

Short title: Representations of swine flu

Representations of swine flu: perspectives from a Malaysian pig farm

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Abstract

Novel influenza viruses are seen, internationally, as posing considerable health challenges, but public responses to such viruses are often rooted in cultural representations of disease and risk. However, little research has been conducted in locations associated with the origin of a pandemic. We examined representations and risk perceptions associated with swine flu amongst 120 Malaysian pig farmers. Thirty-seven percent of respondents felt at particular risk of infection, two-thirds were somewhat or very concerned about being infected. Those respondents who were the most anxious believed particular societal 'out-groups' (homosexuals, homeless and prostitutes) to be at higher infection risk. Although few (4%) reported direct discrimination, 46% claimed friends had avoided them since the swine flu outbreak. Findings are discussed in the context of evolutionary, social representations and terror management theories of response to pandemic threat.

Keywords: Swine Flu, Social representations, Terror Management Theory, Evolutionary Psychology.

Introduction

Swine flu (Influenza A/H1N1/pdm) is a rapidly spreading influenza virus transmitted between humans through coughing or sneezing or via contaminated hands or surfaces (WHO, 2009). An outbreak of the virus in the United States in early 1976 led to the death of a soldier in New Jersey, and left many unanswered questions about the origin and spread of the virus (Gaydos, Top, Hodder & Russell, 2006). A potentially more threatening outbreak emerged in the southern US in the spring of 2009, with early fatalities concentrated in Mexico, but with the virus rapidly spreading worldwide. The WHO declared swine flu a global pandemic on 11 June 2009, by which time an estimated 24,000 had been infected, and 143 had died.

International crises, such as pandemic influenzas pose considerable social, as well as medical, challenges. Although pandemics range from mild to very severe, in contemporary societies infectious diseases, even in ‘far-flung’ places, quickly come to the attention of an international audience (Joffe & Haarhoff, 2002). Modern travel, and mass transportation, means that human-transmittable influenzas may take only days to travel worldwide (Fielding, Lam, Ho, Lam, Hedley & Leung, 2005; Washer, 2004). The deaths of normally ‘healthy’ people can shock both professionals and the lay public (Sim & Mackie, 2009). Governmental warnings about the emergence of a pandemic often serve only to raise anxiety levels (Fielding et al., 2005) and can rapidly contribute to a state of panic, such as the ‘SARS phobia’ that followed the outbreak of Severe Acute Respiratory Syndrome in Asia in 2003 (Cheng, 2004). Faced with an apparently uncontrollable threat, individuals often turn to emotion-focused strategies to cope (Mak, Ho, Cheung, Woo, Cheung, & Lee, 2006). In this paper, we analyse data from a study conducted in Malaysia, focussing on pig farmers, a group at the centre of much public attention during the swine flu crisis (*The Guardian*, May 2009). Here we considered representations of the epidemic, alongside how the farmers themselves changed their daily interactions with others as a result of the crisis. We consider three

theoretical approaches— evolutionary theory, the theory of social representations and terror management theory – in order to help us understand our findings and comprehend representations of, and responses to, the 2009 swine flu pandemic. We introduce each of these briefly below.

Evolutionary theory

One approach to understanding responses to threatening pandemics is evolutionary theory (Green et al, in press), which stresses the ancestral origins of our fear of infection, and the ways in which we respond to infection threat. Schaller and his colleagues suggest a parasitic model, where functionally evolved processes lead us to avoid immunologically dissimilar individuals (Fincher, Thornhill, Murray & Schaller, 2006; Schaller, 2006). As intergroup contact increases the risk of diseases, disease avoidance mechanisms means that individuals or groups foreign to an environment need to be treated with suspicion (Diamond, 1999; Green et al., in press). Those who violate cultural norms (for example, are ‘unusual’ in appearance) are seen as a particular threat for disease spread (Faulkner, Schaller, Park & Duncan, 2004; Schaller, 2006). Because the cost of interaction with other groups outweighs its benefits during times of particular disease threat (high levels of parasitic induced morbidity and mortality), xenophobia and ethnocentrism is likely to increase during such times (Schaller, 2006; Park, Schaller & Crandall, 2007). During such moments, responses are biased towards ‘false positives’ – we are more likely to infer that people are risky because this is less costly for our health than to erroneously assume that they are safe (Faulkner et al, 2004; Park et al., 2007). High parasitic stress is also likely to correlate with ‘moral disgust’, with such a response ‘species-typical’ i.e. universal (Thornhill, Fincher & Aran, 2009).

