

Impact of a foot and mouth disease crisis on post-traumatic stress symptoms in farmers

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Summary Culling 27 000 farm animals during an epidemic of foot and mouth disease in The Netherlands in 2001 resulted in substantial psychological distress among Dutch farmers. We investigated the association of exposure to this crisis with symptoms of intrusions and avoidance as found in post-traumatic stress disorder. Survey results from the Impact of Event Scale administered to 661 Dutch dairy farmers showed that about half of those whose animals were culled suffered from severe post-traumatic distress; we conclude that such agricultural crises can have a substantial impact on mental health.

Declaration of interest None.

In 2001 The Netherlands had an epidemic of foot and mouth disease among livestock, during which 270 000 animals were culled, 200 000 of them after vaccination. The economic and social impact of a similar epidemic in the UK was widely reported but the psychological impact received scant attention (Hannay & Jones, 2002). The mass media, however, reported how ‘traumatic’ these events were for farmers and their families. We therefore conducted a survey to assess the impact of the crisis on post-traumatic stress symptoms, by comparing areas with different levels of crisis severity.

METHOD

A random sample of farmers, selected from a list provided by farmer organisations and a marketing company, were invited by letter to participate in the study ($n=1308$). Two days later they were telephoned to arrange an appointment to conduct the interview. Those who declined were asked about their reasons for refusal. The area of the epidemic was divided into three

regions: (a) where dairy farmers’ livestock had been culled; (b) where dairy farmers had been subject to severe restrictions, but where livestock was not culled (the buffer area); (c) where there were no restrictions or culling (the free area).

In total the study population comprised 661 Dutch dairy farmers (51% of those contacted). In the culled area, 215 farmers of 370 (58%) who were approached cooperated; this figure was 240 of 428 (56%) in the buffer area and 204 of 510 (40%) in the free area. The most important reasons given for not participating were ‘no point’ (24% in the culled area, 40% in the buffer area, 21% in the free area); ‘not willing to dig up all the misery again’ (39% in the culled area); and ‘no time’ (35% in the free area). There was no difference between respondents and non-respondents in demographic data (gender, age, education and farm size). The study took the form of a survey, consisting of interviews conducted 6–8 months after the crisis. During a 5-day training course, 11 interviewers – four women and seven men – were trained to administer the questionnaires. Interviewers and interviewees were always of the same gender. The data reported here are part of a larger study in which qualitative data also were collected (Van Haaften & Kersten, 2002).

Instruments

Demographic measures included age, gender, education and the size of the farm.

The 15-item Impact of Event Scale (IES; Horowitz *et al*, 1979; Sundin & Horowitz, 2002) was used to assess levels of post-traumatic symptoms, event intrusion and event-related avoidance during the past 7 days in response to the foot and mouth crisis. Total scores >25 indicate a clinical level of distress (enough to require professional help) (Chemtob *et al*, 1997). This measure has been shown to be reliable and valid (Horowitz *et al*, 1979, 1993), a finding confirmed by Dutch studies (Van der Velden, 2002; Brom & Kleber, 1985).

One avoidance item (item 7) was skipped because it was felt to be unsuitable for this population. The scoring was corrected so that the sum scores could be compared with other studies using the full 15-item IES. Reliability (Cronbach’s α) in our sample was 0.92 for the total score and 0.88 and 0.84 for the intrusion and avoidance subscales, respectively. The IES was used as a (verbatim) interview questionnaire, as in the study by Richmond & Kauder (2000).

Statistical analyses

Logistic regression analyses with IES caseness (total score >25) as the dependent variable were performed to determine the degree to which demographic variables predicted symptoms of post-traumatic stress disorder (PTSD). Odds ratios and 95% confidence intervals were determined. Analysis of variance (ANOVA) and non-parametric tests for independent samples (Kruskal–Wallis) were used to assess differences between the regions in demographic parameters. To assess the relationship between exposure to the epidemic and development of a clinical level of post-traumatic stress, we tested whether total and sub-scale IES scores were different in the three regions using ANOVA. Logistic regression analysis was used with the IES caseness score as the dependent variable and region as the independent variable, to test whether the percentages of IES caseness were different in the three regions. Because demographic variables did not differ between the three regions they cannot confound the relationship. However, they may still act as an effect modifier. To examine this interaction effects of each of the demographic variables \times region were added to the logistic regression analyses.

