

## BEHAVIOR

# Female genital cutting is not a social coordination norm

New data from Sudan question an influential approach to reducing female genital cutting

By Charles Efferson,<sup>1†</sup> Sonja Vogt,<sup>1†</sup> Amy Elhadi,<sup>2</sup> Hilal El Fadil Ahmed,<sup>2</sup> Ernst Fehr<sup>1†</sup>

The World Health Organization defines female genital cutting as any procedure that removes or injures any part of a female's external genitalia for nonmedical reasons (1). Cutting brings no documented health benefits and leads to serious health problems. Across six African countries, for example, a cohort of 15-year-old girls is expected to lose nearly 130,000 years of life because of cutting (2). We report data that question an influential approach to promoting abandonment of the practice.

A prominent view of female genital cutting is that it is a social norm that evolved culturally within the context of a coordination game, which is a type of social interaction in which all parties face incentives to match strategies (3–6). An especially influential application of this idea has been to interpret cutting as a coordinated practice that families use to prepare their daughters for future marriage (4–9). Under this interpretation, marriage brings prestige from successful reproductive pairings in natal-

ist societies, and it provides the increased social influence and spreading of risk that result when families use marriage to strengthen alliances.

According to this theory, a critical threshold exists such that, if the share of families who cut and demand cut daughters for their sons is above the threshold, all families have an incentive to cut. If the share of families is below the threshold, however, the probability of finding husbands without cutting one's daughters is

***“[C]utting rates show no trace of the discontinuity they should exhibit if families were coordinating...”***

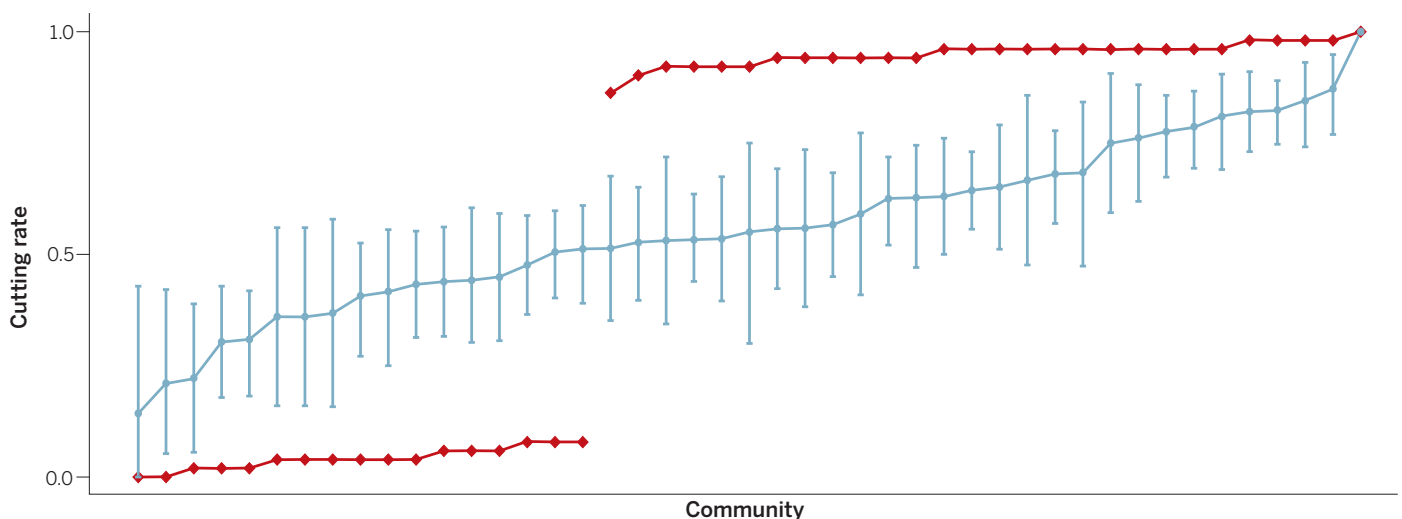
sufficiently high for families to reap the benefits of marriage without the health costs of cutting. The strong policy implication is that development workers must assemble a critical mass of families in a short period of time to move the share of cutting families from above to below the threshold (4–6). After publicly crossing the critical

threshold, cutting should then disappear on its own, quite apart from the activities of the development agency. This idea has been attractive because it suggests how a limited intervention can lead to long-term improvements in well-being.