This evolutionary approach is often controversial. Adaptationist accounts which link early ancestral environment and illness have been seen as difficult to test empirically (Nettle,

2004), reflecting wider questions about the challenges involved in rigorously examining some evolutionary hypotheses (Barker, 1981, Chauvin, 1980). This is not to simply reject evolutionary accounts, but to recognise the likely interplay of biological, psychological and cultural and historical factors in determining disease responses.

Social representations theory

While evolutionary psychology focuses primarily on our ancestral past, social representations theory complements this approach by “showing how fears and anxieties are collectively shared and culturally transmitted” (Green et al., in press), and the normative processes by which such mechanisms become contemporary societal attitudes.

Social representations can be defined as “structured mental ... content about socially relevant phenomena, which take the form of images or metaphors ... created in everyday discourse between social groups” (Wagner, Elejabarrieta & Lahnsteiner, 1995, p. 673). These representations can be seen as a collection of different folk theories, common sense and everyday knowledge (Wagner, 1995), and, rooted in wider ideological beliefs in a society (Joffe & Staerklé, 2007), help sustain the existing social order. Social representations play important social functions in guiding and justifying actions (Páez, Echebarria, Valencia, Romo, San Juan, & Vergara, 1991), helping explain the often apparently ‘irrational’ thoughts about infectious disease held by individuals and communities (Bangerter & Green, 2010; Joffe & Staerklé, 2007). Drawing on historical examples, symbols and metaphors, these representations help anchor complex medical phenomena within existing knowledge and stereotypes, and can be particularly powerful in influencing new societal concerns (Joffe & Lee, 2004; Moscovici, 1984, Washer, 2004). Social representations can have important consequences: they may act as important barriers to health-protective behaviours, and can influence government campaigns and national health policies (Rosenbrock, Dubois-Arber,

Moore, Pinell, Schaeffer, & Setbon 2000). As such, the study of social representations has become an important topic in the analysis of newly emergent diseases (e.g. Joffe & Haarhoff, 2002, on Ebola; Washer, 2004, on SARS).

New epidemics are frequently placed within existing concerns about the risks associated with contemporary societies, and the consequences of globalisation (Joffe & Haarhoff, 2002; Washer, 2004). In the case of swine flu, this may manifest itself in concerns about the implications of intensive agricultural farming, which are seen as increasing infection risk (Khanna, Gupta, Gupta & Vijayan, 2009; Joffe & Lee, 2004; Washer, 2006). Beliefs about infection avoidance and those most likely to be at high risk of infection, are important components of the social representations of new diseases. As in the evolutionary accounts described above, those thought to be at risk from infectious diseases might be stigmatised and seen as ‘moral outcasts’ (Mak et al, 2006), allowing individuals to ‘cope’ by defensively distancing themselves from those they feel pose a threat (Joffe & Haarhoff, 2002; Washer, 2004). During the SARS outbreak, for example, particular groups were deemed as risky (e.g. those from Asian countries visiting Western countries), leading to ostracism and racism (Lee-Baggley, deLongis, Voorhoeave & Greenglass, 2004). ‘Outsiders’ may be viewed with suspicion, cast as the harbingers of dangerous diseases whose ‘strange’ habits are frequently seen as unclean (Green et al., in press). Washer captures this well in his discussion of SARS (2004, p. 2570): “The social representation of SARS resonates with representations of infectious diseases throughout history: we lay the blame for the new threat on those outside one’s own community, the ‘other’”.

Terror Management Theory

Social representations theory and evolutionary psychology focus on group and cultural or situational perceptions of threat. Derived from the theories of cultural anthropologist Ernest

Becker (e.g. Becker, 1973), Terror Management Theory is primarily concerned with the ways in which *individuals* try to boost their self-esteem and cultural worldviews when faced with their own mortality (e.g. Arndt, Greenberg, Schimel & Pyszczynski, 2002). One way of reinforcing these worldviews and sense of social reality is through the application of (primarily negative) stereotypes (Schimel et al., 1999). In situations where we fear for our life (“mortality salience”), we may feel comfortable only with those who fit our stereotypes, and reject out-group members (Schimel et al, 1999). As a consequence, heightened levels of personal anxiety are likely to lead towards the perception that out-group members pose the greatest risk.

