

# The reproductive and survival benefits of mothers and grandmothers in elephants

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Three generations of Amboseli elephants. Credit: Amboseli Trust for Elephants

Only a few mammals and some birds are as long-lived as humans, and many of these species share interesting characteristics in how they age. A new paper in Springer's journal *Behavioral Ecology and Sociobiology*

explores lifetime reproductive patterns in African elephants. Led by Phyllis Lee of the University of Stirling in the UK, the study analysed data from 834 female elephants in Amboseli National Park, Kenya. This population has been continuously monitored since 1972, and data collected on more than 3000 elephants since the study began. This paper analyses 42 years of data on females who survived to be at least nine years old.

For long-lived species such as humans, chimpanzees, whales and some birds, longer survival is associated with higher reproductive rates and a loss in fertility only at an extremely old age. Prolonged post-reproductive lifespans may mean potential advantages for both the surviving individuals and their offspring; post-reproductive longevity thus remains a question of major theoretical interest. Elephant life histories are slow; a 22 month gestation period is followed by 12 months lactational anestrus, and calves suckle until their next sibling is born. Most females in this study gave birth by the age of 14, and as for other species, early starters have higher rates of reproduction.

Most Amboseli females survived into their late thirties, while ten per cent lived into their sixties. According to Lee, [elephants](#) exhibit the classical mammalian pattern of a decline in reproductive rate after age 49, followed by up to sixteen years of post-reproductive survival. This classic life history phenomenon - the selective disappearance of less productive individuals - has not been demonstrated for such a long-lived animal before.

Calf survival goes hand-in-hand with maternal experience and environmental conditions in the calf's first year of life, but is not directly related to the mother's age. First-born calves, those born during a drought and male offspring are more likely to die earlier than others. Even the oldest mothers (aged over 50) raised offspring successfully, although, like the mothers of sons, older mothers have slightly longer

intervals between births.

"The new and exciting part of our study is the strong effect females have on the reproduction of daughters and granddaughters in their family" says Lee. "Daughters of long-lived mothers lived longer themselves and had higher reproductive rates". In some large families, three generations of mother-daughter pairs reproduced simultaneously. Only ten of the 281 mothers monitored ceased reproduction towards the end of their lives.

So while elephant calves clearly get a major survival and reproductive benefit from having a living grandmother, the females do not exhibit classical forms of menopause - or cessation of reproduction long before death - seen in whales and humans, despite having an average of a 16-year period between when a long-lived female's reproductive rate declines and her own death. Lee et al. argue that elephant reproduction is a function of a long-lived mother within a successful family context. The social dimension of grandmothing, such as environmental or social knowledge, appears to be a more important benefit in these female-led families than does a female trading off her own reproduction against that of her daughters, as is typically seen in humans.

**More information:** Phyllis C. Lee et al. The reproductive advantages of a long life: longevity and senescence in wild female African elephants, *Behavioral Ecology and Sociobiology* (2016). [DOI: 10.1007/s00265-015-2051-5](https://doi.org/10.1007/s00265-015-2051-5)

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