



There are an estimated 8.5 to 10.3 million owned cats in the UK, with 19.0-25.5% of households owning a cat (1). However, there are few peer-reviewed publications on population longevity and mortality in domestic cats (2). Improved understanding of longevity and mortality in pet cats will support enhanced breeding, husbandry and clinical strategies that advance the health and welfare of owned cats (3).



This study aimed to analyse veterinary electronic patient records (EPRs) to estimate longevity, report common causes of mortality and identify demographic risk factors for reduced longevity in cats in England. Longevity in crossbred cats was hypothesised to exceed that of purebred cats.

## Aims & Objectives

## Background



## M&M

VetCompass collects de-identified EPR data from primary-care veterinary practices in the UK for companion animal health surveillance (4). Practitioners recorded summary diagnosis terms from an embedded standard nomenclature, the VeNom codes (5), at episodes of clinical care. This study included all cats with data uploaded to VetCompass from September 01, 2009 to December 20, 2012. Data collected included demographic (species, breed, date of birth, sex, neuter status, insurance status, weight and deceased status) and clinical information (free-form text clinical notes, summary diagnosis terms, treatment and deceased status with relevant dates). Death events were validated using the associated 'clinical note' fields and were randomly sampled for further study. Cause of mortality and mechanism of death (assisted [euthanasia] or non-assisted) data were extracted. Mortality was grouped into appropriate pathophysiologic or organ-system categories. Ethical approval was granted by the RVC Ethics and Welfare Committee (URN 2010 1076).

**Analysis:** All analysis used Stata 11. Longevity and common causes of mortality results were described. Purebred and crossbred longevity were compared using the Mann-Whitney U test. General linear regression modelling was used to evaluate risk factors for decreased longevity in cats dying at or after 5 years of age: purebred/crossbred, sex/neuter, weight and insurance. Model diagnostics used visual inspection of residual and residual-versus-fitted plots to assess normality and homoscedasticity, respectively. The level of significance was set at  $P < 0.05$ .

## Results

### All-breed cat longevity

From 118,016 cats attending 90 practices in central and south-east England, a study sample of 4,009 cats with confirmed deaths was randomly selected. Euthanasia accounted for 85.7% deaths and 74.7% were cremated. Median overall longevity was 14.0 years (IQR 9.0-17.0; range 0.0-26.7) and was bimodally distributed, peaking at years 1 and 16 (Fig. 1).

