The Psychological Impact of An Infectious Disease Outbreak on Health Care Workers: Lessons from SARS in Beijing

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SARS Outbreak in 2003

- **Severe Acute Respiratory Syndrome (SARS) was the first newly emerging infectious disease of the 21st century. It is a viral respiratory illness caused by a coronavirus, called "SARS-associated coronavirus" (SARS-CoV).**
- **SARS was first reported in Asia in February 2003. Over the next few months, the illness spread to more than two dozen countries in North America, South America, Europe, and Asia before the SARS global outbreak of 2003 was contained.**
- **According to the World Health Organization (WHO), a total of 8,098 people worldwide became sick with SARS during the 2003 outbreak. Of these, 774 died. The case fatality ratio was 9.6. (The case fatality ratio for the 1918 flu, it is estimated, was 2.2% in the US, but 10 times higher in some other parts of the world).**

Life During the 2003 SARS Outbreak in Asia

A Chinese couple getting married during the 2003 SARS outbreak in Wuhan, China.

www.wcpo.com/specials/2003/sars/

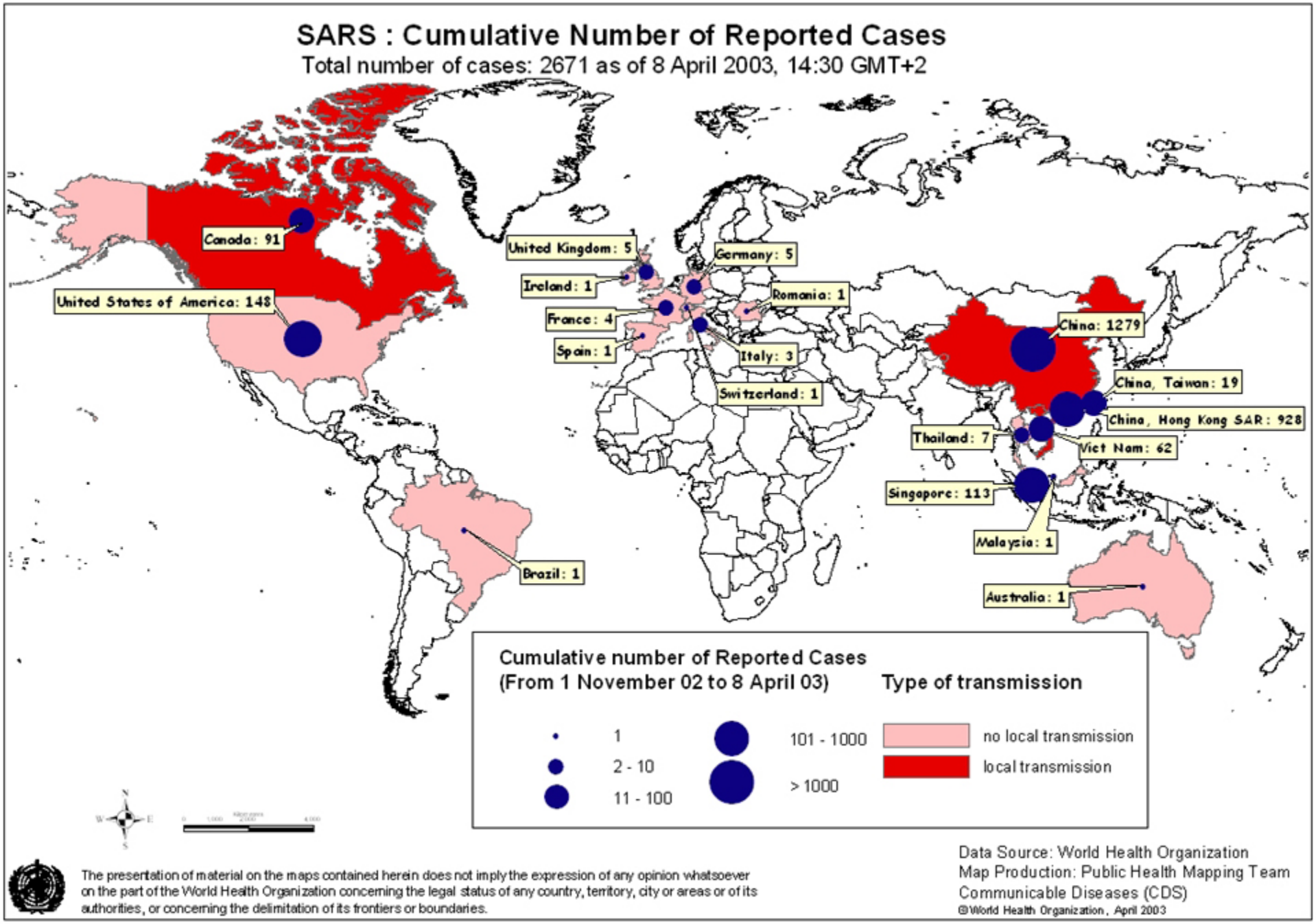
Life During the 2003 SARS Outbreak in Asia