Studying Swine flu: The perspective from Malaysia

Representations and perceptions of threat are likely to be culturally specific. Different societies hold different representations of risk and risk groups, with these representations reflecting both deeply held religious and moral beliefs, and particular, local experiences of epidemics and pandemics (Goodwin et al., 2003). Evolved processes are also likely to be influenced by local variables (Schaller, 2006), while nations may strive to conceal outbreaks for economic and reputational reasons (Cheng, 2004, Washer, 2004, 2006).

Particular concern has been expressed about the threat of swine flu spreading to Asia, where wet markets allow for major contact between people and live animals, and where there is the potential for the virus mixing with other influenza variants, such as avian influenza (Fielding et al, 2005). The dense urban populations characteristic of many Asian cultures have been seen as particularly likely to maximise infection and transmission opportunities (Fielding et al, 2005): during the SARS crisis, contamination was popularly associated with poverty, with those at risk seen as most likely to be living in close confines (Washer, 2004). As Wagner-Egger et al. demonstrate (this issue), lay participants are likely to see Asian

countries as a major source of emerging infectious diseases, with these nations seen as both victims of such diseases and, through their apparent 'lack of hygiene', contributors to its spread. In this paper we explore representations of swine flu, and anxieties about infection, amongst pig farmers in Malaysia.

Pig farmers in Malaysia

One particularly notable aspect of zoonotic diseases is the public assumption that a particular virus is linked to one particular animal (although viruses such as H1N1pdm are actually comprised of human, avian and swine components: Khanna et al, 2009). Environmental factors, such as physical closeness to the animals, are often associated with zoonotic risk (Joffe & Lee, 2004; Khanna et al, 2009), with important consequences for those involved in the rearing and sale of such animals. As Wagner-Egger et al. have shown in this edition, pig farms are likely to be associated with the emergence and transmission of swine flu: indeed, pigs are more frequently involved in interspecies transmission of influenza A than other animals (Khanna et al., 2009). Just as avian influenza prompted speculations about the hygiene practices of Chinese chicken rearers (Joffe & Lee, 2004), we might anticipate similar concerns about pig farmers during a swine flu pandemic. Although there has been previous work examining farm practice in relation to emerging infectious diseases (e.g. Liao, Lam, Jiang et al, 2009; Ly, Van Kerkhove, Holl, Froehlich, & Vong, 2007, both with relation to Avian influenza H5N1), there has been little analysis of social representations of disease on animal farms outside of Western settings (Joffe & Lee, 2004).

Malaysia has a particularly interesting relationship with its pig farmers, but is a country that has been less studied in the light of pandemic threats. The Malaysian population consists of 3 primary racial groups: Malays (65%), Indians (8%) and Chinese (26%) (Department of Statistics Malaysia, 2008). While pork is venerated and eaten regularly by the

Chinese (Goh, Tan, Chew et al, 2000), it is prohibited for consumption under Islam (the religion practised by most Malays). During 1998 and 1999 a new paramyxovirus, Nipah virus, caused severe febrile encephalitis in humans and had a high mortality rate, killing 105 - mostly those who had direct contact with pigs (Chua, 2003). This virus led to the slaughter of more than a million pigs, and had a substantive impact on the economic well-being of the (overwhelmingly Chinese) pig farmers. Pig culling has, however, occurred for more than just health reasons. A recent planned cull of pigs for religious and political reasons, planned by a ruling governmental coalition of mainly Muslim ethnic Malays, was cancelled following fears of exacerbating tension between Chinese and Malay ethnic groups (Thukral, 2007).