Development agencies spend considerable resources for programs based on this approach (6, 9–11). Along with other activities, development workers gradually try to convince families in a community to abandon cutting and to declare publicly that they have done so. Once the development workers estimate they have enough families to cross the critical threshold, they have a public declaration (6–8), typically a large festival where many families declare they will no longer cut their daughters. The hope is that this public declaration will lead the remaining families who cut to realize that abandoning the practice is now in their own interests.

It is surprising given the considerable development funds at stake (6, 9–11), no one has provided data clearly showing that female genital cutting exhibits the characteristics of a social norm based on coordination. In particular, if coordination is an appropriate theoretical framework, two related predictions hold (see the chart). First, communities should have either very low or very high cutting rates, with attitudes reflecting either a noncutting norm or a cutting norm, respectively. Second, if cutting practices and attitudes vary, a pronounced discontinuity should separate noncutting from cutting communities.

To see if such a pattern can be detected, we developed empirical methods that do not rely on interviews with parents. This enabled us to collect data in the state of Gezira, Sudan, that were not compromised



**Cutting rates in Gezira communities.** Red diamonds show ordered cutting rates as predicted by the coordination game model (12). Blue dots show actual cutting rates across the 45 communities with 95% bootstrapped confidence intervals.

by the potential social desirability biases associated with asking parents about cutting [for details, see (12)]. Nine teams of professional photographers and medical doctors visited 45 schools in Gezira, one school in each of the 45 communities in our study (12). Girls in Gezira are typically cut during the summer vacation just before entering primary school or earlier (12). Henna is almost always applied to a girl's feet when she is cut, and this is the only time in a young girl's life when henna is applied. As residual henna remains on toenails for several weeks, our team photographed the feet of nearly all girls in the 45 schools within the first few days of the girls first entering primary school (12).

We also added one question to the medical exams normally sponsored by the Gezira government. The doctors asked each girl if she had been "purified," which is a literal translation of the Arabic word used in the local area to describe being cut. If either the photo or the girl's response indicated cutting, we coded the girl as cut (12).

Communities varied substantially in terms of their estimated cutting rates, but they did not vary in any way that reveals the signature of social norms that evolved within the context of a coordination game (see the chart). Apart from a single community with an estimated cutting rate of 100%, cutting rates were neither extremely high nor extremely low. Moreover, when ordered, cutting rates show no trace of the discontinuity they should exhibit if families were coordinating on cutting practices at the community level.

A formal modeling analysis supports this conclusion (12). The data were best explained, by far, with a heterogeneous model that assumes a different cutting rate for each community. Other models, including a coordination game model that assumes communities had coordinated on either a cutting norm or a noncutting norm, were much worse.

If families were coordinating in marriage pools that were not the same as communities, the observed intermediate cutting rates could conceivably be consistent with the coordination model. However, a representative survey with roughly 2500 adults revealed a very high degree of community endogamy (12). Within each community, a substantial number of participants told us that their families would not refuse marriage with other families in the community

because of cutting practices. These results show that marriage pools did not typically divide or fragment communities based on cutting practices. Moreover, an extended theoretical analysis of the coordination game model shows that, even if one allows for multiple marriage pools within communities, coordination cannot support stable intermediate cutting rates of the sort observed in our data (12).

Finally, if multiple marriage pools with different cutting norms exist within communities, a discontinuity in normative attitudes about cutting should also exist within communities. We developed an implicit association test to measure attitudes in an unobtrusive way (12), and we implemented the test with adults from 2260 randomly selected households in the 45 communities. We found that communities with high cutting rates had significantly more negative attitudes toward uncut girls (Spearman's rank correlation,  $\rho = -0.493$ ,  $P < 0.001$ ). At the individual level, however,

### ***"Public declarations indicate neither widespread abandonment nor that a program has co-opted coordination incentives..."***

the distribution of attitudes showed no evidence of a discontinuity that should have been present if two norms, one in favor of cutting and the other against, co-existed. This conclusion holds whether we look at attitudes over all participants from all communities or at the 45 communities separately (12). Cutting rates and attitudes varied substantially and covaried across communities. Neither measure, however, indicated that cutting was a social norm based on coordination.

