Title: Public perceptions of risk from the Ebola virus and likely behavioural responses to an outbreak

(Original article)

Running head: PERCEPTIONS OF RISK FROM THE EBOLA VIRUS

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ABSTRACT

Aims: To examine the public perceptions of the risk of an Ebola outbreak and the factors associated with planned protective behaviour.

Methods: A cross sectional telephone survey using random digit dialling of 750 members of the New Zealand public between February 12-19, 2015.

Results: Most of the sample (72%) reported they had been following news of the outbreak closely and 28% reported concern that there would be a large outbreak in New Zealand. While 47% of the public were very confident in the public health authorities risk assessment, only 29% were confident about the ability of NZ hospitals to control the outbreak. High rates of planned protective behaviour, in terms of avoiding contact with other people were reported, with 23% reporting they would avoid going to work, using public transport (49%), sending children to school (42%) and public events (52%). A greater number of intended protective behaviours were associated with younger age, a higher concern, and lower confidence in the ability of hospitals to contain the outbreak.

Conclusions: An Ebola outbreak would have large social and economic consequences due to the large proportion of the population who intend to avoid social contact in order to protect their health.

INTRODUCTION

In 2014 the WHO declared the Ebola Virus disease outbreak in West Africa to be a public health emergency of international concern. The outbreak in the West African countries of Liberia, Sierra Leone and Guinea has caused over 23,000 deaths and infected over 500 health workers. Ebola is highly contagious and spreads through contact with body fluids of infected patients. The virus has caused devastating effects in the affected families and communities and produced serious economic consequences in the countries affected. In October 2014 a nurse in Spain and two nurses in the United States developed Ebola after caring for patients who had been transferred from West Africa. Media stories on Ebola increased, often providing information that was alarming and inaccurate.[1]

While no cases of Ebola have occurred in New Zealand, the outbreak received intense coverage in mainstream and social media, which may have increased perceptions of risk. The public's perception of risk, rather than actual risk, has been shown to be a major determinant of protective behaviour following infectious disease outbreaks.[2] Evidence shows that the public are more likely to plan or to adopt protective behaviour when they feel personally at risk, the illness is seen as having severe consequences, the infectious disease engenders high levels of anxiety and the health authorities are perceived as being unable to control the outbreak.[3-6]

Understanding how perceptions of risk about Ebola influence plans to adopt protective behaviour may help health authorities understand the likely impact of an outbreak on behaviours such as using public transport, keeping children from school and going to public events. It may also help target messages to the public to correct misperceptions about the efficacy of specific protective behaviours. In this study we investigated public perceptions of risk from the Ebola outbreak and the factors associated with anticipated protective behaviour in a cross-sectional telephone survey of the NZ general population.

METHODS

Participants

A representative sample of 750 members the New Zealand population was recruited for the telephone survey using random digit dialling. A nationally representative sample was achieved using set quotas based on age, gender and regional distribution of New Zealand. Telephone interviews were conducted between the 12th and 19th of February, 2015.

Measures

Demographic Information

Information was collected on the participant's gender, age group, region of residence within New Zealand, marital status, employment, education level, ethnicity, and household composition.

Views of Ebola

Participants were asked four questions about their knowledge of and concerns about the Ebola outbreak. First, they were asked *how closely are you following news about the recent outbreak of Ebola in West Africa?* Responses were on a 4-point scale from *not at all closely* (1) to *very closely* (4), or *I haven't heard of Ebola.* Participants who gave the final response (n = 6) were excluded from subsequent analyses. Second, participants were asked *how concerned are you that there will be a large outbreak inside New Zealand within the next 12 months?* Responses were on a 4-point scale from *not at all concerned* (1) to *very concerned* (4), or *don't know*.

Next participants were informed that *public health authorities have said that the risk of the Ebola virus spreading to New Zealand and causing an outbreak here is low* and asked *How confident are you in this assessment?* Response options were from *not at all confident* (1) to *very confident* (4), or *don't know*. Finally participants were asked *how confident are you that if the Ebola outbreak spread to New Zealand, that New Zealand hospitals and medical services could contain the outbreak and stop it spreading?* Responses were from *not at all confident* (1) to *very confident* (4) or *don't know*. For all of the above questions, participants who responded *don't know* were not included in the binary logistic regression analyses.

Protective behaviour.

Finally, participants were asked *if there was an Ebola outbreak in New Zealand, would this cause you to reduce any of the following activities: going to work; using public transport; flying domestically; flying internationally; going to public events such as movies, sporting events or concert;, going to hospitals or to the doctor; going into shops; sending my children to school or childcare*. Response options were *yes, no,* or *maybe.*

Statistical Analysis

Statistical analyses were conducted using IBM SPSS Statistics 22. Responses to questions about participants' knowledge of and concerns about Ebola, as well as anticipated protective behaviours, were assessed by frequency of each possible answer. The affirmative responses to questions about protective behaviour were summed give a value between 0 and 8. A multiple regression was then used to identify demographic variables and perceptions that were associated with reported intention to take protective actions during an outbreak. Demographic predictor variables of age (four groups: 29 and under, 30 to 44, 45 to 59, and 60 and over), gender, and education (dichotomized to some or completed high school, and tertiary qualification) were entered into the model. Participants' reported views of Ebola (following news, outbreak concern, confidence in health authorities assessment, and confidence that health systems could stop spread) were also entered. An alpha level of .05 was used for all statistical tests.

