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# Life expectancy tables for cats from the city of Buenos Aires

## Abstract

The aim of the present study was to develop the first life tables for the domestic feline population of the Autonomous City of Buenos Aires by constructing general cohort tables. To develop the life tables, data from felines received for final disposition at the Luis Pasteur Zoonosis Institute of the city from January 2018 to December 2021 were used. Of the 7945 cats that died in that period, the overall life expectancy at birth was 11.01 years (95% CI=10.55- 11.46 years). When life expectancy was analyzed according to sex, significant differences were found, being higher in females, 12.26 years (95% CI: 11.78- 12.73) than in males, 10.92 years (95% CI: 10.50- 11.35). According to neutered status, life expectancy at birth in the neutered, 13.19 years, was significantly higher than in the entire, 5.55 years (p-value=0.00001). Likewise, life expectancy among purebred cats was significantly higher, 14.81 years (95% CI: 14.51- 15.10), than for cross breed cats, 10.97 years (CI: 10.81- 11.13). Regarding the variations in mortality according to the warm or cold season of the year, no differences were observed between the two seasons. The most prevalent causes of death were related to urinary system failures and neoplasms, over 444 records analyzed. This study provides useful information for veterinary professionals and pet owners and is a valuable tool for the planning and development of effective health policies.

**Keywords:** cat, Argentina, life expectancy

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## Introduction

Felines are the most popular companion animals in the Autonomous City of Buenos Aires (CABA), with an estimated population of 295,000 felines. These figures represent 10 cats for every 100 people.[1] There are numerous veterinary care services, both private and public, with the Luis Pasteur Zoonosis Institute (IZLP), an agency under the Ministry of Health, being the veterinary medicine referent for the whole city. As part of the prevention, surveillance and control of rabies, the IZLP has been receiving for final disposal the carcasses of domestic animals in CABA for decades, from Monday to Sunday, 24 hours a day. At the time of receiving the carcass, a death record is made; the access to this data provides the opportunity to analyze population information regarding the life expectancy of domestic animals.

The estimation of life expectancy is useful for a better understanding of longevity according to racial, sexual and neutered status diversity.[2] In Argentina, and particularly in the CABA, no studies have been carried out to date that have estimated the life expectancy of felines. However, in other countries, there are studies that have worked on life expectancy or mortality patterns in cats.[3,4]

A life table is a tabulated expression of life expectancy and mortality-related information at given ages in a population. Rather than providing a single value for the mean age at death, it expresses the probability of death in different age groups in a given population. It provides much more detailed information and inferences than a single summary of the mean age at death at all ages.

For humans it is common to construct life tables as a proxy indicator of the overall health of the population, they are considered an essential tool for planning and the development of effective health policies.

Although useful for human population management, life tables are rarely produced for companion animals; in the case of felines, only one life expectancy table has been produced in Japan. However, studies on this subject have been carried out in Great Britain and Japan for canines,[5–7] and there are some publications that address factors associated with mortality in felines.[4,8,9]

The present study aims to develop the first life tables for the feline population of CABA by constructing general cohort tables, as well as tables for different characteristics including sex, neutered status and breed. Also, calculate proportional mortality by months and seasons. Additionally categorize causes of death according to their physiopathology, when possible. The resulting life tables could improve our understanding of the demographics related to the longevity of the feline population in the city.

## Materials and methods

At the pathological anatomy service of the IZLP, cadavers are received for final disposition. At the time of receipt, information on the cat's sex, breed, age (in years and/or months) and date of death is recorded by hand in the Cremation Books. The data are provided by the owners or the person who brought the animal using a standardized questionnaire.

For this research, data from 7945 felines received between January 2018 and December 2021 at the IZLP were digitized. Breed was classified according to the definitions of the Argentine Feline Association, and in cases where a pure breed could not be identified, it was computed as "cross breed". Data management and analysis was performed using Microsoft Excel 2013 (Microsoft Corp.) and RStudio Version 1.4.1717 software.

