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Community Influences on Female Genital Mutilation/Cutting in Kenya: Norms, Opportunities, and Ethnic Diversity

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Abstract

Female genital mutilation/cutting (FGMC) is a human-rights violation with adverse health consequences. Although prevalence is declining, the practice persists in many countries, and the individual and contextual risk factors associated with FGMC remain poorly understood. We propose an integrated theory about contextual factors and test it using multilevel discrete-time hazard models in a nationally representative sample of 7,535 women with daughters who participated in the 2014 Kenya Demographic and Health Survey. A daughter's adjusted hazard of FGMC was lower if she: had an uncut mother who disfavored FGMC, lived in a community that was more opposed to FGMC, and lived in a more ethnically diverse community. Unexpectedly, a daughter's adjusted FGMC hazard was higher if she lived in a community with more extra-familial opportunities for women. Other measures of women's opportunities warrant consideration, and interventions to shift FGMC norms in more ethnically diverse communities show promise to accelerate abandonment.

Keywords

ethnic diversity, female genital mutilation/cutting, Kenya, multilevel modeling, social norms

Female genital mutilation/cutting (FGMC) refers to procedures in which the external female genitalia are partially or completely removed for non-medical reasons (United Nations Children Fund [UNICEF] 2016). Over 200 million girls and women have experienced FGMC, with around 2.6 million girls at risk of being cut annually *(ibid.).* A human rights violation (United Nations [UN] 2014), FGMC can have serious negative health consequences, including immediate and long-term genito-urinary, obstetric, sexual, and psychosocial complications, although the outcomes vary with procedure severity (Berg et al. 2014; Kimani, Muteshi-Strachan, and Njue 2016; Yount and Abraham 2007; Yount and Carrera 2006). International resolutions calling for action, and national laws banning and regulating FGMC, have expanded over the past two decades (UNICEF 2010; UN 2015). In parallel, the reported prevalence of FGMC has declined in some countries but remains almost universal in others (UNICEF 2013).

Kenya is often cited as a success story of efforts to encourage abandonment of FGMC. FGMC rates dropped by almost half between the 1998 Kenya Demographic and Health Survey (KDHS) and the 2014 KDHS (NCPD Kenya et al. 1999; Kenya National Bureau of Statistics [KNBS] et al. 2015). Cross-sectional data from the 1998 DHS suggests that declines began even earlier (Hayford 2005). Kenyan non-governmental organizations have been active in social and educational campaigns since at least the early 1990s, and these efforts intensified with growing international opposition in the 1990s and 2000s (Cloward 2016). Legal bans on FGMC were implemented in 2001, and the Prohibition of FGMC Law was passed in 2011 as part of a broader goal to promote "health and gender equality" (National Council for Population and Development [NCPD] 2012). Still, about 11.4% of adolescent girls (15–19 years) had experienced FGMC in 2014, with substantial variation across ethnic groups, geographic regions, and communities (KNBS et al. 2015). Understanding the nature of persistence and decline of FGMC in a multiethnic, moderate-prevalence society like Kenya can advance efforts toward more widespread abandonment and a broader understanding of community influences on sociocultural practices with health implications.

Here, we examine the multilevel influences on FGMC in Kenya. We draw on an integrated theory of the community-level influences on FGMC (Yount et al. n.d.) and extend this theory to incorporate community ethnic diversity as an indicator of the "openness" or "closedness" of community social systems. We develop robust measures of community norms, opportunity structures, and ethnic diversity to test our theory using multilevel discrete-time hazard models.

THEORIZING FGMC DECISIONS

Where FGMC is carried out in infancy or early childhood, mothers or grandmothers often are the primary decision-makers, although fathers may be involved (Gruenbaum 2001; Shell-Duncan Hernlund, Wander, and Moreau 2010). In contexts where FGMC occurs in adolescence, girls may choose to undergo the practice (Hodzic 2016; Leonard 2000). Yet, FGMC decisions are also is embedded in hierarchical family and community relationships (Bicchieri 2017). FGMC often marks a rite of passage and ensures social status in the marital family and community (Shell-Duncan, Naik, and Feldman-Jacobs 2016; Yount 2002). FGMC is tied to beliefs about belonging, family, and marriage and childbearing, and these social connotations influence decisions to cut. Thus, decisions about FGMC depend on social relationships and are grounded in social systems.

