Television exposure is related to fear of avian flu, an Ecological Study across 23 member states of the European Union

Jan Van den Bulck, Kathleen Custers

Introduction

The risk of a pandemic resulting from the transmission of an avian influenza virus to humans and thence to other humans has been seen as a significant and real threat for some time. There is a lot of research and commentary on dealing with such a pandemic.1 It is widely assumed that the spreading virus would cause two problems, one being the medical emergency created by countless sufferers and insufficient access to treatment,2 the other being considerable social chaos.3 Such social chaos is not only an extra burden, but may also play a role in spreading the disease as both fear of the disease and fear of stigma may delay detection and treatment.

It is important to note, however, that ‘even before a pandemic emerges, panic is a danger’.5 In other words: even when the disease has not spread among humans the fear of the disease may cause serious problems. In fact, it has been claimed that ‘widespread fear can lead to social and economic consequences as serious as the disease itself’.5 Infection is generally spread when one carrier infects another. A pandemic of fear, however, may be spread by a very different and arguably more virulent vector: the news media. This carrier has the potential to expose hundreds of thousands or more to the same frightening messages at the same time. Even though news media occasionally react to infectious disease with reassuring messages,6 most news reporting of contagion tends to stress risk and danger and minimize avenues for prevention, containment or treatment.7 Content analyses show that news coverage of avian influenza increased dramatically in 20048 but little, if anything, is known about the impact of such news on anxiety among the general public. One quasi-experiment examined the reactions of various community members, such as journalists and first responders, to simulated news stories about a bioterrorism outbreak,9 but no other studies appear to exist. As television (TV) news has been shown to increase fear responses regarding other issues10,11 it appears to be reasonable to assume that a relationship might exist between exposure to TV and fear of avian influenza.

The present study therefore examines whether an ecological relationship exists between numbers of hours of TV watched on average in different countries of the European Union and concern about avian influenza. The rationale for doing an ecological analysis is 2-fold. First, when other types of studies, such as randomized controlled trials or case control studies are absent or rare, ecological data offer a test of the association between variables.12 Second, it is virtually impossible to find people who have not been exposed to the messages of television and intra-population variation may therefore be limited. Comparing populations with differing exposure levels is an important tool to study such general-exposure variables.13 Relationships found in individual level studies may be small if exposure is universal. Stronger relationships may become obvious if the much larger variations which are likely to exist between populations are taken into account.14

Methods

Exposure variable

TV exposure

We used data from the European Audiovisual Observatory Yearbook15 to obtain national estimates of average TV viewing per person per day for the 25 countries of which the European Union consisted in 2005. TV viewing data for Luxemburg and Malta were missing and these countries are therefore not part of the analysis. TV viewing rates were obtained via the ‘people meter’ method in which a representative sample of a given population has a device installed which measures which members of the household (or guests) have watched which channels when and for how long. This is used to make extrapolations regarding national viewing rates. TV exposure is a good indicator of news exposure as it has been shown that avoiding news exposure is virtually absent among TV viewers.16

Background: A pandemic outbreak of H5N1 avian influenza is believed to coincide with large-scale panic. Even without an outbreak fear of infection may be widespread. Mass media coverage of the risks of a pandemic may lead to higher levels of fear. Methods: An ecological study looked at data from 23 member states of the European Union and controlled for population size, level of education, age distribution and income and wealth. Results: When the findings for Cyprus were excluded each additional hour of average TV viewing was associated with a 15.6% increase in the proportion of people worrying about the virus. TV viewing explained 52% of the variance. Conclusion: Fear of a pandemic precedes any real pandemic and may have to be dealt with separately. Exposure to television is highly associated with worrying about the virus. This relationship merits further study.