### Construction of the life table - Chiang's adjusted method[10,11]

To construct the life table, a one-year age interval (x, x+1) is used. The basic variables involved in a cohort life table are lx, the number of animals living at age x and dx, the number of animals dying in the age interval (x, x+1). The probability of an animal dying in the age interval (x, x+1) is calculated as the proportion of animals that died

during this age interval over the animals alive at age x. The fraction of the last year of life for age x (ax) is calculated as the mean of the fraction of the last year of life for animals that would have died during the interval (x, x+1). Calculate the number of years lived by the total cohort in the interval (x, x+1), Lx = (lx-dx)+ax*dx; and the total number of years lived after age x, Tx, as the sum of the number of years lived in each age interval from age x onward. Tx = Lx + Lx+1 + --- + Lw, x =0, 1, ..., w. The life table is constructed using these variables, according to the method described by Chiang. Life expectancy at age x, êx, is calculated as the number of years, on average, that an animal has left to live. The 95% confidence interval was calculated as êx+-1.96*S.E.êx (SE= Standard error).

## Construction of life tables by variable

For each variable under study, sex, neutered status and breed, specific life tables were constructed and differences between life expectancies at birth (ê0) were analyzed for each variable category. A p-value of significance <0.05 was taken. Also, life expectancy at birth was calculated for the only breed whose sample size exceeded 100 individuals, the Siamese breed.

## Proportional mortality by month and by season of the year

Proportional mortality by month was calculated as the proportion of animals dying in the respective months over the total number of animals dying. Likewise, proportional mortality by season was calculated as the proportion of animals dying in the respective seasons (warm: October to March; cold: April to September). Differences between proportions according to seasons were contrasted using the $\chi^2$ test.

## Causes of death recorded

Causes of death recorded by owners were counted by age group and grouped according to appropriate pathophysiological or organic categories. Euthanasia data were excluded when was not accompanied by the primary cause.

# Results

Table 1 shows the life expectancy of the cohort for all races and sexes combined. Overall life expectancy at birth was 11.01 years (95% confidence interval (CI) 10.55-11.46) and the median was 12 years. The probability of death was 0.0816 in the first year of life, and decreased to its minimum value in the sixth year of life.

**Table 1** Cohort life table for companion cats for all breeds and sexes combined

| Age interval (years) | Probability of dying in interval (x,x+1) | Number living at age x | Number dying in interval (x,x+1) | Fraction of last year of life | Number of years lived in interval (x,x+1) | Total number of years lived beyond age x | Expectation of life at age x (year) | 95% Confidence Interval of êx (year) | |
|---|---|---|---|---|---|---|---|---|---|
| x to x+1 | q^x | lx | dx | áx | Lx | Tx | êx | | |
| 0-1 | 0.0816 | 7945 | 648 | 0.335 | 7514 | 87437 | 11.01 | 10.55 | 11.46 |
| 1-2 | 0.0365 | 7297 | 266 | 0.152 | 7072 | 79922 | 10.95 | 10.5 | 11.41 |
| 2-3 | 0.0348 | 7031 | 245 | 0.044 | 6797 | 72851 | 10.36 | 9.91 | 10.81 |
| 3-4 | 0.0335 | 6786 | 227 | 0.035 | 6567 | 66054 | 9.73 | 9.28 | 10.19 |
| 4-5 | 0.0306 | 6559 | 201 | 0.017 | 6362 | 59487 | 9.07 | 8.62 | 9.52 |
| 5-6 | 0.0398 | 6358 | 253 | 0.000 | 6105 | 53126 | 8.36 | 7.9 | 8.81 |
| 6-7 | 0.0334 | 6105 | 204 | 0.000 | 5901 | 47021 | 7.7 | 7.25 | 8.15 |
| 7-8 | 0.0427 | 5901 | 252 | 0.004 | 5650 | 41120 | 6.97 | 6.52 | 7.42 |
| 8-9 | 0.0566 | 5649 | 320 | 0.002 | 5330 | 35470 | 6.28 | 5.83 | 6.73 |
| 9-10 | 0.0473 | 5329 | 252 | 0.008 | 5079 | 30140 | 5.66 | 5.2 | 6.11 |
| 10-11 | 0.0863 | 5077 | 438 | 0.000 | 4639 | 25061 | 4.94 | 4.48 | 5.39 |
| 11-12 | 0.0638 | 4639 | 296 | 0.002 | 4344 | 20422 | 4.4 | 3.95 | 4.86 |
| 12-13 | 0.1059 | 4343 | 460 | 0.001 | 3884 | 16079 | 3.7 | 3.25 | 4.16 |
| 13-14 | 0.1182 | 3883 | 459 | 0.001 | 3425 | 12195 | 3.14 | 2.69 | 3.59 |
| 14-15 | 0.1732 | 3424 | 593 | 0.004 | 2833 | 8770 | 2.56 | 2.11 | 3.01 |
| 15-16 | 0.2282 | 2831 | 646 | 0.002 | 2186 | 5937 | 2.1 | 1.64 | 2.55 |
| 16-17 | 0.2842 | 2185 | 621 | 0.001 | 1565 | 3751 | 1.72 | 1.26 | 2.17 |
| 17-18 | 0.3331 | 1564 | 521 | 0.002 | 1044 | 2187 | 1.4 | 0.95 | 1.85 |
| 18-19 | 0.4602 | 1043 | 480 | 0.000 | 563 | 1143 | 1.1 | 0.64 | 1.55 |
| 19-20 | 0.4263 | 563 | 240 | 0.002 | 324 | 580 | 1.03 | 0.58 | 1.48 |
| over 20 | 1.0000 | 323 | 323 | 0.794 | 257 | 257 | 0.79 | 0.34 | 1.25 |