Theories of FGMC have focused on social norms and gendered opportunities as central determinants of the practice. According to norms-based theories of social behavior, conformity to descriptive norms (what other people do) and injunctive norms (what other people believe should be done) jointly motivate individual behavior. Mackie (1996, 2003) developed convention theory as an application of norms-based theories to FGMC, arguing that community norms specific to FGMC are the primary influence on continuation. In communities where FGMC prevalence is high, parents expect everyone else's daughters to be cut and believe that others expect their own daughters to be cut. Parents also may expect strong sanctions for daughters who remain uncut, such as exclusion of daughters from community events and ceremonies, low position in marriage markets, and reduced social support (Bicchieri 2017; Mackie 1996; Mackie and LeJeune 2009; Shell-Duncan, Wander, Hernlund, and Moreau 2011; Yount 2002, 2004). Fear of social sanctions may lead mothers to have their daughters cut even if the mothers themselves oppose the practice (Shell-Duncan et al. 2016).

Convention theorists contend that changes in FGMC will take place collectively when a "tipping point" or "critical mass" is reached in social, moral, and legal opposition to the practice (Mackie and LeJeune 2009). In theory, a mother will be able to decide not to cut her daughter when broader social acceptance of uncut daughters emerges and social sanctions for non-compliance decline. Evidence supports convention theory, in that community norms around FGMC are related to a mother's decision to cut her daughters (Hayford 2005; Hayford and Trinitapoli 2011; Yount et al. n.d.), and girls are less likely to experience FGMC if they live in communities where fewer girls are cut (Farina and Ortensi 2014).

However, norms specific to FGMC are not the only community-level factors influencing persistence or abandonment. FGMC norms are gendered norms, in that they govern women's behavior *as women*, and they are thus situated in larger gender systems. Feminist theorists emphasize the role of gendered *extra-familial opportunities* in maintaining FGMC (Yount 2002). FGMC has served to regulate women's access to marriage (Leonard 2000; Yount 2002). As a result, the salience of FGMC is tied to the importance of marriage as a source of economic security and social identity. This importance is reflected not only in the prevalence of marriage, but also in the extent to which women are able to participate in economic and social activity outside the family or, conversely, the extent to which women are dependent on marriage for status and security. In many contexts, institutionalized gender inequalities limit women's activities outside the family, including education and paid work, and constrain their sexual and reproductive rights (Kabeer 1999; Muñoz Boudet, Petesch, Turk, and Thumala 2013). In communities where these constraints are less strict, and women have more extra-familial opportunities — such as delaying marriage to adulthood, attending school, and participation in market work — mothers may see marriage as less necessary for their daughters' survival and FGMC as less important (Boyle, McMorris, and Gomez 2002; Modrek and Liu 2013; Shell-Duncan et al. 2016; Yount 2002).

Some evidence supports feminist theories. Daughters have a lower risk of FGMC when their mothers have more schooling (Andro and Lesclingand 2007; Hayford 2005; UNICEF 2013; Yount 2002) or work outside the home (Boyle et al. 2002). Women who marry early are more likely to have their daughters cut (Farina and Ortensi 2014; Jensen and Thornton 2003; Modrek and Liu 2013). In Mali, women who experienced FGMC were more likely to be in polygamous marriages and to have experienced physical, sexual, and psychological violence (Salihu et al. 2012). In Kenya, FGMC was unrelated to polygamous marriage, but was related to being married to older partners and to earlier sexual debut (Yount and Abraham 2007). Thus, existing theory suggests that women may be better able to act on their preferences for abandoning FGMC in communities in which women have more extra-familial opportunities.

COMMUNITY HETEROGENEITY AND FGMC

Both convention and feminist theories implicitly rely on the assumption that women and their daughters are part of a clearly defined and homogenous community that serves as a reference group for FGMC norms and extra-familial opportunities. In practice, the relevant reference community is not always well-defined or homogenous. To some extent, heterogeneity is captured in measures of community norms or opportunity structures. For instance, communities in which FGMC practices vary will have weaker descriptive norms around FGMC. However, communities in which multiple distinct groups co-reside may be qualitatively different from more homogenous communities, even after accounting for variation in norms.

Here, we operationalize community heterogeneity with a measure of ethnic diversity. A large and vibrant literature examines the influence of ethnic diversity on community relations and social cohesion in high-income countries. At the neighborhood level – that is, in relatively small, geographically contiguous spaces in which people are likely to have repeated informal interactions – ethnic diversity is consistently associated with lower levels of social cohesion (van der Meer and Tolsma 2014). In sub-Saharan Africa, research on how ethnic diversity affects social relations generally focuses on larger levels of aggregation, examining the influence of ethnic competition on political stability, economic investment, and policy implementation at the national level (e.g., Easterly and Levine 2007; Lieberman 2007). However, a few community-level studies have found that ethnically diverse communities have lower levels of social cohesion (Glennerster, Miguel, and Rothenberg 2013) and lower levels of investment in collective goods (Miguel and Gugerty 2005). Ethnically diverse communities appear to be less able to enforce social sanctions that promote pro-social behavior (Habyarimana, Humphreys, Posner, and Weinstein 2007; Miguel and Gugerty 2005). If ethnically diverse communities have weaker social ties and weaker enforcement of norms, they also may have lower levels of FGMC, net of community norms and opportunity structures.