Keywords: avian influenza (H5N1), ecological study, fear, pandemic, television exposure.
Table 1 Raw data used in the analyses

<table>
<thead>
<tr>
<th>Country and country code</th>
<th>Percentage worried about viruses</th>
<th>Hours of TV per day</th>
<th>School expectancy at 5 years of age</th>
<th>PPP</th>
<th>Population (in million)</th>
<th>Percentage over 65</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria (at)</td>
<td>55</td>
<td>2.62</td>
<td>16.0</td>
<td>33 140</td>
<td>6.679</td>
<td>15.74</td>
</tr>
<tr>
<td>Belgium (be)</td>
<td>62</td>
<td>3.42</td>
<td>19.2</td>
<td>32 640</td>
<td>8.599</td>
<td>11.93</td>
</tr>
<tr>
<td>Cyprus (cy)</td>
<td>83</td>
<td>3.48</td>
<td>13.7</td>
<td>22 230</td>
<td>0.552</td>
<td>13.99</td>
</tr>
<tr>
<td>Czechia (cz)</td>
<td>65</td>
<td>3.43</td>
<td>16.3</td>
<td>20 140</td>
<td>8.572</td>
<td>13.81</td>
</tr>
<tr>
<td>Germany (de)</td>
<td>63</td>
<td>3.52</td>
<td>17.1</td>
<td>29 210</td>
<td>64.174</td>
<td>18.31</td>
</tr>
<tr>
<td>Denmark (dk)</td>
<td>53</td>
<td>2.55</td>
<td>18.0</td>
<td>33 570</td>
<td>4.380</td>
<td>Missing</td>
</tr>
<tr>
<td>Estonia (ee)</td>
<td>63</td>
<td>3.70</td>
<td>17.5</td>
<td>15 420</td>
<td>0.887</td>
<td>16.34</td>
</tr>
<tr>
<td>Greece (el)</td>
<td>79</td>
<td>4.08</td>
<td>16.3</td>
<td>23 620</td>
<td>8.674</td>
<td>17.98</td>
</tr>
<tr>
<td>Spain (es)</td>
<td>54</td>
<td>3.62</td>
<td>17.3</td>
<td>25 820</td>
<td>35.882</td>
<td>16.83</td>
</tr>
<tr>
<td>Finland (fi)</td>
<td>47</td>
<td>2.82</td>
<td>19.2</td>
<td>31 170</td>
<td>4.279</td>
<td>15.72</td>
</tr>
<tr>
<td>France (fr)</td>
<td>72</td>
<td>3.43</td>
<td>16.6</td>
<td>30 540</td>
<td>44.010</td>
<td>16.38</td>
</tr>
<tr>
<td>Hungary (hu)</td>
<td>74</td>
<td>4.42</td>
<td>16.8</td>
<td>16 940</td>
<td>8.503</td>
<td>15.56</td>
</tr>
<tr>
<td>Ireland (ie)</td>
<td>54</td>
<td>3.00</td>
<td>16.6</td>
<td>34 720</td>
<td>3.090</td>
<td>11.15</td>
</tr>
<tr>
<td>Italy (it)</td>
<td>83</td>
<td>3.95</td>
<td>16.6</td>
<td>28 840</td>
<td>49.208</td>
<td>Missing</td>
</tr>
<tr>
<td>Lituania (lt)</td>
<td>73</td>
<td>3.32</td>
<td>16.8</td>
<td>14 220</td>
<td>2.804</td>
<td>15.06</td>
</tr>
<tr>
<td>Luxembourg (lu)</td>
<td>68</td>
<td>Missing</td>
<td>14.3</td>
<td>65 340</td>
<td>0.367</td>
<td>14.18</td>
</tr>
<tr>
<td>Latvia (lv)</td>
<td>75</td>
<td>3.40</td>
<td>16.6</td>
<td>13 480</td>
<td>1.394</td>
<td>16.36</td>
</tr>
<tr>
<td>Malta (mt)</td>
<td>84</td>
<td>Missing</td>
<td>14.3</td>
<td>18 960</td>
<td>0.323</td>
<td>13.17</td>
</tr>
<tr>
<td>Netherlands (nl)</td>
<td>53</td>
<td>3.25</td>
<td>17.2</td>
<td>32 480</td>
<td>13.242</td>
<td>13.94</td>
</tr>
<tr>
<td>Poland (pl)</td>
<td>81</td>
<td>4.02</td>
<td>17.0</td>
<td>13 490</td>
<td>31.610</td>
<td>13.05</td>
</tr>
<tr>
<td>Portugal (pt)</td>
<td>75</td>
<td>3.53</td>
<td>16.9</td>
<td>19 730</td>
<td>8.081</td>
<td>16.91</td>
</tr>
<tr>
<td>Sweden (se)</td>
<td>47</td>
<td>2.45</td>
<td>19.8</td>
<td>31 420</td>
<td>7.377</td>
<td>17.21</td>
</tr>
<tr>
<td>Slovenia (si)</td>
<td>65</td>
<td>2.87</td>
<td>17.2</td>
<td>22 160</td>
<td>4.316</td>
<td>15.17</td>
</tr>
<tr>
<td>Slovakia (sk)</td>
<td>66</td>
<td>3.35</td>
<td>15.0</td>
<td>15 760</td>
<td>1.664</td>
<td>11.62</td>
</tr>
<tr>
<td>United Kingdom (uk)</td>
<td>55</td>
<td>3.65</td>
<td>20.1</td>
<td>32 090</td>
<td>47.686</td>
<td>16.01</td>
</tr>
</tbody>
</table>

