

Rodent infestations in domestic properties in England, 2005-2007: An interim report arising from the 2005, 2006 and 2007 English House Condition Survey data.

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1. Overview

The 1996 and 2001 English House Condition Surveys (EHCS) each reported on data collected during a single year once every 5 years. From 2002 onwards the EHCS is carried out on a continuous rolling programme that surveys a random sample of domestic properties in England over successive two year periods (Table 1). These surveys provide an 'average' position for each of the two year periods sampled; for example 2005 is nominally represented by the survey data collected between April 2004 and March 2006. A summary of the prevalence of rats outside dwellings, and mice and rats inside dwellings, for the 2003 and 2004 survey periods was provided in 2008 (Defra 2008). This reported that the prevalence of mice inside dwellings for the 2003 and 2004 survey periods were both significantly higher than the 2001 figure of 1.43%. The prevalence of rats inside for the 2003 and 2004 survey periods did not differ significantly from the 2001 figure of 0.26%, and the prevalence of rats outside did not differ significantly from the 2001 figure of 2.94%.

Table 1. Survey periods for the English House Condition Survey (EHCS) from 2002 onwards.

'Year'	Start of survey	End of survey
2003	April 2002	March 2004
2004	April 2003	March 2005
2005	April 2004	March 2006
2006	April 2005	March 2007
2007	April 2006	March 2008

This report considers the datasets collected for a further three survey periods April 2004 to March 2006 (2005), April 2005 to March 2007 (2006) and April 2006 to March 2008 (2007) and compares these data with those from previous surveys. Analyses of the information on rodent presence from these three EHCS survey datasets are summarised in Table 2 with data from previous surveys shown for

comparison. There are no statistically significant differences in the prevalence of mice inside, rats inside, or rats outside for occupied dwellings between 2003 and 2007. Since the previously reported increase in the percentage of properties with mice inside (2001–2003), there has been no further significant increase. Furthermore, there has been no significant increase in the percentage of properties with rats outside since 2001. The percentage of properties with rats inside increased between 2004 and 2007, although this difference is not statistically significant when a correction for multiple comparisons is applied (see Appendix). The percentage of properties in England with evidence of rats inside in 2007 is no higher than in 1996 and is within the boundaries of previous surveys.

Table 2. Summary of estimates for the percentage of occupied properties with mice and rats inside, and rats outside, English Housing Condition Survey 1996 - 2007.

Year	Percent of occupied dwellings (weighted)		
	Mice inside	Rats inside	Rats outside
2007	2.07	0.37	3.04
2006	1.94	0.36	3.10
2005	2.04	0.30	3.10
2004*	2.02	0.24	3.04
2003*	2.14	0.31	3.24
2001*	1.43	0.26	2.94
1996*	1.8	0.4	1.7

*Previously published estimates from EHCS data

2. Data Collection

From 2002 onwards the English House Condition Survey (EHCS) is carried out on a rolling programme that surveys a representative random sample of domestic properties in England over successive two year periods. The advantage of this rolling survey is that trends can potentially be picked up more quickly. It is necessary to pool data collected in successive years to ensure that all property types are represented in the sample. Properties to be surveyed are selected at random but as some types of housing are likely to be under represented, a weighting is applied to each property

category to correct this. Depending on how the random survey falls, the weighting applied to any particular property category will vary between survey periods. The analyses included in this report are of the datasets collected for the two-year periods April 2004 to March 2006, April 2005 to March 2007 and April 2006 to March 2008. These therefore provide an average position for each of the two periods, nominally presented as '2005', 2006 and '2007' respectively. Each of these overlapping datasets shares common data with neighbouring surveys, for example, data collected between April 2005 and March 2006 are common to both '2005' and '2006' datasets. The weights applied to these common data differ between the two datasets and thus they cannot be excluded from either dataset without compromising weighted comparisons. This means that correctly weighted annual datasets cannot be extracted from the 2-year data sets, although comparisons between these data sets can be made by statistical analyses that allow for the common data contained within overlapping surveys.

3. Estimation of occurrence

The criteria for rodent presence (mice inside, rats inside, and rats outside) were the same as used in the analyses of the 1996 and 2001 EHCS rodent data:

- a) Mice inside: if either of the following two conditions were met:
 - i) Occupier said there was a 'current problem' and it was 'in the home'
 - ii) Surveyor saw evidence of mice in living room, kitchen, bedroom, bathroom or circulation i.e. hallways, stairs, landing and downstairs WC.

- b) Rats inside: – same as for mice inside above.

- c) Rats outside: if either of the following two conditions were met:
 - i) Occupier said there was a 'current problem' and it was 'in the garden'
 - ii) Surveyor saw evidence of rats in the garden.

Mice and rats inside in communal areas and mice outside were not included in the analyses.

Percentages were based on occupied dwellings and those for rats outside were further limited to properties with gardens (front or rear plots).

The quoted standard errors (S.E.) were calculated as previously: $S.E. = \sqrt{(p \cdot q/n)}$, where p is the proportional presence, q is the proportional absence, and n is the sample size.

The prevalence estimates of rodent occurrence in 2005, 2006 and 2007 are shown in Table 3 while those found in the 2003 and 2004 (Defra 2008) and 1996 (MAFF 2001) and 2001 (Defra 2005) surveys are given in Table 4 for comparative purposes.