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When analyzing the data according to sex, it was observed that the life expectancy at birth of male and female cats was 10.92 (95% CI: 10.50- 11.35) and 12.26 (95% CI: 11.78- 12.73) years, respectively, resulting in a significant difference (p-value=0.025). Likewise, the values found regarding the neutered status showed significant differences being the life expectancy at birth higher in neutered felines, 13.19 years, than in entire felines, 5.55 years (p-value=0.00001) (Table 2).

**Table 2** Life expectancy at age 0 by sex and neuter status

| | Number | Expectation of life at age 0 (year) | 95% Confidence interval (year) | P-value |
|---|---|---|---|---|
| Sex | | | | |
| Male | 3809 | 10.92 | (10.50- 11.35) | =0.025 |
| Female | 4074 | 12.26 | (11.78- 12.73) | |
| Neuter status | | | | |
| Neutered | 6558 | 13.19 | (13.14- 13.25) | < 0.00001 |
| Entire | 1281 | 5.55 | (5.48- 5,62) | |

With the addition of neutering status, a substantially higher probability of death was observed in females and entire males than in their castrated counterparts. In males, the difference between life expectancy at birth in entire, 4.86 years, and castrated, 12.13 years, was found to be significant and remained until the interval 5-6 years (p-value=0.012). In females, life expectancy at birth was 5.64 years for the entire and 13.29 years for the castrated (p-value= < 0.00001). This difference remained significant until the interval 6-7 years (p-value=0.03) (Figure 1).

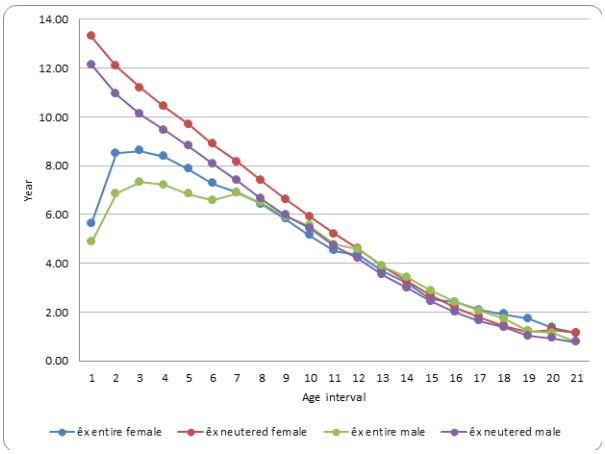


**Figure 1** Life expectancy for female and male cats according to neutered status at different ages (year).

Table 3 shows the comparison between the life expectancy at birth of the undefined breed versus the totality of the pure breeds. It is observed that the crossbreed presented a life expectancy of 10.97 years (CI: 10.81- 11.13), while for the purebreds it was 14.81 years (95% CI: 14.51- 15.10). The difference was significant between these variables (p-value< 0.00001).

The values of life expectancy at birth, median age and maximum age attained for the Siamese breed are shown below (Table 4).