Outcome variable

Anxiety about avian influenza

We used the data of the Special Eurobarometer 238 on ‘Risk Issues’ which lists the percentage of people who report concern about ‘new viruses like avian influenza’. These data were collected between the second of September and the sixth of October 2005 by means of face-to-face interviews in nationally representative random samples of people aged ≥15 years. Total sample size was 24 643 respondents representing a population of 366,356,283 people aged ≥15 years. These people were asked the question: ‘For each of the following issues, please tell me if you are very worried, fairly worried, not very worried or not at all worried by it?’ and one of the issues was ‘New viruses like avian influenza’. We used the percentage of people who answered they were fairly worried or worried.

Confounders

Population size

It is customary in ecological studies to take population sizes into account. The larger a population the less extreme rates are assumed to be. There is, however, some discussion about the validity of such an approach. It has been argued that population size should only be entered as a self-standing variable and not as a weight. We therefore used the size of each country’s population aged ≥15 years as a covariate.

Level of education

Both TV viewing and fear responses might be influenced by people’s level of education. Average level of education per country was estimated as school expectancy for 5-year olds in 2001/2006. This variable represents the average number of years a 5-year old will continue to study.

Income and wealth

Wealthier nations or wealthier people might be more likely or less likely to watch a lot of TV or to feel worried about health related issues. To adjust for the potential bias caused by this confounder Purchasing Power Parity in dollars (PPP) was added to the regression analysis as a covariate. Purchasing Power Parity estimates average purchasing power in a country, taking local prices into account and is therefore a better indicator for wealth and purchasing power than Gross Domestic Product per capita.

Age

The age distribution of a population may cause spurious relationships as older populations may watch more television and be more concerned about issues of health and infection. On the other hand, fear of deadly strains of influenza could affect young people as well as old people because the threat of pandemic influenza is a rare case where infectious disease is identified as hazardous to younger adults. We used the proportion of people over 65 per country as reported by the WHO as a confounder. If fear is limited to the older cohorts in the population this variable might act as a confounder. If age is distributed more evenly across age groups it would not act as a confounder. If young people are more worried than older people the relationship should be reversed. Raw data are presented in table 1.

Analysis

Linear regression analysis was used to test whether a linear relationship existed between hours of TV watched per country (independent variable) and the proportion of people who expressed anxiety about avian influenza (dependent variable) in each country. TV viewing estimates from 2005 were used. For a variable to be a confounder, it must be related to both the exposure and the outcome variable. School expectancy was related to anxiety (r = −0.63, P = 0.0001), but not to TV exposure (r = −0.08, P = 0.73). Population size was related to TV exposure (r = 0.39, P = 0.06), but not to anxiety (r = 0.02, P = 0.63).
The age distribution of the population was neither related to anxiety ($r = -0.17$, $P = 0.44$) nor to TV exposure ($r = 0.21$, $P = 0.37$). Only personal wealth showed some relationship with both anxiety ($r = -0.40$, $P = 0.05$) and TV exposure ($r = -0.45$, $P = 0.03$) and PPP was therefore entered as a confounder. We used the Statistical Package for the Social Sciences (SPSS$^{TM}$ release 15) for the analyses.

### Results

The respondents watched a mean (SD) of 3:21 (0:31) h of television per day. There was considerable variation with people watching on average 4:25 h a day in Hungary on the one end and 2:27 h in Sweden at the other extreme. The average percentage of people indicating worried about viruses such as avian influenza across countries was 60.0 (11.6). The weighted average reported by Eurostat across Europe was 66.0%. Malta scored highest with 84.0% and Sweden scored lowest with 47.0%.