In this study we examined perceptions of risk and experiences of swine-flu related discrimination amongst pig farmers in Malaysia in the months July to September 2009. The Malaysian government responded to the swine flu threat in April 2009 by declaring that the H1N1pdm vaccine stock would be injected into pigs as a preventive measure. The Malaysia Health Minister directed all State Veterinary Services directors to monitor pig farms in their respective states as a precaution and to report on any sign of swine flu infection (BERNAMA, 2009). Pig workers were instructed to use face masks and, where workers showed similar symptoms to influenza, they were to be given leave and to undergo medical examination. In July 2009, Malaysian Deputy Health Minister reassured the upper house of parliament that H1N1pdm flu spreads between humans and the virus would not harm the public who consume pork. Two months later (September 2009) Perak State Health Committee Chairman indicated that knowledge among pig breeders on disease control was, however, still low. He urged pig farmers to monitor the level of their personal health as a second wave of the outbreak was predicted (The Pig Site, 11 September 2009).

Methods

Participants and procedure

Participants were 120 Malaysian pig farmers and handlers. Participants were predominantly (85%) male, and 90% were Chinese, reflecting the Chinese domination of this industry in Malaysia. Respondents were aged between 20 and 67 (mean age 38) and averaged nine years of schooling. Seventy percent of those questioned were married.

Participants were recruited from 35 pig farms randomly selected from a list of the 550 pig farms situated throughout the country. Fifteen farms (50 participants) in the State of Selangor were visited and questioned by a team of interviewers on their farms, using a structured questionnaire with translations in three languages (English, Mandarin, and Bahasa Malay). The same questionnaire was posted to the managers of the remaining 20 pig farms, with a request to distribute this amongst all pig handlers and farmers. This produced a further 70 responses.

Materials

We address four questions: 1) what are the most common representations of the origin and spread of swine flu? 2) which particular groups are seen 'at risk' of infection from the virus? 3) how does this perception of risk relate to individuals' own anxieties and reported behaviours? and 4) how have social contacts between pig farmers and other groups changed as a result of the swine flu threat? In line with other studies of the representation of viruses (e.g. Joffe & Haarhoff, 2002) our emphasis was on the socio-cultural meanings, rather than medical definitions, of swine flu.

The questionnaire first asked participants about the origins of swine flu (*what was the reason for this epidemic?*), how to protect oneself against swine flu (ten options, including *avoiding crowds, avoiding those known to be infected*), and personal concern about, and perception of, personal and group risk. Participants indicated which areas they would avoid

from a list of options based on the findings of our previous work on swine flu perception and risk in Europe and Asia (Goodwin et al., 2009) (*congested places, medical settings, Mexico, the US or other countries with high rates of infection*). Following Terror Management Theory we asked respondents “have you been thinking about your death more since the outbreak of swine flu?” (potential responses from *not more than before* to *much more than before* on a 3-point scale). We also asked participants “How concerned are you personally about you, yourself being the victim of this outbreak?” and “How concerned are you personally infecting your family?” (both on 4-point scales, from *not at all concerned* to *very concerned*). Participants indicated whether they changed their daily routine as a result of the threat posed by swine flu (*yes/no*). In line with previous work on transport use following SARS and Ebola outbreaks (Lee-Baggley et al., 2004; Washer, 2004) we asked participants if they intended to use public transport *less often, the same, or more often* as a result of the swine flu threat, and whether they were cancelling or delaying travel by air as a result of the threat (*yes / no*).

Respondents also assessed relative risk of infection from a list of eleven groups also taken from our earlier work in this country (Goodwin et al., 2009), and from other work based on previous research on representations and reactions to HIV/AIDS, the Ebola virus and SARS (Lee-Baggley et al, 2004; Cheng, 2004; Goodwin et al., 2003; Joffe & Haarhoff, 2002; Mak et al, 2006; Washer, 2004). A list of these groups is in Table 1. These groups included three ‘moral outgroups’ (prostitutes/ the highly sexually active, homosexuals, alcoholics), often marginalised by wider society and associated with risk in previous epidemics (Goodwin et al, 2003; Joffe & Staerklé, 2007). Given the link between (a failure of) self-control over destiny and broader societal rejection (Joffe & Staerklé, 2007), we included ‘the homeless’ as a further group for comparison. We incorporated pig farmers as well as ‘general farmers’ in our list of risk groups. We added ‘city workers’ to tap concerns about infection in crowded places (Lee-Baggley et al., 2004), ‘health care workers’ as these