FGMC beliefs and practices are tied to ethnic group identity, in Kenya as elsewhere in sub-Saharan Africa (e.g., Thomas 2003; Weinreb 2001; White 1990), but there is substantial variation in FGMC within as well as across ethnic groups (Cloward 2016; Gruenbaum 2001; Leonard 2000; KNBS et al. 2015). The presence of a non-practicing group may facilitate behavioral change among members of a historically practicing group. In a study of Maasai communities in Kenya, Cloward (2016) found that frequent contact with members of other ethnic groups was associated with less likelihood of cutting one's daughter and of plans to do so. However, the impact of ethnic diversity goes beyond exposure to new ideas. Even where co-resident ethnic groups share similar FGMC norms, more ethnically diverse communities may have less kin-based and more diffuse social ties (Bicchieri 2017; Shell-Duncan et al. 2016). Women living in these communities may conclude that community expectations about FGMC are weak (or weakly enforced), and that it is possible to reject the practice without diminishing opportunities for their daughters (Bicchieri 2017). In this way, ethnic diversity may create more favorable environments for women to act upon non-normative beliefs.

CURRENT STUDY

Drawing on the research and theory described above, we hypothesize direct effects of community FGMC norms, extra-familial opportunity structures, and ethnic diversity on daughters' FGMC. Because FGMC decisions reflect interactions between individual goals and larger social networks, we also hypothesize that a mother's ability to carry out individual preferences regarding FGMC varies across communities depending on these characteristics.

We propose two primary hypotheses:

H1. A daughter has a lower adjusted risk of experiencing FGMC if she lives in a community with (a) norms that are less supportive of FGMC; (b) more opportunities for women outside marriage; and (c) greater ethnic diversity.

H2. A mother's disapproval of FGMC is more strongly associated with her daughter's FGMC if the pair live in a community with (a) norms that are less supportive of FGMC; (b) more opportunities for women outside marriage; and (c) greater ethnic diversity.

In a prior case study, we tested a subset of these hypotheses in Egypt (Yount et al. n.d.). In the current study, we assess whether the gender-systems framework developed for Egypt (Yount et al. n.d.) can be extended to a region with a very different range of community characteristics regarding FGMC norms and extra-familial opportunities. We add an important theoretical and empirical dimension to this study in Kenya by exploring the additional influence of community ethnic diversity.

Kenya presents a distinct context both in terms of FGMC practice and prevalence and in terms of gender systems and extra-familial opportunities. Kenya is a multiethnic society that has experienced substantial decline in the prevalence of FGMC. Women's average age at marriage is young (median 20 years), and about 10% of married women are in polygynous marriages (KNBS et al. 2015). Kenya is relatively more industrialized than many countries in the African sub-continent, but subsistence agriculture remains an important source of economic production (World Bank 2018). As in much of sub-Saharan Africa, women's labor is central to agricultural production (Boserup 1970). However, women are more likely to be engaged in the production of crops for food than in cash crops (Ellis et al. 2007) and less likely than men to be employed in the formal labor market (30% vs. 70%; *ibid.*). Thus, extra-familial opportunities for women remain constrained.

DATA AND METHODS

Data and Analytic Sample

We used data from the 2014 Kenya Demographic and Health Survey (KDHS; KNBS et al. 2015). The 2014 KDHS used a stratified, two-stage cluster sample design, in which 995 clusters in rural areas and 617 clusters in urban areas were randomly selected from 5,360 clusters in the 2009 Kenya Population and Housing Census. These clusters approximate villages and urban neighborhoods (Kohler, Behrman, and Watkins 2000) and were our community-level (level-2) sample. From each selected cluster, 25 households were selected randomly without replacement. Ultimately, 36,430 households were interviewed (99% response rate), including 31,079 eligible women 15–49 years old (97% response rate). Within each cluster, half of the households were randomly assigned to a shorter questionnaire that did not include FGMC questions. Women who received the full survey were eligible for our analysis (N = 14,741; 96% response rate).

The 2014 KDHS collected FGMC information in two ways: reports from all women about their attitudes about and experiences with FGMC, and reports from women with daughters aged 0–15 about daughters' experiences with FGMC. Women who received the full survey were asked if they had ever heard of "female circumcision." Those who had not were asked if they had ever heard of a practice in which a girl has part of her genitals cut. Women who had not heard of FGMC based on these two questions (n = 442, 3%) did not complete the rest of the FGMC module, and in this analysis, were coded as not having experienced FGMC and not supporting FGMC. Women with missing data on whether they had heard of FGMC (n = 4), ethnicity (n = 7), religion (n = 3), or polygamy status (n = 12) were dropped. The final sample used to create community-level variables included 14,715 women 15–49 years old across 1,593 communities. On average, there were 9.2 women per community (*Median* = 9; *range* = 1–23).

