

# Hot flashes? Thank evolution

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A study of mortality and fertility patterns among seven species of wild apes and monkeys and their relatives, compared with similar data from hunter-gatherer humans, shows that menopause sets humans apart from other primates.

Nonhuman primates aren't immune to the fading female fertility that comes with age, the researchers say. But human females are unique in living well beyond their childbearing years.

"Unlike other primates women tend to have a long post-reproductive life. Even before [modern medicine](#), many women lived for 30 to 35 years after their last child was born," said co-author Susan Alberts of Duke University and the National Evolutionary Synthesis Center.

In a study appearing the week of July 29 in the *Proceedings of the National Academy of Sciences*, Alberts and colleagues compared mortality and fertility data for seven species of wild primates to similar data for the !Kung people of Southern Africa, a human population of hunter-gatherers with limited access to modern medicine or birth control.

The nonhuman primate data were based on long-term observations of 700 adult females, including capuchins in Costa Rica, murrets in Brazil, baboons and blue monkeys in Kenya, chimpanzees in Tanzania, gorillas in Rwanda and sifakas in Madagascar.

This is the first study to compare humans with multiple primate species

living in the wild.

For each species, the researchers estimated the pace of reproductive decline—measured as the probability, at each age, that a female's childbirth will be her last—and compared it with the rate of decline in overall health, measured as the odds of dying with each passing birthday. "This way we were able to compare the rate of aging in the reproductive system with the rate of aging in the rest of the body," Alberts said.

The results suggest that in [nonhuman primates](#), reproductive decline is surpassed by declines in survival, so that very few females run out of reproductive steam before they die. A female baboon, for example, may live to age 19, and continues to reproduce to the end.

But in human females the reproductive system shuts down much more rapidly than the rest of the body. "Half of women experience [menopause](#) by the age of 50, and fertility starts to decline about two decades before that," Alberts said.

What distinguishes a human female from her primate cousins is not that the human biological clock ticks faster, but that mortality is so much lower in humans than in other primates, according to work done by University of Utah anthropologist Kristen Hawkes, who was not an author of this study.

This study supports that idea, the researchers say. In both humans and chimpanzees, for example, female fertility starts to decline in the late 30s and early 40s. "[But] even in human populations with little access to modern medicine, like the !Kung [hunter-gatherers in this study], most women survive for decades after their last child is born. Nonhuman primates rarely do that," Alberts said.

If evolution has given us longer lifespans than our primate cousins, why

hasn't female reproduction kept pace? And in a world where individuals with more offspring tend to win the evolutionary contest, why shut down reproduction with decades of survival still ahead?

It may be that older females who forego future breeding to invest in the survival of their existing children and grandchildren gain a greater evolutionary edge than those who continue to reproduce. Once a baby chimp is weaned it can forage for itself, whereas human infants are nutritionally dependent long after they leave the breast.

"[Human children] can benefit greatly from having mothers and grandmothers who are still alive and not tied up with helpless infants," Alberts explained.

Another possibility is that mammalian eggs simply have a limited shelf life. According to this idea, we've extended our lives to the point where we've outlived our egg supply. A woman is born with all the eggs she will ever have—in contrast to sperm, which men produce throughout their lives.

"Female African elephants seem to give birth into their 50s and occasionally into their 60s, so at least one mammal species appears to have surpassed the typical lifespan for mammalian eggs," Alberts said. "Female killer whales are the opposite—like humans their fertility peters out in their 30s and 40s, while they often live into their 70s. But there just aren't enough long-term data on other mammals to address the shelf-life hypothesis conclusively."

**More information:** "Reproductive aging patterns in primates reveal that humans are distinct," Alberts, S. C. et al. *Proceedings of the National Academy of Sciences*, 2013.

Provided by Duke University

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