High School Students in Hong Kong during the 2003 SARS outbreak.

concise.britannica.com/ebc/art-71568

Why choose Beijing, China as Study Site?

The earliest cases of SARS occurred in China, which also had more cases overall than any other country. According to the World Health Organization (WHO), about two thirds of the world's SARS cases occurred in China (WHO, 2003). Beijing was among the cities most heavily affected by SARS.



data source: China Internet Information Center
China Ministry of Health (by 10:00 am of May 18, 2003, Beijing Time)
Website: www.nationsonline.org/oneworld/china_sars_map.htm

Why study Health Care Workers?

Health care workers had the greatest risk of being infected with SARS: WHO statistics show that more than 20% of the people who contracted SARS were health care workers (WHO, 2003).

A Health Care Worker's Day During the SARS Outbreak

Giving a patient a breathing mask

www.chinareport.com.cn/18s/sars/03-sars-3a.htm

A Health Care Worker's Family

A couple greeting each other by video phone while the husband was working in a SARS ward.

www.cnii.com.cn/20030915/ca211153.htm

Specific Aims

(1) examine post-exposure probable PTSD among HCWs, in relation to demographic factors, different types of exposure to SARS, as well as during-outbreak attitudes and perceptions regarding SARS-related risks; and

(2) examine current levels of fear of SARS among HCWs, and factors associated with those fear levels.

It is hoped that the findings will help us to better understand the long-term psychological impact of exposure to a fast-spreading, life-threatening infectious disease such as SARS, and in turn help us to prepare to effectively respond to future global disease outbreaks, such as a possible flu pandemic.

Sample and Study Procedure

- A sample of 549 hospital employees was drawn from a major hospital in Beijing which was affected by the 2003 SARS outbreak.

- Using hospital employee rosters, employees were randomly selected for recruitment into this study based on a stratification strategy designed to be representative of the health care staff and professionals of the hospital as a whole. The response rate is 83%.

- Doctors and nurses working in units with high exposure to SARS patients were oversampled. Those aged 35 to 50 were also oversampled. Because stratification had been used in the selection of the sample, appropriate weights were created for use in all the analyses.
- Randomly selected health care workers finished self-report questionnaire.

MEASURES

Psychological impact of the SARS Outbreak

- **The IES-R (Impact of Event Scale – Revised) (Weiss, 1997) is a self-report measure assessing subjective distress resulting from a traumatic life event. It was used to assess PTSD symptoms experienced by the subjects during the three-year period following the SARS outbreak.**

- **The IES-R has 22 items, each with a Likert rating scale from 0 to 4. The instrument has been translated into, and validated in, Chinese. A score of 20 or more was interpreted here – as in previous studies of populations affected by traumatic events (Feinstein et al., 2002; Hawryluck et al., 2004) – to indicate probable PTSD.**

Direct Exposure to the SARS Outbreak

Work Exposure was defined as working in a high-risk location, such as a SARS ward, fever clinic, Department of Infectious Diseases, Emergency Room, Department of Pulmonary Medicine, or X-ray Lab, during the outbreak period, defined as January to June, 2003.

Any Quarantining, based on six questionnaire items, was defined as being quarantined because of being diagnosed with SARS or suspected SARS, or having direct contact with SARS patients (at work, at home or in other places).

Indirect Exposure to the SARS Outbreak

This was defined as having family members or friends who died of SARS or developed SARS and were hospitalized and treated for it.

Media Exposure

Three questions were asked about level of exposure to media coverage including TV, internet, radio, and magazines.