The regression analysis across 23 member states of the 2005 European Union (TV viewing data were missing for Luxemburg and Malta) showed that the proportion of people worried about viruses was positively associated with television viewing. Visual inspection of the graph (figure 1) showed that Cyprus was a considerable outlier. The analyses were therefore run with and without Cyprus. In the analysis including Cyprus the correlation between TV viewing and fear was $r = 0.56$. Each additional hour of average television viewing was associated with a 12.2% increase in the proportion of people worried about avian influenza (95% CI: 3.9–20.5).

### Discussion

Our ecological analysis suggested that higher levels of television exposure coincided with higher levels of anxiety concerning viruses such as H5N1. Research on media exposure shows that it is virtually impossible for television viewers to avoid watching news programmes. News on the many risks associated with avian flu became ‘endemic’ in 2004. It is therefore safe to assume that exposure to television in 2004 and 2005 included exposure to news about the risks of a ‘bird flu’ pandemic. Other research has shown that news exposure can lead to increased anxiety about risks.$^{10,11}$ The current study therefore suggests that exposure to television news could be attributing to a ‘pandemic of fear’ even though no actual pandemic of avian influenza has yet materialized.

It has been argued that getting ready for a possible pandemic should not only include preparing for the medical emergencies associated with a large scale outbreak, but should also take into account that wide scale social chaos and panic needs to be fought at the same time.$^{2}$ The WHO has developed guidelines on ‘outbreak communication’.$^{12,13}$ This view correctly makes a distinction between the ‘bio-demographic burden’ (the pandemic) and the ‘psychological impact’ (the fear of a pandemic).$^{14}$ Most disaster planning, however, fails to recognize that the risk of infection and the perception of risk are two different things and may therefore evolve separately. Fear may be widespread even when the virus poses no threat.$^{15}$ While good disaster preparedness generally includes crisis communication plans, risk communication may also be needed when no pandemic is apparent.$^{16}$ This is a situation

### Table 2 Regression analysis of proportion of population worried about avian influenza vs. average TV viewing volume in hours per day, with and without the data for Cyprus, with and without adjusting for personal wealth (PPP)

<table>
<thead>
<tr>
<th></th>
<th>$B_0$ (95% CI)</th>
<th>SE</th>
<th>$P$-value</th>
<th>$B_1$ (95% CI)</th>
<th>SE</th>
<th>$P$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Including Cyprus</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TV viewing$^a$</td>
<td>23</td>
<td>24.063 (−4.188–52.315)</td>
<td>13.585</td>
<td>0.091</td>
<td>12.243 (3.907–20.580)</td>
<td>4.009</td>
</tr>
<tr>
<td>TV viewing$^b$</td>
<td>23</td>
<td>57.708 (21.144–94.271)</td>
<td>17.528</td>
<td>0.004</td>
<td>7.561 (−0.702–20.580)</td>
<td>3.961</td>
</tr>
<tr>
<td><strong>Excluding Cyprus</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TV viewing$^a$</td>
<td>22</td>
<td>11.616 (−12.292–35.524)</td>
<td>11.461</td>
<td>0.323</td>
<td>15.574 (8.578–22.570)</td>
<td>3.354</td>
</tr>
<tr>
<td>TV viewing$^b$</td>
<td>22</td>
<td>38.706 (6.145–71.266)</td>
<td>15.557</td>
<td>0.022</td>
<td>11.571 (4.279–18.863)</td>
<td>3.484</td>
</tr>
</tbody>
</table>

a: Unadjusted
b: Adjusted for personal wealth (PPP)

$N$ = number of countries, $B_0$, intercept of the regression line; $B_1$, slope of regression line
in which often no health officials or government communication experts will have been assigned to deal with the communication needs of the population and the media. The media play a particular role in this process. It has been suggested that inaccurate or sensational media reporting is what causes the division between actual risk and the perception of risk. The current study supports the hypothesis that media exposure may contribute to a feeling of fear regardless of the presence of an actual threat. Dealing with media portrayals of risk is, however, a difficult issue. It has been remarked that risk communication suffers from a fundamental paradox: it needs to be able to raise the alarm while reducing fear at the same time. In many media systems the media are free to report on what they feel is important. More importantly, however, risk and crisis communication rely on a good relationship and trust between crisis communicators and the media. Attempting to restrict or regulate how the news media deal with epidemics might therefore not be advisable. The ‘psychological impact’ of an outbreak should probably be treated as real regardless of the question whether there is an actual ‘bio-demographic burden’ or not. Finally, since perceptions of risk and fear of infection determine behavioural responses monitoring media coverage of avian influenza risks may offer an early warning of changing health consumption patterns.