The individual-level (level-1) sample included 8,978 mothers with 19,679 daughters. We dropped daughters older than age 15 (*n* = 4,209) and daughters missing age data (*n* = 1,378).[1] Of the remaining 14,092 daughters (*n* = 7,938 mothers), 976 (6.9%) had missing data on FGMC status (*n* = 957) or age at cutting (*n* = 19). The final sample included mothers (*n* = 7,535) with daughters aged 0–15 with complete information about FGMC status and age at cutting (*n* = 13,116), representing 1,580 communities. We then randomly selected one daughter from each mother to create 7,535 mother-daughter pairs for our analytical sample. In this sample, there were 10 women per community on average (*Median* = 10; *range* = 1–23).

In addition to FGMC information, the 2014 KDHS women's survey included questions about marital status, age at first co-residence with a husband/partner, schooling attainment, and recent work experience. A household survey included questions on demographic characteristics of members and household assets and amenities (e.g., housing material, electricity) that the DHS used to calculate a household wealth index (KNBS et al. 2015).

Measures

Our measures reflect the hierarchical nature of the data, with mothers and daughters at level 1 nested within communities at level 2.

Outcome: Hazard of daughter's FGMC. The outcome variable for this analysis was a daughter's hazard of experiencing FGMC. Maternal responses to questions on daughters' FGMC status and age at cutting were used to create a discrete-time survival file based on person-periods of exposure. We used multi-year periods of exposure (risk sets) rather than single person-years to reduce computational burden and to allow for estimation of hazards during age risk sets where the number of events was sparse (Stewart 2010).[2] Based on an examination of the hazard curves and exploratory analyses, we modeled periods of exposure for the age risk sets 0–5, 6–7, 8–9, 10–11, and 12–15–years–old. For each exposure period, daughters were coded 0 if they did not experience FGMC and 1 if they experienced FGMC. Exposures for girls who had not experienced FGMC by the time of the survey were right-censored. Daughters' age risk sets were not centered.

Individual-level variables.

Maternal FGMC status and attitudes. We created a composite measure using four questions about maternal FGMC status and attitudes about FGMC. Mothers indicated whether they had experienced FGMC (0 = *yes*, 1 = *no*). Self-reports of FGMC status have been shown to be reliable (Klouman, Manongi, and Klepp 2005). We included this behavioral indicator with measures of attitudes because women's FGMC experience reflects the FGMC attitudes and norms of the family and community in which they grew up. These beliefs, in turn, influence daughters' FGMC directly (because maternal kin may participate in FGMC decisions) and indirectly (through their effect on mothers' beliefs). Mothers answered three attitudinal questions about whether they believed: 1) their religion required FGMC; 2) their community required FGMC; and 3) FGMC should be abandoned. For all three variables, attitudes disfavoring FGMC were coded 1, and neutral (*it depends, don't know*) or favorable attitudes about FGMC were coded 0. Women who reported *no religion* were coded 1 for questions about religious support.

We explored and confirmed that these four items reflect a single latent construct using exploratory factor analysis (EFA) and confirmatory factory analysis (CFA) in random-split half samples of mothers using MPlus (Muthén and Muthén 1998-2012). We assessed model fit using the Root Mean Squared Error of Approximation (RMSEA less than .07 with a 90% confidence interval including .05), Comparative Fit Index (CFI greater than .95), Tucker-Lewis Index (TLI greater than .95), and non-significant χ^2 (Hu and Bentler 1999; Kline 2005; Steiger 2007). The factor had good fit (*RMSEA* = .04 [.03, .06], *CFI* = 1.00, *TLI* = .999, χ^2 = 26.40, *p* = .000), large standardized factor loadings (.84–.98), and good reliability (α = .84). We used the estimated factor score for "maternal FGMC status and attitudes" as a predictor in our models.