RESULTS

Logistic regression gave significant odds ratios for age ($\beta=0.026$, *s.e.* $=0.008$, *OR* $=1.03$, 95% *CI* 1.01–1.04, $P=0.002$) and education ($\beta=0.651$, *s.e.* $=0.177$, *OR* $=1.92$, 95% *CI* 1.36–2.71, $P<0.001$), indicating increased risk of PTSD symptoms for farmers who were older and with lower education. For gender there was only a trend towards women farmers being more at risk ($\beta=0.298$, *s.e.* $=0.175$, *OR* $=1.35$, 95% *CI* 0.96–1.90, $P=0.087$). There was no significant difference for farm size. There was also no statistical difference between the regions for age, gender, education and farm size (Table 1). The

IES total and sub-scale scores differed significantly between the exposed and less exposed areas (Table 1). The levels of PTSD symptoms were highest in the culled area and lowest in the free area. The odds ratio for significant levels of symptoms in the culled area *v.* the free area was 5.78 (95% CI 3.57–9.34) and in the buffer area *v.* the free area it was 1.68 (95% CI 1.01–2.78). The effect of exposure on IES caseness was not modified by age (age \times region interaction $P=0.12$), gender (gender \times region $P=0.72$), education (education \times region $P=0.36$) or farm size (farm size \times region $P=0.79$).

DISCUSSION

Almost half of the farmers whose livestock was culled had symptoms of post-traumatic stress at levels requiring professional help. Even in the area with severe restrictions but no culling, more than one in five farmers had severe symptoms. Levels of symptoms were higher among older participants and those with less education, as has been found in other studies (e.g. Kessler *et al*, 1995). Our results are in line with those of Hannay & Jones (2002), who showed that the foot and mouth outbreak affected the mental health of those involved in farming and tourism in Dumfries and Galloway in the UK. As in our study, impact was closely related to the extent of the cull.

Although the foot and mouth crisis is not a traumatic event in the usual sense, the consequences do resemble features of PTSD. The qualitative data show that, for instance, the sight of the slaughter of healthy animals has become engraved in the memory of the farmers – possibly symbolising the end of their business. The culling was accompanied by a feeling of

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complete loss of autonomy (Van Haaften & Kersten, 2002). Flashbacks and nightmares affected the farmers in a way seen in people who developed PTSD following violent crime or a severe accident (e.g. Gersons, 2000). The foot and mouth crisis appears to be perceived as an extreme stressor and a substantial threat to the health and well-being of individual farmers.

A limitation of this study is the fact that no clinical diagnosis was made. However Wohlfarth *et al* (2003) have shown that IES caseness has a high sensitivity (0.93–1.00) and specificity (0.78–0.84) for predicting PTSD according to DSM-IV criteria (American Psychiatric Association, 2001). A relatively low response rate (often a problem in survey research) is another limitation. Differential non-response might affect outcome. In this study, the farmers in the culled area – who had the highest level of symptoms – were the least willing to ‘dig up all the misery again’. Therefore, if there is a bias, it could be assumed that the high prevalence of post-traumatic stress symptoms is an underestimation of the real level of psychopathology. Another limitation is the study’s cross-sectional design. Longitudinal studies are needed, preferably with an assessment prior to severe events such as culling of animals, and with follow-up assessments to study the course of symptoms.

Although foot and mouth disease infected only animals, its consequences were severe for humans. Since it is likely that the agricultural sector will be affected by emergencies like this in the future, policies for preventing and fighting the virus should be accompanied by action to mitigate the effects on the mental health of humans.

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Table 1 Demographic characteristics and post-traumatic stress symptoms stratified by area

	Culled area <i>n</i> =215	Buffer area <i>n</i> =240	Free area <i>n</i> =204	<i>P</i>	Statistic
Age, years: mean	46.3	45.7	46.4	0.74	$F_{(2,658)}=0.358$
Gender, % female	51.6	54.5	51.5	0.76	$\chi^2_{(2)}=0.553$
Education, % low	40.9	39.7	34.0	0.30	$\chi^2_{(2)}=2.442$
Farm size, ha: mean	36.5	35.3	35.6	0.70	$F_{(2,258)}=0.297$
IES score: mean (s.d.)					
Total score	24.0 (15.8)	13.5 (14.0)	9.6 (12.6)	<0.001	$F_{(2,654)}=56.453$
Intrusion sub-scale	13.4 (8.4)	7.2 (7.1)	5.4 (6.8)	<0.001	$F_{(2,655)}=65.003$
Avoidance sub-scale	10.5 (8.9)	6.2 (7.7)	4.2 (6.4)	<0.001	$F_{(2,654)}=35.320$
Severe level of IES total score, %	47.9	21.1	13.7	<0.001 [†]	$Wald_{(2)}=63.60$

IES, Impact of Event Scale.