This study had obvious limitations. First, ecological studies run well documented risks. The relationships may be the result of the ‘ecological fallacy’ and important confounders may not have been identified. Nevertheless, schooling levels and personal income, two important confounders in many public health studies and population size and age distribution, two potentially important confounders in ecological studies, did not explain the relationship we found between TV viewing and fear of dangerous viruses. Some authors even warn against dismissing ecological data too readily (creating an ‘individualistic fallacy’). The data used in this study show considerable variation in both the exposure and the outcome variable and no other studies on the fear of viruses such as H5N1 appear to exist. A second limitation might be that the populations under study may vary demographically and this variation may explain differences, although differences in age distribution did not explain variations in either TV viewing or worries about viruses. Third, while the data were group level data they were gathered using traditional survey methods. TV viewing behaviours were measured fairly reliably, using electronic devices registering the television viewing behaviours of nationally representative samples, but anxiety was measured using self reports. Finally, we are assuming that those who watch a lot of TV also watch a lot of news. Few people avoid the news on TV (either willingly or by accident) and research on TV viewing behaviour shows that heavy TV viewers watch a lot of everything. Their selectivity in deciding what to watch is remarkably limited. TV news being among the most popular programmes in many countries this article assumes that heavier levels of viewing include more exposure to news.

Cyprus appeared to be an outlier compared with the rest of the countries included in this study. There may be several explanations for Cyprus’ results. First, it may be a result of random variation, especially in a country with a small population. Second, either the TV volume or the fear variable may have been measured badly in this particular country. Neither Eurostat (which measured fear) nor the European audiovisual observatory (which collected viewer rates) reported any special observations regarding measurement issues in Cyprus. Third, viewing rates may have been unusually low in Cyprus. The country report for Cyprus in the same volume of the European audiovisual observatory’s yearbook did not show any unusual features of Cyprus’ television landscape. Neither were the viewing rates we used in our analysis a deviation from the trend of previous years. Finally, the fear of a pandemic may have been unusually high in Cyprus in the period in which the data were gathered (September through October 2005). The overview of press releases from the Cyprus News Agency for that period shows several messages from government ministers trying to reassure the population regarding the ‘bird flu’ issue. Minister of Agriculture, Natural Resources and Environment Timmy Efthymiou was quoted on the 19th of October as suggesting that Cyprus was at a much higher risk of an outbreak compared with other EU countries because the island is a much used resting place for migrating birds. It would therefore appear that levels of fear may have been higher than average in Cyprus at the time.

Further research into the hypothesized relationship between exposure to news and fear of avian influenza could look in two directions. Experiments should examine whether people’s fear levels increase after exposure to various types of news stories regarding a pandemic or a risk of infection. Second, field studies may be conducted by examining past or future cases of extensive media attention to avian influenza and measuring whether visits to family physicians or emergency rooms with real or imagined flu-like symptoms increased or whether there was any evidence of subsequent surges in the sale of antiviral drugs.

**Conclusion**

In conclusion, this study found a strong relationship at the ecological level between levels of television viewing and anxiety about new viruses such as avian influenza. Half of the variation in the data was predicted by the television viewing variable. Where people are exposed to a lot of television, higher levels of anxiety about new viruses such as avian influenza exist. This suggests that preparation for a pandemic should (i) include dealing with people’s fears and (ii) do so even if no outbreak has yet occurred.

**Conflicts of interest:** None declared.

**Key points**

- The news media started to pay attention to the threat of avian flu in 2004.
- There is a strong ecological relationship between exposure to TV and fear of avian flu across European Union member states.
- Those dealing with the threat of avian flu have to realize that fear of avian flu can exist and evolve independently of any actual outbreak.
- Monitoring of media attention to avian flu may serve as an early warning of changes in medical consumption patterns.

**References**

8 Nerlich B, Halladay C. Avian flu: the creation of expectations in the interplay between science and the media. Social Health Ill 2007;29:46–65.

Received 29 December 2008, accepted 17 April 2009