

# High stress during pregnancy decreases offspring survival, mongoose study shows

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High stress during pregnancy decreases offspring survival, according to this mongoose study. Credit: Harry Marshall

Researchers studying banded mongooses in Uganda have discovered that pups born to females that experienced elevated stress hormones during

the later stages of pregnancy are much less likely to survive their first month.

Dr Jennifer Sanderson, now a science teacher at Bedminster Down School in Bristol, spent four years observing wild [banded mongooses](#) to understand the effects that maternal [stress](#) may have on the survival of mongoose [pups](#).

She discovered that female mongooses at the bottom of the social hierarchy experience an increase in circulating [stress hormones](#), or 'glucocorticoids', and these high [stress levels](#) decrease the likelihood that pups will survive. The findings of the study are published today in the Royal Society journal *Biology Letters*.

Females often have to compete for access to the right resources to breed successfully, even in the most cooperative animal societies. Such female competition is widespread in animal populations but this study is the first to investigate if there is a link between socially induced stress and offspring survival in a wild cooperative mammal.

According to Dr Sanderson: "We all think of stress as a bad thing and it's easy to imagine that high stress levels during pregnancy can have negative effects on a baby's development. Our study has shown that pups born to [females](#) with high circulating glucocorticoids in the third trimester are much less likely to survive the first weeks of life and are unlikely to emerge from their burrows."

Banded mongooses are close relative of the famous meerkat and are found living in stable social groups across Central and Eastern Africa. They are highly social and breed communally with all females within a group commonly giving birth on exactly the same day.







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The Banded Mongoose Research Project, led by Professor Michael Cant from the Centre for Ecology and Conservation at the University of Exeter's Penryn Campus in Cornwall, has been observing the mammals' breeding behaviour for over 20 years.

Professor Cant added, "Banded mongooses are almost unique because most females within the group commonly become pregnant together and then give birth on exactly the same day. On first glance it seems that the females are working together to produce and care for a huge communal litter. However, these results suggest that dominant females may be stressing out their female group mates during pregnancy - a strategy which decreases the survival chances of pups born to their competitors while potentially increasing their own pups' chances of making it to adulthood."

Dr Sanderson used an ultrasound machine to count the number of foetuses carried by banded mongooses in Uganda and then used genetic analyses to find out which females were the mothers of the pups which survived. Dr Sanderson also collected hundreds of faecal samples from the Ugandan mongooses which were then taken to a special Wildlife Endocrinology Lab at Chester Zoo where they were analysed for concentrations of hormones by the zoo's experts.



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In social species such as banded mongooses dominant females may use aggressive tactics to induce a hormonal response in subordinates and prevent them from breeding. While previous studies have shown a link between socially-induced stress and conception rates, this is the first to show that elevated stress levels experienced during pregnancy can have negative effects on the survival of offspring.

These findings provide new insight into the subtlety of female competition within even the most cooperative animal societies and provide a better understanding of how stress associated being a subordinate female can affect offspring development.

**More information:** 'Elevated glucocorticoid concentrations during gestation predict reduced reproductive success in subordinate female banded mongooses' by J Sanderson, HJ Nichols, HH Marshall, EIK Vitikainen, FJ Thompson, SL Walker, MA Cant, AJ Young is published in the journal *Biology Letters*. [rsbl.royalsocietypublishing.org ...  
.1098/rsbl.2015.0620](https://rsbl.royalsocietypublishing.org/doi/10.1098/rsbl.2015.0620)

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