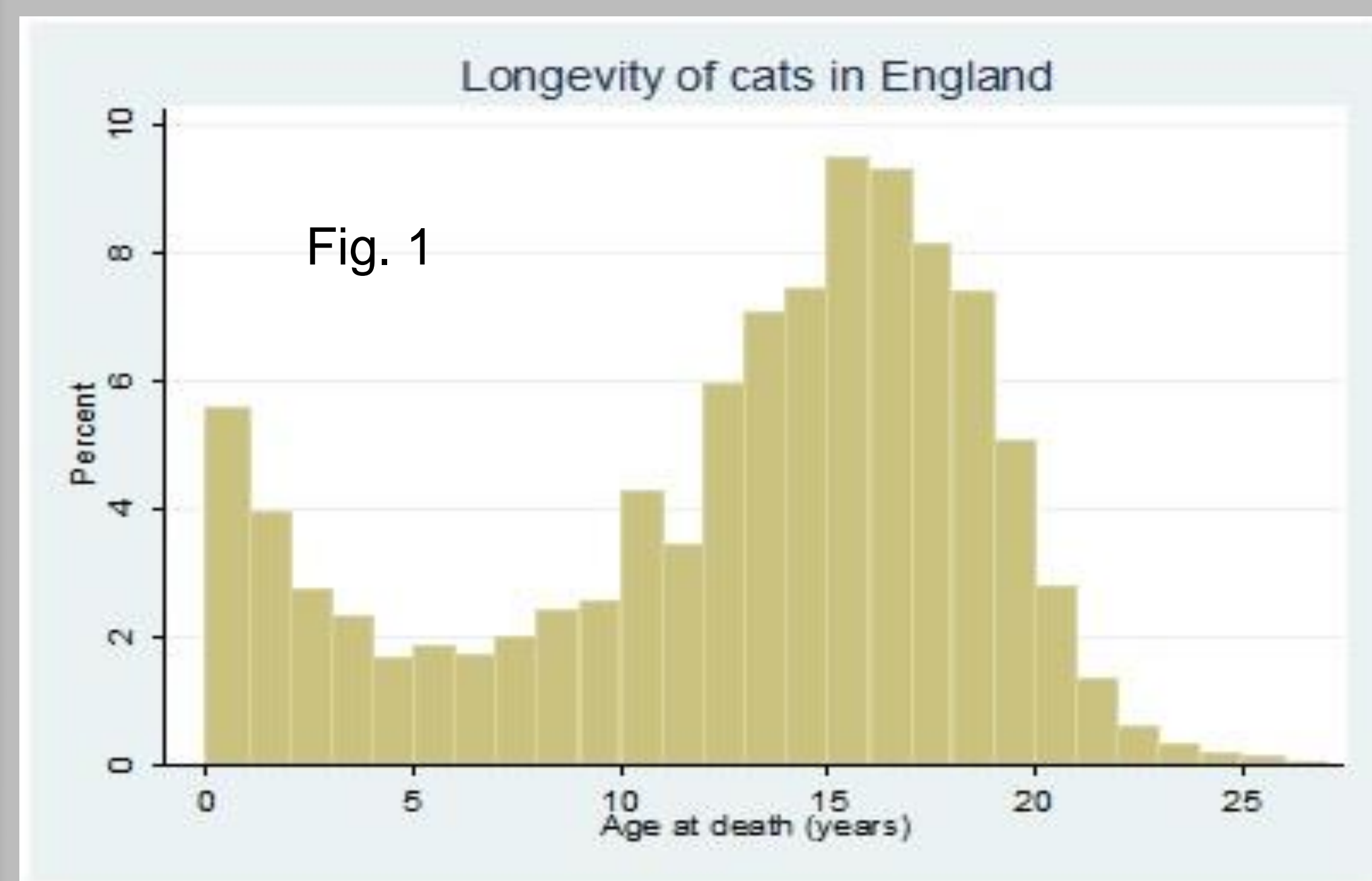


Table 1. Breed-specific longevity (yrs)

Breed	Median	IQR	Range	No. cats
Birman	16.1	8.1-16.9	1.0-20.7	12
Burmese	14.3	10.0-17.0	0.7-20.7	31
Siamese	14.2	10.8-19.0	0.9-21.1	31
Persian	14.1	12.0-17.0	0.0-21.2	70
Crossbred	14.0	9.2-17.0	0.0-26.7	3,621
British SH	11.8	5.8-16.3	0.0-21.0	69
Maine Coon	11.0	4.0-15.5	0.2-19.0	14
Ragdoll	10.1	0.9-14.8	0.1-17.9	21
Abyssinian	10.0	1.1-18.1	1.0-20.8	11
Bengal	7.3	2.2-11.5	0.6-13.7	15