RESULTS

Sample Demographics

The sample comprised 750 participants: 359 males (48%) and 391 females (52%). 14% were aged 29 years or less, 37% were 30-44, 19% were 45-59 years, and 30% were aged 60 and over. The participants' first reported ethnicity was: 72% NZ European, 10% Maori, 2% Pacific Island, 9% non-NZ European, 6% Asian, and 2% another ethnicity.

Knowledge of and concerns about the Ebola outbreak

The majority of participants reported that they had been following the news about the recent outbreak of Ebola in West Africa either very closely (21%) or somewhat closely (51%). Only 20% had not been following very closely, and 8% not at all closely. A very small number of participants had never heard of Ebola (1%), and were excluded from further analyses. A large majority of participants reported that their primary source of information about Ebola was the news media (87%), followed by social media sources (5%). When a secondary source of information was reported, it was mostly social media (10%).

After establishing the level and type of information seeking, participants were asked about their level of concern that there would be a large Ebola outbreak in New Zealand within the next 12 months. The majority of respondents were not very concerned (41%), or not at all concerned (30%). Just over one fifth of

participants (21%) reported being somewhat concerned, and 7% were very concerned. Three participants were unsure when asked about their level of concern about a potential Ebola outbreak.

Participants were also asked about their level of confidence in the assessment by public health authorities that the risk of an Ebola outbreak in New Zealand was low. The majority of participants had high levels of confidence in this assessment, reporting being very confident (48%) or somewhat confident (41%). A minority of respondents were not very confident (8%), not at all confident (2%), or unsure (1%). Levels of reported confidence that New Zealand hospitals and medical services could contain an Ebola outbreak were not as high, with 23% of participants reporting being very confident, and 46% somewhat confident. However, a relatively large proportion reported being not very confident (23%), and 6% were not at all confident, or unsure (2%).

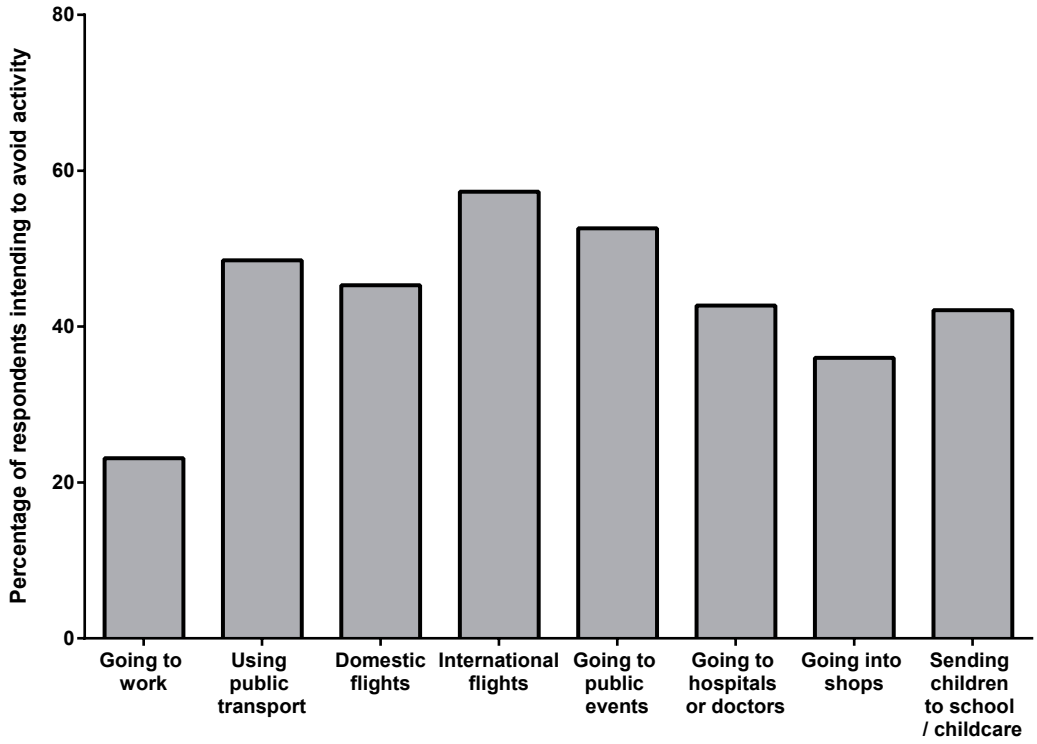
Protective Behaviours in the Event of an Outbreak