Other Exposure to traumatic events

Subjects were asked about exposure to potentially traumatic events prior to and following the SARS outbreak, including (a) severe injury in violent circumstances (b) witnessing a death or serious injury of a close friend or family member, and (c) living through a major disaster.

During-outbreak Attitudes Towards SARS Risks

HCWs were asked questions regarding the attitudes towards SARS-related risks that they had had during the 2003 outbreak.

Nine of these were yes-no questions used to assess their during-outbreak perceptions of SARS-related threat.

One question, "Because I wanted to help the SARS patients, I was willing to accept the risks involved", was used separately in our analyses as a measure of altruistic risk acceptance.

Current Fear of SARS

Three questions were used to assess subjects' current fear of SARS: Thinking about SARS makes me feel anxious; I feel tense when I think about the threat of SARS; I feel quite anxious about the possibility of another outbreak of SARS.

Analysis I

Descriptive analyses were conducted first, in order to examine the characteristics of the sample. Bivariate analyses were carried out to designate factors associated with probable PTSD.

Table 1a: Socio-Demographic Factors and Probable PTSD (1)

			Probable PTSD		
		Total (N=549)	No (N=494)	Yes (N=55)	P-value
GENDER	Male	23.5	23.7	22.2	0.8089
	Female	76.5	76.4	77.8	
AGE	35 and younger	33.8	32.8	41.9	0.0192
	36 – 50	47.1	46.5	52.9	
	51 and older	19.1	20.7	5.2	
MARITAL STATUS	Single	11.8	11.4	15.7	0.2028
	Married	84.0	84.9	76.5	
	Divorced/Separated	4.2	3.7	7.8	

Source: Beijing_SARS_001FB, 005_PW

Table 1b: Socio-Demographic Factors and Probable PTSD (2)

			Probable PTSD		
		Total (N=549)	No (N=494)	Yes (N=55)	P-value
EDUCATION	High School or Lower	35.0	35.1	33.8	0.8480
	More than High School	65.0	64.9	66.2	
HOUSEHOLD INCOME	< 20,000	16.2	16.1	16.6	0.4194
	20,000 – 39,999	27.4	28.1	20.8	
	40,000 – 69,999	31.2	31.5	29.0	
	70,000 +	25.2	24.3	33.6	
PROFESSION	Doctor	20.7	20.6	21.5	0.3107
	Nurse	37.6	36.7	45.3	
	Technician	22.1	22.1	22.7	
	Other (Administrative/ Housekeeping)	19.6	20.6	10.6	

Source: Beijing_SARS_001FB, 005_PW

Table 1c: Exposure to the SARS outbreak and Probable PTSD

			Probable PTSD		
		Total (N=549)	No (N=494)	Yes (N=55)	P-value
WORK EXPOSURE TO SARS		24.6	22.1	46.9	< 0.0001
ANY QUARANTINING		18.8	16.4	40.5	< 0.0001
ANY INDIRECT EXPOSURE		8.9	7.4	22.9	0.0001
MEDIA EXPOSURE	TV Exposure	78.6	79.2	73.6	0.3306
	Web Exposure	23.3	22.6	29.0	0.2960
	Other Media Exposure	60.2	60.4	58.5	0.7856
OTHER TRAUMATIC EVENTS					
	Prior to SARS	13.0	13.1	12.6	0.9170
	Post-SARS	5.5	5.9	1.7	0.1932

Source: Beijing_SARS_001FB, 005_PW

Table 1d: Attitudes and Fear related to SARS, and Probable PTSD

	Total (N=549)	Probable PTSD: No (N=494)	Probable PTSD: Yes (N=55)	P-value
DURING THE OUTBREAK				
Risk Perception (M)	3.7	3.5	5.6	< 0.0001
Risk Acceptance	65.8	67.2	53.4	0.0405
CURRENT FEAR OF SARS (M)	2.1	2.0	3.0	< 0.0001

Source: Beijing_SARS_001FB, 005_PW

Analysis II

- Logistic regression analyses were subsequently conducted in three steps, with probable PTSD as the outcome variable.

- Model 1: three variables measuring exposure to the SARS outbreak (exposure at work, any quarantining, and any indirect exposure) were entered into the equation, along with socio-demographic variables, and prior exposure to trauma, as control variables.

- Model 2: perception of SARS risks was added into the model.

- Model 3: risk acceptance was added.

- The three steps were intended to help us to assess the possible mediating effects of risk perception and risk acceptance.