**Table 3** Life expectancy at age 0 by breed

| Breed | Number | Expectation of life at age 0 (year) | 95% Confidence interval (year) | P-value |
|---|---|---|---|---|
| All | 7945 | 11.01 | (10.55- 11.46) | |
| Pure Breed | 1171 | 14.81 | (14.51- 15.10) | < 0.00001 |
| Cross Breed | 6774 | 10.97 | (10.81- 11.13) | |

**Table 4** Key statistics extracted from the life table corresponding to Siamese breed felines

| Breed | Life expectancy (êx ) at age 0 (year) | 95% confidence interval of êx (year) | Median (year) | Maximum (year) | Number of cats in the life table |
|---|---|---|---|---|---|
| Siamese | 14.45 | 14- 14.9 | 15 | 25 | 1014 |

Being the only breed that exceeded the number of 100 individuals in the sample analyzed, we can observe that its life expectancy greatly exceeds the general life expectancy and remains within the expected values for pure breeds.

As for the proportional death per month, January had the highest value (9.35%) and June the lowest (6.58%). The proportion of cats that died in the warm season (October to March) was higher than those that died in the cold season (April to September) but the difference was not significant ($\chi 2$= 3.4683, p-value< 0.06255) (Figure 2).

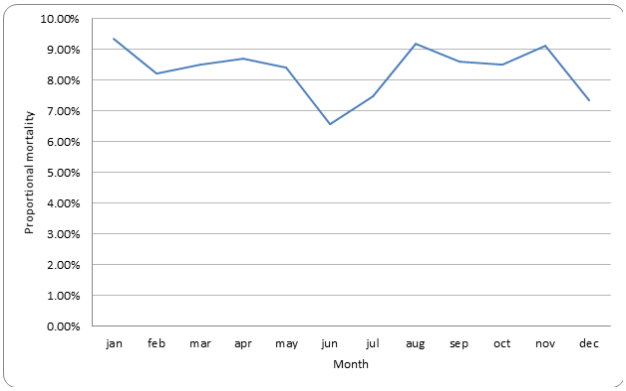


**Figure 2** Proportional mortality of cats by month.

There were 444 records of causes of death, representing 5.92% of the felines analyzed. The categories of death grouped according to their pathophysiology and age group are shown below (Table 5).

It was observed that for the youngest age group (0 to 4 years) the most prevalent reasons were infectious and traumatic, while for the rest of the age groups, the most prevalent reasons were related to urinary system failures and neoplasms.

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**Table 5** Causes of mortality according to age group

| Age group | 0 a 4 | 5 a 9 | 10 a 14 | over 15 |
|---|---|---|---|---|
| **Causes** | **Number (%)** | | | |
| Urinary system failure | 16 (18) | 33 (34) | 47 (30) | 43 (43) |
| Neoplasia | 13 (15) | 23 (24) | 50 (32) | 37 (37) |
| Infectious disease | 23 (26) | 15 (15) | 13 (8) | 2 (2) |
| Trauma | 20 (22) | 5 (5) | 3 (2) | 1 (1) |
| Cardiovascular system failure | 4 (4) | 6 (6) | 9 (6) | 2 (2) |
| Respiratory system failure | 5 (6) | 3 (3) | 15 (10) | 5 (5) |
| Hepatic failure | 2 (2) | 5 (5) | 7 (4) | 2 (2) |
| Gastroenteropathy | 1 (1) | 3 (3) | 4 (3) | 0 (0) |
| Multiorgan failure | 0 (0) | 3 (3) | 2 (1) | 6 (6) |
| Endocrinopathy | 0 (0) | 0 (0) | 5 (3) | 2 (2) |
| Neuropathy | 2 (2) | 1 (1) | 1 (1) | 1 (1) |
| Sudden death | 3 (3) | 0 (0) | 1 (1) | 0 (0) |
| Total | 89 (100) | 97 (100) | 157 (100) | 101 (100) |

## Discussion

This study presents the first life expectancy tables for the CABA feline population, as well as the first in Latin America.