Individual-level control variables. We controlled for several maternal characteristics: age (in years), schooling attainment (1 = *primary school or higher*, 0 = *no education,* or *incomplete primary*), work status (1 = *works for cash,* or *cash and in-kind payment,* 0 = *does not work,* or *works only for in-kind payment*), age at first co-residential relationship (1 = *age 18 or older at first union* or *age 18 or older and unmarried,* 0 = *less than age 18 at first union,* or *less than age 18, unmarried, and has a daughter*), marital status (1 = *never married*, 0 = *ever married*), and whether her husband/partner had other wives (1 = *married and not in a polygamous union* or *not currently married*, 0 = *in a polygamous union*). Maternal religion also was included (1 = *Christian* or *Catholic*, 0 = *Muslim, no religion,* or *other religions*) because FGMC varies across religious groups in some contexts (Hayford and Trinitapoli 2011; Kandala and Komba 2015; UNICEF 2013). There were 23 ethnic group categories in the KDHS, including an "other" category. Because many of the ethnic groups were small, including all 23 categories led to multicollinearity. Instead, we created a four-category measure for maternal ethnicity based on group size and current FGMC prevalence. This classification incorporated proxies for FGMC norms and political influence (size of group). The categories were: Large circumcising groups (percentage of adult women in the full sample ≥9.5%, ≥10% of mothers cut; Kalenjin, Kamba, Kikuyu), large non-circumcising groups (percentage of adult women in the full sample ≥9.5%, <10% of mothers cut; Luhya and Luo), small circumcising groups (percentage of adult women in the full sample <9.5%, ≥10% of mothers cut; Boran, Embu, Gabbra, Kisii, Kuria, Maasai, Mbere, Meru, Orma, Rendille, Samburu, Somali, Taita/Taveta, and other), and small non-circumcising groups (percentage of adult women in the full sample <9.5%, <10% of mothers cut;

Mijikenda/Swahili, Turkana, Pokomo, Iteso). We also included a binary covariate from the DHS household wealth index quintiles (1 = *wealth in the top 40% [top two quintiles]*, 0 = *wealth in the bottom 60% [bottom three quintiles]).* Daughters from wealthier families tend to be at lower risk of cutting (Andro et al. 2016; Kandala and Komba 2015; Yount 2002). Last, we included a continuous variable representing the calendar year in which a daughter was born to capture variance explained by the normative, legal, and institutional environment at birth (1999–2014). Individual-level variables were group-mean centered except for maternal age and daughter's birth year, which were grand-mean centered.

In exploratory analysis, we tested different specifications for education, wealth, and ethnic identity to assess the sensitivity of results to our coding. Coefficients for theoretically central variables were virtually unchanged when including all education categories (no education, incomplete primary, complete primary, incomplete secondary, complete secondary) and wealth categories (all five quintiles). Using the full set of 23 ethnic groups was not possible, due to collinearity issues. An alternative coding scheme with seven categories (five largest ethnic groups and two small combined groups) produced similar overall results (all theoretically central coefficients are similar in magnitude; most theoretically central coefficients are unchanged in significance except for the squared terms for community FGMC norms, which is only marginally significant in this specification, $p = .053$).

Community-level variables.

*Community FGMC norms and extra-familial opportunities***.** For community norms and extra-familial opportunities, we constructed latent factors using a similar procedure to that described above for maternal FGMC status and attitudes. We constructed factors from proportions of key community characteristics. To assess community FGMC norms, we computed the proportions of women who had not experienced FGMC, believed their religion did not require FGMC, believed their community did not require FGMC, and believed FGMC should be abandoned (coded as described above). A behavioral outcome (proportion of adult women cut) was included because it measures descriptive norms, or the actual behavior of people in the community, a salient element of the normative context.

To measure extra-familial opportunities, we calculated the community-level proportions of women who had: completed primary schooling or higher, worked for cash or both cash and in-kind payment in the past twelve months, first lived with their partner at age 18 or older (ever-married women), and were not in polygamous unions (includes unmarried women). We included the level of polygamy in a community because research across contexts in sub-Saharan Africa shows that settings in which polygamy is common are characterized by other factors related to women's power and status inside and outside the family: young age at marriage, large spousal age differences, less freedom of choice in one's spouse, higher acceptability of intimate partner violence, and less influence for women in the distribution of economic resources in the household, whether women were in polygamous or monogamous marriages (Agadjanian and Ezeh 2000; Chojnacka 2000; Goldman and Pebley 1989; Smith-Greenaway and Trinitapoli 2014; Timæus and Reynar 1998). In exploratory analyses, we included separate variables for the proportion of unmarried women and the proportion of women in monogamous unions; the factor structure was similar, so we retained the more parsimonious specification.

We created "community FGMC norms" and "community opportunities" factor scores using the KDHS sample of women 15–49 years old from 1,593 communities. All adult women were included in the factor analysis to capture characteristics representative of the wider community. We performed EFA and CFA to confirm that community-level items reflected two latent factors. The model had adequate fit (*RMSEA* = .10 [.09, .11], *CFI* = .970, *TLI* = .955, χ^2 = 322.43, *p* = .000) and high standardized factor loadings for community FGMC norms (.75–.97) and community opportunities (.49–.90). Reliability was excellent for norms (α = .94) and fair for opportunities (α = .68). We calculated factor scores based on these models and used them as predictors in our models. Because theory suggests that there may be a "critical mass" for community norms, we also included a squared term to account for nonlinear associations.