have direct contact with the sick, and ‘airport workers’ as a group who were seen as at the ‘front line’ of new infections entering a country (*The Daily Telegraph*, 3rd May, 2009). Media discussions about the unusually high initial infection rates amongst the young (MSNBC, 6th May 2009) meant we included young adults as risk groups, as well as the elderly, another group at higher risk from seasonal influenzas. Finally, we included the immune compromised, with this latter group not only at risk from seasonal influenza, but may also liable to be outcast as otherwise inferior, and even “morally indecent” (Green et al, in press; Joffe & Staerklé, 2007). Relative risk was assessed using a three-point relative risks scale (from *more at risk than me* to *less at risk than me*).

Respondents indicated changes in actual contact with a related list of others, as a result of the pandemic (children other than your family, elderly other than family, health workers, the sexually active, frequent travellers, homosexuals, and ‘immoral people’¹, all on a 3-point scale *spend less time with than usual, no difference, spend more time with than usual*). Finally, respondents indicated whether friends (or family) wanted to spend less time with them since the outbreak (using the same contact scale) and whether they had experienced or felt discriminated against as a result of the virus (all *yes, no, or unsure*).

Results

The origin of swine flu

Respondents were asked to indicate the reason for this epidemic; on the basis of the previous research respondents were given a choice of farming methods, the nature of modern life, gene or viral mutation or other reason/ did not know. Only 3 (3%) respondents mentioned farming methods; 30% mentioned “modern life”, a similar percentage “viral mutation”.

Perception of risk

Thirty-seven percent of respondents felt that they were at particular risk of infection, with a further 3% unsure. On a four point scale (*very concerned, somewhat concerned, a little concerned* and *not at all concerned*) 49% rated themselves as “somewhat concerned” about their own infection risk, or that to their family, with a further 17% very concerned (mean score 2.66/4, where a high score indicates greater concern); using a similar scale, 42% were somewhat concerned, 21% very concerned about infecting their own family (mean 2.65). Thirty-three percent of the respondents claimed that they had been thinking a little more about death and their mortality as a result of the pandemic, 12% a lot more, with the remainder reporting that they were not thinking about their mortality more than before the threat. Respondents also judged comparative risk for the 11 groups on a 3-point scale ranging from *much less risk than me* to *riskier than me*. Table 1 lists comparative risk estimates for the groups assessed. As can be seen, the immune compromised, airport workers, health workers, the elderly, those who are highly sexually active and homosexuals were all more likely to be seen as at greater risk of infection.

Risk groups and avoidant behaviour

Respondents could provide multiple responses to the best way to protect themselves against infection (Table 2). The five most frequent answers were hand washing (57%), avoiding crowds (55%), keeping away from infected countries (41%), or infected people (40%), and the wearing of gloves and masks (40%). Thirty-eight percent reported they were less likely to use public transport, 37% less likely to travel by air, as a result of the threat. However, only 16% indicated that they would change their daily routine to avoid infection. There was a significant correlation between worry and cancelling flights ($r(114) = .23, p < .01$), and worry and work distraction ($r(114) = .42, p < .01$), and a marginal correlation between worry and reducing public transport use ($r(114) = .16, p < .09$).

Participants also indicated how they might change their social interactions as a result of the pandemic with children (other than your family), other adults (other than family), elderly (other than family), health workers, the sexually active, frequent travellers, homosexuals, and ‘immoral people’. There was no significant increase in interaction for any of these categories (no more than 3% reported an increase for any of these target interactants) but significant numbers of respondents did report a desire to spend less time with frequent travellers, ‘immoral’ people, those deemed highly sexually active, homosexuals and health workers (respectively mentioned by 46%, 45%, 42%, 38% and 36% of respondents). Worry was correlated significantly with the perception that the homeless and homosexuals were at higher risk (respective r s (106, 104) = .24, .22, both $p < .05$). Finally we correlated perceived personal risk with declared avoidance of other groups. Those who were more anxious about being a victim were more likely to report an actual change in contact with children and the young (r (114) = .20, $p < .05$), with health workers (r (109) = .25, $p < .01$), those seen as highly sexually active (r (107) = .38, $p < .01$), other pig farmers (r (107) = .28, $p < .01$), frequent travellers (r (109) = .33, $p < .01$), homosexuals (r (101) = .46, $p < .01$) and ‘the immoral’ (r (100) = .45, $p < .01$).