Table 2: Logistic Regression Analysis of Factors Associated with Probable PTSD[a]

	Model 1	Model 2	Model 3
	AOR (95% CI)[b]	AOR (95% CI)	AOR (95% CI)
EVENT EXPOSURE			
Work Exposure	2.09 (1.03, 4.26)*	1.64 (0.78, 3.42)	1.73 (0.82, 3.64)
Any Quarantining	2.09 (1.00, 4.37)*	1.63 (0.75, 3.52)	1.68 (0.77, 3.66)
Any Indirect Exposure	3.08 (1.40, 6.81)**	3.30 (1.43, 7.66)**	3.44 (1.45, 8.19)**
ATTITUDES TOWARDS SARS DURING THE OUTBREAK			
Risk Perception[c]		1.47 (1.26, 1.72)***	1.49 (1.27, 1.75)**
Risk Acceptance			0.47 (0.25, 0.89)*

[a] In all models, age, gender, family income, education level, marital status and any prior exposure are controlled for.
[b] AOR = Adjusted Odds Ratio; CI = Confidence Interval.
[c] Continuous variable.

Analysis III

Multiple linear regression analysis was conducted to examine the factors affecting HCWs' current fear of another SARS outbreak.

Table 3: Multiple Regression Analysis of Factors Associated with Current Level of Fear of SARS

	Estimated Regression Coefficient	P-value
SOCIO-DEMOGRAPHIC FACTORS		
Female	0.226	0.0040
Age (Ref = 51 and older)		
35 and younger	-0.108	0.2793
36-50	-0.072	0.4168
Low Educational Level	-0.281	< 0.0001
Married	0.236	0.0115
DURING-OUTBREAK ATTITUDES TOWARDS SARS		
Risk Perception	0.102	< 0.0001
Risk Acceptance	-0.167	0.0158
Probable PTSD	0.797	< 0.0001

Summary (1)

- One of the strengths of this study is the examination of probable PTSD in relation to different types of exposure to the SARS outbreak, including exposure to SARS at work, being quarantined, a death or illness of a relative or friend from SARS, and exposure to media coverage of the outbreak, as well as exposure to other traumatic events prior to or following the SARS outbreak.

- Our findings indicate that exposure to the SARS outbreak at work, being quarantined, and the death or illness of a relative or friend from SARS, all independently contributed to probable PTSD. On the other hand, media exposure and exposure to other traumatic events prior to or following exposure to the SARS outbreak were not related to posttraumatic stress.

Summary (2)

- Another strength of this study is the examination of the relationship of risk perception and altruistic acceptance of risk, with level of exposure to SARS, probable PTSD and fear of future infectious disease outbreaks. Our findings provide information that may prove useful toward improving understanding of the role of risk perception in psychopathology.

- Our study found that the impact of exposure to the SARS outbreak (exposure through work or being quarantined) on HCWs' posttraumatic stress may have been mediated by their perceptions of the related risks. The effect of indirect exposure was not being mediated by risk perception levels.

Summary (3)

- **Although a few years have passed since the SARS outbreak, due to the high level of contagiousness, relatively high mortality rate, and initial ignorance about the nature of the disease, SARS-related fears still exist among HCWs. Therefore, improving our understanding of these fears and the associated factors can be useful for policy makers preparing to respond to possible future outbreaks of infectious disease.**

- **It was not surprising to find probable PTSD to be positively associated with HCWs' current fear of another outbreak of SARS or similar diseases. We also found that, among HCWs, there was more fear of SARS among females and among married health care workers. The latter finding may indicate that having greater family responsibilities increases an individual's level of fear in the context of an infectious disease outbreak.**

Summary (4)

- **The finding that risk perception and altruistic acceptance of risk independently contribute (though in opposite directions) to HCWs' fear of a future outbreak of SARS or another infectious disease, provides important information for policy makers and public health officials.**
- **The level of perceived disaster-related risk will be influenced by the individual's level of awareness and knowledge related to the disaster. Government programs aimed at raising such knowledge and awareness influence individuals' perceptions, and may help a society to become better prepared, and be more in control of a disaster situation; however, such programs may also have detrimental effects, as a result of raising people's anxiety levels. More studies are needed to understand how levels of preparedness at the government or community level influence individuals' risk perceptions, and, in turn, their anxiety levels and general mental health status.**

The End