Community ethnic diversity. We measured ethnic diversity of communities using the Herfindahl-Hirschman Index (HHI; Hirschman 1964). The HHI was calculated by summing the squared proportions of each ethnic group in the community. We used a normalized (re-scaled) version of the index with values between 0 and 1, then reverse-coded the HHI so higher scores represented more ethnic diversity. This measure, sometimes called "ethnic fractionalization," can be interpreted as the likelihood that two randomly selected individuals would be members of *different* ethnic groups, and is the standard measure used in the field (van der Meer and Tolsma 2014). We used all 23 ethnic groups in the KDHS to calculate the HHI rather than the collapsed set of four categories used at the individual level. Our factor was designed to capture the role of ethnic diversity in contributing to the heterogeneity and openness of social ties, not the FGMC practices of specific ethnic groups (as captured in the collapsed categories).

Community-level control variables. We controlled for two community-level attributes: urbanicity (KDHS urban designation) and the proportion of women living in households in the top 40% (top two quintiles) of the KDHS household wealth index. Urbanicity and wealth are associated with daughters' risk of FGMC (Hayford 2005; UNICEF 2013; Yount 2002) and were included to account for characteristics that could influence the relationship between daughters' risk of FGMC and community norms, opportunities, or ethnic diversity. A robustness test with all wealth quintiles revealed identical results for theoretically central variables, so we used the more parsimonious specification (as we did at level 1). Community-level variables were grand-mean centered.

Analysis

We used multilevel discrete-time hazard models (Barber et al. 2000; Reardon, Brennan, and Buka 2002) to estimate the association of individual-level (mother/daughter) and community-level variables with daughter's age-risk-set hazard of FGMC. Using event-history models, we predicted the risk that a daughter experienced FGMC at each age risk set, while accounting for censoring. We used a multilevel hazard model to account for the hierarchical nature of the data, with women nested in their communities.

We estimated a baseline model including only key explanatory variables (maternal FGMC status and attitudes, community FGMC norms, community extra-familial opportunities, community ethnic diversity, and cross-level interactions) and a full model including controls. Both models included four risk sets for daughter's age (6–7, 8–9, 10–11, and 12–15 years) with 0–5 as the reference group. Level-2 correlations and variation inflation factors indicated that multicollinearity was not a concern (results available on request). The assumption of proportional odds was statistically tenable ($\chi^2(28)$, $p = .08$) based on a joint test of significance for 28 interactions between age risk sets and key predictors (Reardon et al. 2002; Stewart 2010).[3] Model results with individual-level and community-level predictors entered in separate steps were virtually identical to the final models (available on request). Models were estimated using STATA 14.1 (StataCorp 2015).

Ideally, multilevel analyses using DHS data would use individual- and community-level weights to account for the unequal probability of selection at the household and community levels. However, DHS datasets only include individual-level weights (Pullum 2015). We ran a weighted single-level model with the full set of variables to examine whether our findings were robust to the incorporation of information on the stratified sample design (available on request). There were no substantive changes to the inferential conclusions. All descriptive statistics were weighted.

RESULTS

Sample Characteristics

The average age of mothers at the time of the survey was 31.9 years, and the average age of daughters was 6.6 years (Table 1). One quarter (26%) of mothers in the sample had experienced FGMC. However, just 2% of daughters had experienced FGMC at the time of the survey, with an average age at cutting of 7.5 years. Girls had a 12.8% cumulative probability of being cut by age 15 based on Kaplan-Meier failure calculations (not shown). Mothers tended to be married (81%), not in a polygamous partnership (89%), and Christian or Catholic (91%). The majority (66%) began living with their first husband/partner at age 18 or later. Almost half (45%) belonged to a large, circumcising ethnic group (Kalenjin, Kamba, or Kikuyu). While 62% of mothers had completed primary schooling or higher, just 23% had completed at least secondary school. Over one third (37%) lived in urban areas, and 60% worked for cash or both cash and in-kind payment.

[Table 1 about here]

Multivariate Results

In Model 1 (Table 2), the maternal FGMC status and attitudes factor is significantly associated with a daughter's hazard of experiencing FGMC. The hazard of being cut is lower for daughters with mothers expressing greater opposition towards FGMC (*AOR* = .25[.14, .43]). As hypothesized, a daughter's hazard of cutting is lower if she lives in a community with norms that are less supportive of FGMC (*AOR* = .03[.02, .05]; H1a). The coefficient for the squared community norms factor is also statistically significant, indicating a non-linear relationship with FGMC norms. Hazards of cutting are lower in communities with greater ethnic diversity (*AOR* = .25[.13, .49]; H1c). Yet, a daughter has a higher hazard of cutting (*AOR* = 2.16[1.53, 3.05]) as extra-familial opportunities for women in her community increase, an association contrary to expectation (H1b).