Perceived discrimination

Sixty-four percent of our respondents indicated that being a pig farmer had significantly influenced the social time they spent with others, with a further 25% unsure. 46% claimed that friends had avoided them since the outbreak of swine flu, 48% claimed the same for family. However, reported direct discrimination was low: only 4% mentioned that they had been directly discriminated against as a result of the outbreak, with 17% unsure.

General Discussion

Major influenza pandemics occurred three times in the 20th century: in 1918, 1957 and 1968 (WHO, 2008). Although there has been some important work on risk perception and attribution processes in farm settings (e.g. Lia, Lam, Dang et al, 2009; Ly et al, 2007) little work has been conducted on understanding representations of risk groups and their behavioural implications in sites of potential zoonotic infection. Our present study should therefore permit us important insights into representations and threat perceptions amongst a relevant respondent group during pandemic threat, and the impact of being located in the potential centre of a pandemic on daily interactions. Our data was collected relatively early in the H1N1pdm outbreak: major pandemics may last two or three years (WHO, 2008), and understanding initial representations may be vital in tackling later prejudice and pandemic-related behaviours.

In our modern ‘risk’ society, risk is globalised: in the words of Beck (1992), risks “dip under borders” (p. 36). Our participants were particularly likely to associate the virus with viral mutation and the link with ‘modern life’, referencing an association between (lax) modern regulation and emergent diseases noted elsewhere (Joffe & Lee, 2004; Pidgeon, Kasperson & Slovic, 2003; Washer, 2006). This also echoes the strong link between environment and health made by Chinese respondents in other studies of pandemic threat (Joffe & Lee, 2004). In a ‘risk society’, agriculture can also be seen as threatening, providing a “distribution point” for dangerous toxins (Beck, 1992, p. 79), acting as an exemplar of “industrially forced degradation of the ecological and natural foundations of life” (Beck, 1992, p. 80). However, few of our respondents directly related agriculture or farming methods to the present swine flu outbreak. Work on previous major influenza outbreaks in Asia has also found that those closely related to relevant industries (e.g. poultry retailers during H5N1) were likely to downplay pandemic threat, and were consequently less likely to change their husbandry and related habits (Liao, Lam, Dang, Jiang, Udomprasertgul &

Fielding, 2009; Ly et al., 2007). Perhaps as a result of this, behavioural change may be limited, with few of our respondents indicating a change in their daily routine as a result of the pandemic.

To personally protect themselves against the threat of infection, participants suggested a series of measures largely reflective of the advice given by health professionals (e.g. regularly washing hands, avoiding large gatherings) (cf. Khanna et al., 2009). However, consistent with previous observations from evolutionary psychology, cultural anthropology and research on social representations, participants suggested some particular groups to be at enhanced risk, despite the lack of epidemiological evidence for this assumption. Such groups included apparent ‘moral outgroups’, such as prostitutes and homosexuals. Homosexuals in Malaysia may be seen as having compromised immunity through the association of homosexuality with HIV/AIDS, and may be viewed as transgressing a social norm of restrained sexuality in an otherwise conservative nation (see Joffe & Staerklé, 2007). Collectivist societies – such as Malaysia (Hofstede, 2001) – are liable to restrict women’s sexual behaviour, and are more likely to condemn promiscuity (Goodwin, 1999). While our respondents were largely not Muslim, negative attitudes towards prostitutes and homosexuals in Malaysian society as a whole are likely to reflect the influence of Qur’anic verses and later influential religious commentaries in that culture: in the words of Sahih al-Bukhari (3:34:439), “Allah's Apostle forbade taking the price of a dog, money earned by prostitution”. Those on the fringes of society are particularly likely to be seen as importers of disease (Douglas, 1992). ‘Moral weakness’ during a time of widespread disease threat can be seen as potentially damaging, so that infectious disease acts as “a resource for controlling designated public enemies” (Douglas, 1992, p. 85). Because infection is often hidden, and therefore carriers are not obvious, this allows a ready opportunity for accusation or exclusion (Douglas, 1992). Hence, while we do recognise that our respondents were presented with limited categories of

possible 'out-groups', we would also contend that such risk perceptions reflect persisting associations between poor self-control and health (Joffe & Lee, 2004; Joffe & Staerklé, 2007) and wider cultural perceptions of 'immoral' behaviour and disease risk (Sontag, 1989).