There were high numbers of the population who would reduce their activities to potentially limit their exposure to the virus. As is shown in Figure 1, almost one quarter (23%) reported that they would reduce going to work, 49% would reduce their use of public transport, 45% and 57% would reduce domestic and international flights, respectively. Around half of respondents (53%) said they would reduce their attendance at public events such as movies, sporting events or concerts, 43% would avoid hospitals or going to

the doctor, 36% would reduce going into shops, and 42% would try to avoid sending their children to school or child care. (Figure 1)

Figure 1

Percentage of respondents intending to cease activities to avoid potential contact with Ebola virus



Predictors of Protective Behaviours

A multiple regression analysis was carried out to assess the influence of demographic variables and perceptions of Ebola on the number of protective behaviours that participants reported that they would engage in if there was an Ebola outbreak. The

demographic variables of age, sex, and education alone predicted a significant amount of the variance in the number of protective behaviours reported, $F(1, 715) = 6.119$, $p < .001$, $R^2_{adj} = .021$. The addition of the participants' perceptions of Ebola predicted a significantly greater amount of variance than did demographics alone, $F_{change}(7, 711) = 14.092$, $p < .001$, $R^2_{change} = .072$. The overall model predicted a significant amount of variance in the number of intended protective behaviours, $F(7, 711) = 10.867$, $p < .001$, $R^2_{adj} = .088$. Greater age was significantly associated with fewer protective behaviours. Greater concern about a NZ outbreak and lower confidence in NZ hospitals and medical services to contain the virus and stop it spreading were associated with higher numbers of intended protective behaviours (Table 1).

Table 1

Results of final multiple regression model: variables predicting total number of intended protective behaviours

	Beta	t	Sig.
Age	-.114	-3.104	.002
Sex	.069	1.918	.056
Education	-.043	-1.160	.246

Follow News	.036	.995	.320
Concern about NZ outbreak	.121	2.910	.004
Confidence in risk assessment	-.047	-1.091	.276
Confidence in NZ hospitals to stop spread	-.176	-4.533	.000

DISCUSSION

This survey was conducted in February 2015, when approximately 23,250 cases of Ebola had occurred in Africa, causing approximately 9,380 deaths.[7] We found that most New Zealanders had been closely following stories about Ebola in the news media. The majority of respondents were not concerned that there would be a large outbreak of Ebola in New Zealand and were confident that New Zealand medical services would be able to prevent the spread of disease. However, approximately 7% of the sample was very concerned that there would be a large outbreak inside New Zealand within the next 12 months, and 30% were not confident that New Zealand hospitals and medical services would be able to contain an outbreak and stop it spreading within New Zealand.

Almost half of respondents reported that if there were an Ebola outbreak in New Zealand they would avoid using public transport, attending public events, and sending their children to

school. A lesser proportion reported they would avoid going to work and going into shops. Even if the proportion of New Zealanders who actually would have responded in these ways to a local outbreak was only one tenth of those who indicated an intention to change their usual behaviour, the impact on New Zealand communities and the economy would have been extremely disruptive. We found that the total number of protective behaviours that respondents reported they would adopt in the event of an Ebola outbreak in New Zealand, was significantly correlated both with their level of concern that there would be a large Ebola outbreak in New Zealand in the next 12 months, and with their level of confidence in the New Zealand medical services to contain an outbreak.

Our findings are consistent with previous studies looking at the relationship between perceptions of risk and the likelihood of engaging in protective behaviour during a pandemic.[3-6,8] A recent study in Sweden investigated the self-reported intentions of Swedish adults with regard to social distancing in the event of an influenza outbreak.[9] This study found that approximately 10% of subjects indicated they would stay home when not ill, and approximately 25% reported an intention not to use public transport, during a future influenza outbreak. Subjects who reported an intention to engage in these social distancing were more likely to have higher levels of anxiety about catching influenza and about the severity of subsequent illness.

Our findings have implications for public health communications in the event of similar future health threats, particularly concerning the ability and preparedness of medical services to contain the outbreak. Providing frequent, reliable, estimates of the likelihood of a threat spreading to New Zealand may help to reassure those who become unduly fearful in response to news media reports from overseas. These messages had been available on the Ministry of Health website since September 2014, where Dr Don Mackie, the Chief Medical Officer of Health stated "*Our assessment is the risk of Ebola arriving in New Zealand is very low and the risk of actually having transmission of Ebola in New Zealand is extremely low*".[10] However, the results of our study suggest that a significant proportion of the New Zealand public either had not heard this message or had not been convinced by it. A priority for public health messages in relation to future health threats should be to provide frequent, realistic estimates of the likelihood of the threat occurring, and to repeatedly emphasise the preparedness and ability of the New Zealand health system to contain and manage the health threat.

The other significant correlation with the total number of protective behaviours that respondents reported they would adopt in the event of an Ebola outbreak in New Zealand was with the age of the respondent. Especial efforts to target public health messages at young people may reassure this population group and thus

reduce the proportion who may consider adopting protective behaviours. Increased use of social messaging and other innovative communication strategies may enhance the delivery of health messages to younger population groups.

Competing interests/ Conflicts of interest: Nil.

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