[Table 2 about here]

To illustrate the non-linear association between community norms and daughters' FGMC, we graphed predicted probabilities of daughters' FGMC across communities with varying levels of FGMC norms, setting other variables to their mean (Figure 1). The shape of the curve indicates that, once a certain level of normative support for rejecting FGMC is reached, the impact of additional community support levels off. Although not a direct test, this finding is consistent with the idea of a "tipping point" for community norms.

Contrary to hypotheses H2a and H2b, interactions of maternal FGMC status and attitudes with community norms and community opportunities are not significant. A significant interaction is observed between maternal FGMC status and attitudes and community ethnic diversity (*AOR* = .29[.09, .97]; H2c). The reduction in the hazard of cutting for girls living in more ethnically diverse communities is greater for daughters whose mothers had negative attitudes toward the practice. In Model 2, findings for key predictors are robust to the inclusion of controls, except for the interaction of maternal FGMC status and attitudes with community ethnic diversity, which no longer is significant.

Alternative Models of Extra-Familial Opportunities

Because the relationship between daughters' FGMC hazard and community-level extra-familial opportunities was contrary to expectations, we tested an alternative model employing the separate components of the extra-familial opportunities factor and their cross-level interactions in order to understand whether a particular measure was driving the unexpected results. Results are shown in Table 3. Associations between other predictors and daughters' hazard of cutting are substantively unchanged in these alternative models.

[Table 3 about here]

In this alternative model, daughters have greater hazard of cutting in communities with higher proportions of mothers who completed primary school or higher (*AOR* = 7.78[2.53, 23.92]), consistent with the model including a factor score for women's extra-familial opportunities. The proportion of mothers not in polygamous unions is also positively associated with the hazard of daughters' FGMC (*AOR* = 4.12[1.08, 15.72]). Neither the proportion of women working in the community nor early marriage in the community is significantly associated with daughters' FGMC hazard.

The interaction between maternal FGMC status and attitudes and the community proportion of women not in polygamous unions is statistically significant in the hypothesized direction (*AOR* = .02[.00, .98]. Thus, there is some support for H2b in this specification. However, including the four cross-level interactions as a group does not improve model fit compared to a model without them (based on χ^2 and AIC). Overall, the association of women's extra-familial opportunity structures with daughters' FGMC is largely consistent when items are tested individually or as a single factor score. Because the items are highly correlated, and because our theoretical framework considers the opportunity system rather than individual elements of the system, we prefer the main specification.

DISCUSSION

In this article, we use nationally representative data to study the multilevel determinants of mothers' decisions about FGMC for their daughters in Kenya, a context where FGMC prevalence is declining. Our analysis extends recent studies of FGMC that focused on the influence of gender systems comprised of community gender norms and structural opportunities for women outside the family (Yount et al. n.d.) by testing this framework in a context with different social and economic manifestations of patriarchal kinship networks and by adding a measure of community ethnic diversity. Following the innovations of recent prior work, we also improve the measurement of key explanatory variables and account for the hierarchical and survival nature of the data (i.e., variation in exposure to risk among daughters of different ages at the time of the survey) using multilevel discrete-time hazard models.

Consistent with prior research, we find that a daughter's hazard of FGMC is lower if she had a mother who was less supportive of FGMC. Extending prior research, our measure of maternal FGMC status and attitudes incorporates experiences of FGMC and perceptions of community and religious pressures toward FGMC, thus combining multiple aspects of individual beliefs. Also consistent with prior research, community norms disfavoring FGMC are strongly associated with a lower hazard of cutting for daughters. The community norms factor includes FGMC prevalence, indicating that a daughter's hazard of FGMC is lower in communities with fewer women who had been cut. Both what others do, and what others expect a woman to do, matter for her ability to reject a harmful social norm like FGMC (Bicchieri 2017). Our assessment supports the theory that a "collective change of expectations" alongside "coordinated actions" are necessary to change community norms (Bicchieri 2017:111). This relationship is non-linear, suggesting that once community-level normative support for rejecting FGMC is high enough further changes have minimal impact on daughters' hazard of cutting.

Unexpectedly, a daughter's FGMC hazard is higher if she lived in a community with more extra-familial opportunities for women. This finding is evident even after controlling for urbanicity and community wealth and contradicts feminist theory and findings from Egypt (Yount et al. n.d.). It is possible that our measures do not adequately capture women's access to extra-familial opportunities. Our factor is based on aggregate measures of women's experiences outside of marriage, including later first union, fewer polygamous relationships, more formal schooling, and more prevalent employment. If mothers in this context do not see these experiences as desirable "opportunities" or real alternatives for their daughters, increases in these experiences may not facilitate the abandonment of FGMC. For instance, some scholars argue that rising ages at first marriage in much of sub-Saharan Africa result from economic uncertainty, which constrains young couples' ability to support themselves (Shapiro and Gebreselassie 2014). If this interpretation bears out, a greater proportion of unmarried women may indicate strained marriage markets rather than increased opportunities. Further, measures of work in the DHS tend not to capture the full range of economic activities in which women are engaged (Langsten and Salem 2008); this limitation may be more salient in Kenya than in Egypt because more of women's work takes place outside the formal labor force. More research is needed to understand whether and to what extent women's collective community-level empowerment may be protective.