In our data, almost a third of our pig farmers claimed city workers were at significantly greater risk than themselves. This too may reflect perceptions about the risks of 'modern life', as well as a view that crowding was a risk factor in disease spread. Recent memories of infection (e.g. SARS, which led to two deaths in Malaysia) are likely to have informed our respondent's anxiety about their personal susceptibility to infection. The relatively high level of worry amongst our sample appears to challenge the argument that Asian populations are more 'resilient' to fears, due to their history of exposure to hardship and disease (Ji, Zhang, Usborne & Guan, 2004). Consistent with terror management approaches, the actual avoidance of particular groups was correlated with personal anxiety, with a notable association between individual worry and the tendency to see socially marginalized groups (the homeless, homosexuals, prostitutes) as at higher risk. This is likely to have a number of implications. Increased levels of personal concerns can lead to a tendency to reinforce worldviews through stereotyping, underlining the need for responsible media campaigns that provide proportional risk assessments and clear, practical guidelines for the minimization of risk. A tendency to see particular groups (e.g. health workers) as at risk can have important implications in contributing towards the avoidance of health-protective behaviours (De Vet, Nooijer, Oenema, de Vries & Brug, 2008), while previously marginalized social groups may be less likely to receive appropriate medical resources as a result (Mak et al, 2006). While few of our respondents reported direct discrimination as a result of their occupation, there was evidence of avoidance by some significant others, with almost half of the farmers claiming that friends or family had them as a result of the pandemic, and almost two-thirds reporting a reduction in their social activities.

Social representations of disease – and subsequent responses to perceived threat - are dynamic and fast changing, making the study of emergent representations itself a race against time (Cheng, 2004, Lau, Yang, Tsui, & Kim, 2003). Particularly important may be the gathering of data during the escalating responses that accompany WHO epidemic/ pandemic alert phases 4 and 5 (Gupta, Toby, Bandopadhyay, Cooke, Gelb, & Nguyen-Van-Tam, 2006). In previous work conducted during swine flu Pandemic Stage 5 (April and May, 2009), 302 students and community members in Kuala Lumpur answered similar questions to those asked of the pig farmers in the current study (partly published in Goodwin et al., 2009). Although our samples were of course very different, many of our findings reported in our current study were also evident in this broader population. The same ‘outgroups’ were seen as at heightened risk (the homeless, homosexuals, prostitutes), with this risk perception significantly related to perceived personal vulnerability to infection (respective r s for these three groups .27, .24 and .19, all $p < .001$). Our pig farmers were, however, twice as likely to report city workers as a high risk group than our respondents in Kuala Lumpur (32% versus 15%), consistent with earlier work suggesting differential pandemic threat perceptions amongst those living in urban and rural settings (Liao, Lau, Dang et al, 2009). Future studies should aim to conduct longitudinal studies with samples of selected groups of respondents (e.g. city employees, farm workers) in order to help tease out both the longitudinal and group-specific nature of emerging disease representations.

Limitations and further research

This paper provides ‘snap shots’ of representations during a specific time in the life cycle of a particular disease (swine flu), and temporal and financial restrictions limited the number of questions we could ask and the methods we employed. Indeed, depending on the course of the pandemic, continued exposure to a hazard may make people feel more or less at risk, and

develop beliefs and actions accordingly (Fielding et al, 2005). Our pig farms were all within two hours drive of the capital and may therefore not represent the full country. In particular, our analysis of transport use, and flying in particular, may have been influenced by baseline usage, although the growth of budget airlines such as Air Asia does make such flying a popular choice, even within Malaysia. Finally, our data was self-report and inevitably self-selective, and could be helpfully complemented by the use of other methods, such as the analysis of media reports (e.g. Joffe & Haarhoff, 2002). In particular, forced choices (such as the limited options given to our respondents when discussing the origins of swine flu) can be supplemented by more open-ended measures that allow for a broader range of responses.

