS were varied, with confidence in TTSH at one end of the spectrum (82% of the respondents expressed confidence in the hospital's ability to handle SARS) and nursing homes at the other end (36% cited confidence in the ability of nursing homes to deal with the virus). Respondents' perceptions about the appropriateness of SARS control measures were high, with the majority of the respondents endorsing measures undertaken as being appropriate.

While a regression analysis indicated the trend that higher knowledge of SARS was significantly

associated with higher level of public trust, it explained only ~5% of the variation for public trust. Knowledge about SARS control measures did not contribute significantly to the level of public trust.

In addition, the study reveals some rather unexpected findings upon further analysis. First, while knowledge about infection control measures undertaken at TTSH was low (mean per cent score of $20 \pm 16\%$), the level of confidence was high, with 82% of the respondents expressing confidence in the hospital's ability to deal with SARS. Secondly, despite the low knowledge level of the public about infection control measures undertaken at TTSH and other healthcare institutions (mean per cent score of $17 \pm 14\%$), 91% of the respondents felt that these measures were appropriate. The study also found while knowledge about SARS and infection control measures were lowest among those with primary education or below, they were more likely to express confidence in the ability of institutions' ability to handle SARS.

There is thus an apparent contradiction between low knowledge about SARS and infection control measures yet high level of public trust in the government and their actions. Several possible explanations can be given for this phenomenon.

The Model of Risk Information Seeking and Processing (Griffin *et al.*, 1999) seeks to understand how individuals respond to messages about health risks. The model adapted and synthesised theories from the Heuristic Systematic Model of Information Processing (Eagly and Chaiken, 1993) and proposes that people who engage in more effortful information seeking and processing are more likely to develop risk-related cognitions, attitudes and behaviours that are more stable over time. Some of the key concepts

proposed by the model, information sufficiency, perceived hazard characteristics and social trust, provide useful theoretical grounding to facilitate understanding the responses of the survey respondents to the SARS crisis.

'Information sufficiency' is the amount of information people say they need in order to deal adequately with a given risk in their own lives (Griffin *et al.*, 1999). Information would be pursued and processed until perceived knowledge reaches the sufficiency threshold, which would represent the point at which the individual is confident that he or she can cope behaviourally with the risk (e.g. take effective preventive action). However, people might avoid risk content if, for example, it produces worries with which they cannot cope. Some may not pay attention or simply avoid such information all together. This might explain why while basic knowledge about SARS (e.g. awareness that fever is a symptom of SARS) was high, the overall knowledge score remained low in the study as most Singaporeans may feel that basic knowledge about SARS allows them to cope adequately with the crisis at a personal behavioural level.

'Perceived hazard characteristics' reflect the degree to which a risk is understood and the degree to which it evokes a 'feeling of dread' (Griffin *et al.*, 1999). Some studies have found that the more dreaded the hazard, the more people want strict regulations employed to reduce its risks (Eagly and Chaiken, 1993; Geogory and Mendelsohn, 1993). The fear of SARS was widespread, causing stress and anxiety wherever it struck (Clark, 2003; Cong *et al.*, 2003; Falsey and Walsh, 2003; Lee *et al.*, 2003; Wenzel and Edmond, 2003). This can explain why most Singaporeans endorsed the SARS control measures implemented in Singapore as being appropriate even though there was low knowledge sufficiency.

The concept of 'social trust' also offers useful insights. Researchers have identified social trust as a key mediating factor in circumstances requiring collective action (Slovic, 1992; Earle and Cvetkovich, 1994). Social trust serves as a cognitive heuristic tool that decreases the complexities of social life to workable levels. When people face threatening events or conditions, they often make risk judgements based on social trust, an expectation that assigns to others the responsibility for working on some necessary task (Slovic, 1992; Earle and Cvetkovich, 1994). It was clear that social trust was rampant during the SARS crisis in Singapore. Singapore has

sometimes been described as having a communitarian ideology (Chua, 1995). State interventions in social life are often viewed as pre-emptive measures for ensuring the collective well-being or as measures of good government. During the SARS crisis, the government actively promoted public confidence in the ability of TTSH to cope with SARS. Several leaders of the country shared their personal views about SARS and expressed confidence in the ability of the hospital to handle the crisis. The 'social norm' (Fishbern and Ajzen, 1975; Ajzen and Fishbein, 1980) of accepting TTSH as being capable of dealing with SARS was further enforced when individuals who did not admit themselves into the hospital when suspected of SARS were publicly criticised.

As people placed increasing trust in the government, institutions and hospitals to manage SARS, it could have led them to experience less personal worry and perceived vulnerability to SARS. Given the situation that little was known about SARS and that there was constant appeal for people to live life as normally as possible, people tried to manage their lives by reducing complexities through increased social trust, which also implied an expectation on the government to take over the responsibility for fighting SARS. Consequently, they developed high confidence in the measures undertaken by the government, despite having a low level of knowledge about SARS.

In summary, the low level of knowledge about SARS and infection control measures may indicate that the information sufficiency threshold is low, meaning Singaporeans need very little information in order to feel confident to cope with SARS or they do not see the need to know all the control measures before feeling confident with what the government is doing to handle the SARS crisis. This is no doubt mediated by the high perceived hazard associated with SARS and the high social trust ascribed to the government. Taken together, these concepts help to explain the apparent disparity between the low knowledge about SARS and the control measures on the one hand, and high confidence in key institutions dealing with SARS, high endorsement about SARS control measures being appropriate and high satisfaction with the government's response to SARS on the other hand.

In conclusion, some useful lessons can be gleaned from the study. The low knowledge level but high level of trust implies that public compliance is high. While public compliance may

be high, it may not necessarily translate to private conviction and conversion about the importance of adopting appropriate preventive measures. However, even though private conversion may be the best societal control in the long-term, high-risk situations require quick short-term measures (Asch, 1955; Moscovici, 1985), and those taken for SARS were effective and appropriate for Singapore. Taking into consideration the cultural and societal background, instilling public compliance seemed to be an efficient tool of helping to cope with the immediate SARS crisis. Moving forward, it is important that future educational efforts promote private conversion and personal responsibility, utilising veracious and creative messages and taking into consideration different situations within the social and cultural context.

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