For the period of the study, between 2018 and 2021, there was an annual average estimated at 312,966 felines inhabiting CABA. The sample size of cats participating in the study represented 2.5% (7,945/312,966). Regarding the general population of cats in the city, 82% are neutered1. In the present study the percentage of neutered cats was 84%, this indicates that neutered cats may be overrepresented in our study and, consequently, the overall life expectancy may have been overestimated.

In this work, we estimated an overall life expectancy of 11.01 years (CI:10.55- 11.46 years), significantly higher than that published for cats from Japan,[5] 4.2 years. However, it should be taken into account that the data published for Japan is more than 30 years old, and more current life expectancy tables for felines have not been published to allow comparison of the information.

Regarding sex and neutered status, we observed disparate results to those published by other countries.[4,9] Animals of both sexes showed significantly different life expectancies at birth, in line with that published for cats from England but in contrast to that published for cats from Sweden.[4] It should be noted that those studies used different analysis methodologies than the one used in this study. In turn, neutering was associated with an elevated life expectancy at age 0 for both sexes. Some authors suggest that entire felines are more likely to suffer traumatic deaths at an early age, which would decrease life expectancy at birth.[8]

Regarding life expectancy at birth with respect to breeds, significant differences were found between the total of pure breeds and the crossbreed, with life expectancy being higher in pure breeds, this is in contrast to what has been published for cats from England.[9]

Life expectancy and breed mortality profiles may differ between populations for a wide variety of genetic and health reasons. For the Siamese breed, a similar median longevity, 15 years, was observed to that presented for British Siamese cats, 14.2 years.[9]

The proportional mortality by months of pet cats obtained in our study showed that the probability of dying during the warm season did not differ significantly from the cold season.

With respect to the recorded causes of death, despite having fewer data, we found agreement with that reported for felines from England and Sweden.[4,9] Cats under 5 years old recorded causes related to infectious processes or trauma, and those over 5 years old, urinary disorders and neoplasms.

## Conclusion

The life tables generated in the present study promote not only a better understanding of the life span of cats, but also a solid knowledge on which to base strategies to improve the quality of life in domestic felines. The findings of increased life expectancy in neutered animals corroborate recommendations to spay or neuter cats at an early age.

Given the prolongation of life expectancy in humans, as a result of advances in medicine and improved living conditions, it is expected to see a similar trend in urban pets that share similar living standards. It would be interesting to do a similar study in cats living in rural or semi-rural environments to evaluate possible differences in their life expectancy.

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## Conflict of Interest

Author declares there is no conflict of interest in publishing the article.

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## References

1. Responsible ownership and health module report of dogs and cats. Annual Household Survey 2018; 2020.
2. Chiang CL. The life table and its applications. Robert E Krieger Malabar; 1984.
3. Hayashidani H, Omi Y, Ogawa M, et al. Epidemiological studies on the expectation of life for cats computed from animal cemetery records. *Jpn J Vet Sci.* 1989;51(5):905–908.
4. Egenvall A, Nødtvedt A, Häggström J, et al. Mortality of life-insured Swedish cats during 1999-2006: age, breed, sex, and diagnosis. *Journal of veterinary internal medicine*. 2009;23(6):1175–1183.
5. Hayashidani H, Omi Y, Ogawa M, et al. Epidemiological studies on the expectation of life for dogs computed from animal cemetery records. *Nippon Juigaku Zasshi*. 1988;50(5):1003–1008.
6. Inoue M, Kwan N, Sugiura K. Estimating the life expectancy of companion dogs in Japan using pet cemetery data. *The Journal of veterinary medical science*. 2018;80(7):1153–1158.
7. Teng KT, Brodbelt DC, Pegram C, et al. Life tables of annual life expectancy and mortality for companion dogs in the United Kingdom. *Sci Rep.* 2022;12:6415.
8. Rochlitz I. Study of factors that may predispose domestic cats to road traffic accidents: part 1. *The Veterinary record.* 2003;153(18):549–553.
9. O'Neill DG, Church DB, McGreevy PD, et al. Longevity and mortality of cats attending primary care veterinary practices in England. *Journal of feline medicine and surgery.* 2015;17(2):125–133.
10. Schoen R. Calculating life tables by estimating chiang's from observed rates. *Demography.* 1978;15(4):625–635.
11. Methods for constructing life tables for Canada, provinces and territories. Report prepared by Demography Division; 2019.