Table 2. Common causes of cat mortality

Attributed cause	Rank	No. (%)	Median	IQR
Trauma	1	405 (12.2)	3.0	1.1-9.0
Renal disorder	2	399 (12.1)	15.1	12.0-17.3
Non-specific illness	3	370 (11.2)	16.0	13.3-18.0
Neoplasia	4	356 (10.8)	13.6	11.3-16.0
Mass lesion disorder	5	336 (10.2)	14.2	12.0-16.5
Neurological	6	231 (7.0)	15.1	13.0-18.0
Respiratory disorder	7	183 (5.5)	13.7	10.0-16.8
Cardiac disease	8	139 (4.2)	14.0	11.5-16.3
Endocrine disorder	9	124 (3.8)	16.0	12.9-17.3
Thromboembolic	10	106 (3.2)	12.0	8.1-15.0
Enteropathy	11	98 (3.0)	14.7	10.4-17.0
Hepatopathy	12	61 (1.8)	13.6	10.0-16.4
Viral disorder	13	60 (1.8)	3.8	0.6-10.4
Urinary disorder	14	57 (1.7)	7.0	3.5-13.0
Abdominal disorder	15	48 (1.5)	15.7	10.9-18.1
Oral cavity disorder	16	47 (1.4)	15.5	12.7-18.0
Behavioural disorder	17	43 (1.3)	16.0	14.0-18.6
Ocular disorder	18	37 (1.1)	16.0	9.0-18.0
Anaemia	19	36 (1.1)	10.9	2.8-15.0
Parasitic disorder	20	31 (0.9)	15.2	12.0-17.8

Longevity varied widely between breeds but the numbers of individual pure breeds was low (Table 1).

The most frequent causes of mortality overall were trauma, renal disorder, non-specific illness, neoplasia and mass lesion disorders (Table 2).

Using univariable analysis of deaths at all ages, the median longevity of crossbred cats (14.0 years, IQR 9.1-17.0) was longer than purebred cats (12.5 years; IQR 6.1-16.4) ( $P < 0.001$ ). Female cats (15.0 years, IQR 11.0-17.4) had higher median longevity than male cats (13.0 years, IQR 7.6-16.0) ( $P < 0.001$ ). Neutered cats (15.0 years, IQR 11.8-17.0) had higher median longevity than un-neutered cats (11.0 years, IQR 2.13-16.0) ( $P < 0.001$ ).

Table 3. Final multivariable linear regression results for risk factors associated with longevity (cats dying  $\geq 5$  years)

Variable	Coefficient	95% CI	P-value
Purebred status			
Crossbred	Baseline	-	-
Purebred	-0.6	-0.2 to -1.1	0.008
Sex/neuter status			
Female entire	Baseline	-	-
Female neutered	0.6	0.1 to 1.0	0.007
Male entire	-1.8	-1.3 to -2.3	<0.001
Male neutered	0.1	-0.4 to 0.5	0.756
Bodyweight			
< 3.0 kg	Baseline	-	-
3.0-3.9 kg	-0.8	-0.3 to -1.3	0.001
4.0-4.9 kg	-1.7	-1.2 to -2.2	<0.001
5.0-5.9 kg	-2.0	-1.4 to -2.7	<0.001
$\geq 6.0$ kg	-3.3	-2.5 to -4.2	<0.001
No weight	-0.4	-0.8 to 0.0	0.047
Insured status			
Not insured	Baseline	-	-
Insured	-1.1	-0.7 to -1.5	<0.001

Multivariable modelling of cats that died at or after 5 years of age indicated that crossbred cats survived 0.6 years ( $P = 0.008$ ) longer than purebred cats. Neutered female cats lived 0.6 years ( $P = 0.007$ ) longer and entire male cats lived 1.8 years ( $P < 0.001$ ) shorter than entire female cats. Increasing bodyweight was associated with decreasing longevity ( $P < 0.001$ ). (Table 3).

Adjusting for clustering within veterinary clinics did not affect the results. No significant interactions or major departures from residual normality or homoscedasticity were identified.

### References

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## Discussion

Crossbred cats lived significantly longer than purebred cats. Individual breeds varied substantially in longevity; the most long-lived breeds included the Birman, Burmese, Siamese and Persian whereas the shortest surviving included the Bengal, Abyssinian and Ragdoll. Increasing adult cat bodyweight was negatively associated with longevity. The most common causes of mortality in cats were trauma, renal disorders, non-specific illness, neoplasia and mass lesion disorders. The study highlighted common causes of mortality and identified important breed-related associations with compromised longevity.