The enormous heterogeneity we observed in cutting practices within and across communities points toward other potent forces sustaining cutting. Families may value cutting because they see it as a religious obligation (13), or they see cutting as the only way to produce feminine women in a society where gender must be clearly marked (13). Alternatively, perhaps cutting families believe that some men wield considerable power in the mating market and providing these men with costly signals of sexual fidelity brings a net benefit (13). Finally, families who cut may underestimate the risks of cutting because they do not link cutting to later health problems (14).

Heterogeneity means that a single criti-

cal threshold is unlikely to exist. Each family will have its own threshold. Thus, the claim that a public declaration will reduce cutting lacks empirical foundation. A public declaration of abandonment runs the risk of merely assembling families who already place a low intrinsic value on cutting, while the families who give it high intrinsic value will remain unconvinced. Public declarations indicate neither widespread abandonment nor that a program has co-opted coordination incentives in a way that will lead to reductions in cutting (12).

Other policies may contribute more effectively to the reduction of cutting. Identifying the benefits families attribute to cutting is crucial to promoting sustainable changes in values, preferences, and the harmful practices that sometimes follow. This may lead to different kinds of policy interventions such as communications-based programs or increasing the benefits of abandonment with conditional transfers. ■

#### REFERENCES AND NOTES

1. World Health Organization, Female Genital Mutilation (2014); [www.who.int/topics/female\\_genital\\_mutilation/](http://www.who.int/topics/female_genital_mutilation/).
2. D. Bishai et al., *Bull. World Health Organ.* **88**, 281 (2010).
3. G. Mackie, *Am. Sociol. Rev.* **61**, 999 (1996).
4. G. Mackie, J. LeJeune, "Social dynamics of abandonment of harmful practices: A new look at the theory" (Innocenti Working Paper 2009-06, UNICEF Innocenti Research Centre, Florence, Italy, 2009).
5. N. Diop et al., *The TOSTAN Program: Evaluation of a Community Based Education Program in Senegal* (Population Council, Washington, DC, 2004).
6. UN Population Fund (UNFPA)–UN Children's Fund (UNICEF), Joint Evaluation of the UNFPA-UNICEF Joint Programme on Female Genital Mutilation/Cutting (FGM/C): Accelerating Change (2013); <http://bit.ly/FGM-CProgrammeEval>.
7. TOSTAN, Community Empowerment Program (2013); <http://bit.ly/TostanCEP>.
8. B. Shell-Duncan, K. Wander, Y. Hernlund, A. Moreau, *Soc. Sci. Med.* **73**, 1275 (2011).
9. UK Department for International Development, Towards Ending Female Genital Mutilation/Cutting in Africa and Beyond (DFID, London, 2013); <http://devtracker.dfid.gov.uk/projects/GB-1-203024/>.
10. L. Featherstone, The UK announces...measures to end female genital mutilation/cutting [news story] (DFID, London, 2014); <http://bit.ly/measuresFGM-C>.
11. TOSTAN, Annual Reports and Financials (2013); [www.tostan.org/annual-reports-financials](http://www.tostan.org/annual-reports-financials).
12. Materials and methods are available as supporting material on Science Online.
13. E. Gruenbaum, *The Female Circumcision Controversy: An Anthropological Perspective* (Univ. of Pennsylvania Press, Philadelphia, 2001).
14. K. Hoff, "Behavioral economics and social exclusion: can interventions overcome prejudice?" (Policy Research Working Paper 7198, World Bank, Washington, DC, 2015).

#### ACKNOWLEDGMENTS

We thank the Gezira State government, the Sudan National Council for Child Welfare, the Gezira State Council for Child Welfare, and the national field office of UNICEF in Sudan. Funded primarily by the Swiss National Committee of UNICEF and is also part of an European Research Council grant on the "Foundations of Economic Preferences."

#### SUPPLEMENTARY MATERIALS

[www.sciencemag.org/content/349/6255/1446/suppl/DC1](http://www.sciencemag.org/content/349/6255/1446/suppl/DC1)

10.1126/science.aaa7978

<sup>1</sup>Department of Economics, University of Zurich, 8006 Zurich, Switzerland. <sup>2</sup>Khartoum, Sudan. \*These authors contributed equally to this research. †Corresponding author. E-mail: charles.efferson@econ.uzh.ch; sonja.vogt@econ.uzh.ch; ernst.fehr@econ.uzh.ch