Several variables not directly assessed in this research may also influence behavioural responses to influenza pandemics. The perceived costs involved in modifying behaviours may be a useful additional variable (Tang & Wong, 2005). Further individual factors, such as personal values, may both influence threat perception and moderate the relationship between the threat of disease and avoidance behaviours (Schaller, 2006). More research in particular is needed into the potentially complex relationship between the general population and health-care workers, a group often discriminated against during influenza pandemics and avoided by many of our pig farmers (Bai, Lin, Lin, Chen, Chue & Chou, 2004). Such a group may act as vital gatekeepers to medical care during prolonged pandemic threat.

Wider implications

Representations of swine flu are set within broader public health and political contexts. Apparent contradictions – or exaggerations – by governmental representatives regarding swine flu risks can lead to confusion and threaten centrally promoted policies (Bloom, 2003; Sim & Mackie, 2009). Newspaper headlines over major health threats often seem to equivocate between panic and reassurance (Washer, 2006; Ungar, 1999). Indeed,

swine flu media coverage proved to be a good example of an “on-again, off-again outbreak and pandemic” (Briggs & Nichter, 2009, p. 190), with politicians opting for a dual rhetoric which both raised alarm and reassured the public, sometimes within a single statement (Briggs & Nichter, 2009). The ‘anchoring’ of swine flu largely within the context of the 1918 Spanish flu emphasised the threatening aspect of the pandemic (cf. Bauer & Gaskell, 1999), while health news was often closely shaped in close relation to health advertising (Briggs & Nichter, 2009), as well as broader debates over the role of pharmaceutical companies (Jenkins, 2010). Much early media coverage also served to reinforce stereotypes: while Mexican health officials were generally seen by international experts as effective, the media often portrayed Mexicans as unhygienic and irresponsible in delaying their reporting of the epidemic (Briggs & Nichter, 2009).

The implications of a pandemic threat can, of course, go beyond the initial loss of lives in a country. Pandemics are particularly likely to hit resource-poor regions (WHO, 2008), often leading to a further diminution in economic activity within a country (for example, through its effect on market places, restaurants and tourism). This can then lead to further economic negative impacts on a nation (Lee-Baggley et al, 2004), as well as the inability of that nation to cope with other health challenges (WHO, 2008). Inevitably, therefore, high levels of threat awareness do not necessarily predict behavioural change (de Zwart et al, 2007). Understanding representations of pandemic threat, and their implications for health behaviours and social relations, is therefore an important ongoing task for social scientists in a world of continuing disease challenges.

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Footnote

¹ There is, of course, a question as to the extent to which respondents would have previously had contact with homosexuals, or at least the degree to which they would admit to this in a society which strongly condemns homosexuality. However, we believe the response given by our pig farmers illustrates the tendency to reject all potential out-groups in the light of anxiety about swine flu.

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Table 1: "Risk groups" and relative risk (Frequency, Percentage)

Group	Much less risk	Same risk	Much greater risk
Health workers	14 (12)	37 (33)	63 (55)
General farmers	25 (23)	75 (69)	9 (8)
City workers	18 (16)	58 (52)	36 (32)
Airport workers	14 (12)	32 (28)	69 (60)
Homeless people	23 (21)	54 (50)	32 (29)
Prostitutes/ highly sexually active	13 (12)	45 (42)	49 (46)
Alcoholics	24 (22)	65 (60)	19 (18)
Homosexuals	16 (15)	51 (48)	40 (37)
Young adults	26 (24)	70 (65)	11 (10)
Elderly	15 (14)	44 (41)	49 (46)
Immune weakened	3 (3)	23 (20)	87 (77)

Table 2: Most frequently mentioned ways of best protection against infection

Method of protection	Frequency	Percentage
Regularly wash hands	68	57
Avoid crowds	65	55
Avoid infected people	47	40
Avoid infected countries	49	41
Wear gloves and mask	47	40
Vaccination	20	17
Avoid contact with diseased pigs	16	13
Take antivirus/antibiotic	12	10

Note: Only methods mentioned by more than 10% of respondents are included.