Table 3. Prevalence of rodents in and around occupied dwellings in the '2005', '2006' and '2007' datasets, sample size, weighted percentage presence, standard error, and lower and upper limits of 95% confidence interval.

2007	Sample	% (weighted)	S.E.	Low 95%	High 95%
Mice inside	15604	2.07	0.114	1.85	2.29
Rats inside	15604	0.37	0.049	0.28	0.47
Rats outside	12973	3.04	0.151	2.75	3.34

2006	Sample	% (weighted)	S.E.	Low 95%	High 95%
Mice inside	15648	1.94	0.110	1.72	2.15
Rats inside	15648	0.36	0.048	0.26	0.45
Rats outside	13062	3.10	0.152	2.80	3.39

2005	Sample	% (weighted)	S.E.	Low 95%	High 95%
Mice inside	16059	2.04	0.111	1.82	2.26
Rats inside	16059	0.30	0.043	0.21	0.38
Rats outside	13387	3.10	0.150	2.81	3.40

Table 4. Prevalence of rodents in and around occupied dwellings in the 1996, 2001, 2003 and 2004 datasets, sample size, weighted percentage presence, standard error, and lower and upper limits of 95% confidence interval.

2004	Sample	% (weighted)	S.E.	Low 95%	High 95%
Mice inside	15874	2.02	0.112	1.80	2.24
Rats inside	15874	0.24	0.039	0.17	0.32
Rats outside	13202	3.04	0.149	2.75	3.33

2003	Sample	% (weighted)	S.E.	Low 95%	High 95%
Mice inside	15950	2.14	0.115	1.91	2.36
Rats inside	15950	0.31	0.044	0.22	0.40
Rats outside	13530	3.24	0.152	2.94	3.54

2001*	Sample	% (weighted)	S.E.	Low 95%	High 95%
Mice inside	17532	1.43	0.090	1.25	1.61
Rats inside	17532	0.26	0.038	0.19	0.34
Rats outside	14344	2.94	0.141	2.66	3.22

*From Defra report

1996*	Sample	% (weighted)	S.E.	Low 95%	High 95%
Mice inside	12127	1.8	0.12	1.56	2.04
Rats inside	12127	0.4	0.06	0.29	0.51
Rats outside	9799	1.7	0.13	1.44	1.96

*From MAFF report

4. Analysis of year-to-year comparisons

Comparisons to examine for statistically significant differences amongst the 1996 to 2007 survey periods for mice inside, rats inside and rats outside are shown in Table 5 using the statistical analysis described in the Appendix.

Table 5. Comparisons between pairs of survey periods from 1996 to 2007 of the weighted percentage of properties with (a) mice inside, (b) rats inside and (c) rats outside; “+ve” denotes a significantly higher level relative to survey given in top row, “-ve” denotes a significantly lower level relative to survey given in top row, and “n.s.” indicates no significant difference between surveys. For example, the percentage of properties with evidence of rats outside during 2001 – 2007 is higher than in 1996, but there has been no significant increase since 2001. Comparisons marked with an asterisk (*) are non-significant when a Bonferroni correction for multiple comparisons is applied (see Appendix).

(a) Mice inside

	1996	2001	2003	2004	2005	2006
1996						
2001	-ve*					
2003	+ve*	+ve				
2004	n.s.	+ve	n.s.			
2005	n.s.	+ve	n.s.	n.s.		
2006	n.s.	+ve	n.s.	n.s.	n.s.	
2007	n.s.	+ve	n.s.	n.s.	n.s.	n.s.

(b) Rats inside

	1996	2001	2003	2004	2005	2006
1996						
2001	-ve*					
2003	n.s.	n.s.				
2004	-ve*	n.s.	n.s.			
2005	n.s.	n.s.	n.s.	n.s.		
2006	n.s.	n.s.	n.s.	n.s.	n.s.	
2007	n.s.	n.s.	n.s.	+ve*	n.s.	n.s.

(c) Rats outside

	1996	2001	2003	2004	2005	2006
1996						
2001	+ve					
2003	+ve	n.s.				
2004	+ve	n.s.	n.s.			
2005	+ve	n.s.	n.s.	n.s.		
2006	+ve	n.s.	n.s.	n.s.	n.s.	
2007	+ve	n.s.	n.s.	n.s.	n.s.	n.s.

5. References

Defra (2005) Rodent infestations in domestic properties in England, 2001. A report arising from the 2001 English House Condition Survey. Prepared for European Wildlife Division, Defra, by Central Science Laboratory, York. July 2005.

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MAFF (1999) Rodent infestations in domestic properties in England – a report arising from the 1996 English House Condition Survey. London: Ministry of Agriculture Fisheries and Food (MAFF)

Peres-Neto, P.R. (1999) How many statistical tests are too many? The problem of conducting multiple ecological inferences revisited. *Marine Ecology Progress Series* **176**: 303-306.

Appendix – Statistical Analysis

For each of the three response variables, "mice inside", "rats inside" and "rats outside" two-tailed examination of the 95% confidence interval of the difference in percentages between samples from different survey periods was made to determine whether these differences were statistically significant. Hence, 21 comparisons were made for each of these three variables. However, by chance, we would expect that at least 1 in 20 comparisons will indicate a statistically significant difference even if there is no real difference in the true percentages of rodent presence between any two survey periods. Results are thus also reported using the Bonferroni correction to adjust for this, which is the most simple and straightforward approach for reducing the error associated with a relatively low number (<45) of multiple comparisons (Peres-Neto, 1999).