We find that a daughter's FGMC hazard is lower if she lived in a more ethnically diverse community, regardless of maternal ethnic-group membership. This is an important contribution as it explicitly models within-community heterogeneity as a factor facilitating social change. By studying community ethnic diversity, we move beyond a simplistic understanding of ethnic identity as an index of "culture" or a proxy for the specific content of social norms toward considering ethnic diversity as a way of understanding the nature of social boundaries. Ethnic diversity could be a proxy for exposure to networks that oppose cutting, or for awareness of alternative practices, as Cloward (2016) found in Maasai communities. However, the persistent association of ethnic diversity with FGMC hazard when controlling for community norms and maternal ethnic identity indicates that this association is not fully explained by exposure to beliefs and suggests that heterogeneity may play a role in processes of social change. Most research on the impact of ethnic heterogeneity on social cohesion, both in high-income countries and in sub-Saharan Africa, frames reduced social cohesion as a negative outcome that hinders the equitable distribution of resources or economic development. Our findings highlight the potentially positive role of weakened social sanctions in facilitating social change around harmful practices. Importantly, unlike measures of ethnic group identity which are country-specific, ethnic diversity is a measure of social interaction and exchange that can be easily calculated for other multiethnic countries (i.e., most other sub-Saharan countries where FGMC is practiced). Furthermore, both theory and measures related to ethnic diversity could be extended to assess other forms of diversity that may bear on processes of social change, such as religious diversity or diversity of national origin.

Contrary to expectations, interactions between maternal FGMC status and attitudes and community FGMC norms, extra-familial opportunities, and ethnic diversity are not significant after including covariates. Regardless of community characteristics, daughters have a lower hazard of cutting when their mothers were uncut and disfavored the practice. Community opposition to FGMC and ethnic diversity both reduce daughters' hazard, regardless of maternal FGMC status and attitudes. The independence of these associations suggests the importance of other social institutions not measured here. For example, communities that oppose FGMC may have stricter law enforcement or fewer people willing to perform FGMC procedures. These factors would reduce FGMC prevalence regardless of maternal intentions. Further, the long history of educational campaigns and efforts to promote alternatives to cutting in Kenya (UNICEF 2013) may have resulted in national-level normative support for abandonment, allowing even women in communities with strong FGMC norms to deviate from them.

This study underscores the importance of a multilevel social ecological framework to understand the structural and normative conditions that jointly influence daughters' FGMC hazard. Maternal FGMC status and attitudes, community norms disfavoring FGMC, and community ethnic diversity are related to a lower hazard of FGMC for daughters in Kenya. Further research is needed to understand whether these findings apply to other countries. In Kenya, the presence of large and politically powerful ethnic groups that are historically non-circumcising may create conditions that are propitious for decline. Substantial past prevalence reductions also may increase the salience of Kenyan mothers' attitudes for daughters' outcomes. Our factor analytic approach facilitates comparative analyses using similar measures of attitudes, norms, and opportunities.

Limitations and Recommendations for Future Research

Certain limitations of this analysis inform recommendations for future research. First, we use DHS clusters as a proxy for "community." Averages based on a sample of respondents from each cluster are imprecise estimates of the true population value and may introduce biases in the estimation, especially when both the intra-class class correlations (ICCs) and the average cluster size are small (Kravdal 2006). In our sample, estimated ICCs are .33 for community opportunities and .73 for community norms, well above the .20-level at which bias becomes unacceptable for the standard DHS cluster size of 25 respondents (Kravdal 2006). Although our ICCs are within a reasonable range, our average cluster size is small. In the absence of specific simulation studies, however, it is not possible to definitively state the level of bias. Future DHS should consider asking FGMC questions to all women, or randomly assigning the shorter survey to clusters instead of households, to ensure multilevel modeling approaches may be used with adequate cluster sizes. Substantively, the DHS clusters may not fully capture the varied and multiple social networks in which mothers are embedded (Bicchieri 2017). Future research may consider new ways to identify other influential networks, such as social network analysis and Global Positioning System mapping. Community-level measures of heterogeneity are a step in this direction.

Second, our analysis is restricted to two ecological levels. Other characteristics at the meso-level (i.e., regional politics), and macro-level (i.e., national legal environment) warrant consideration. This type of comparison will be necessary to understand why change has taken place more rapidly in some contexts than in others.

Third, our predictors were measured at the time of the survey, while the FGMC outcome occurred before the survey. The average age of daughters in the sample is 6.6 years; it is likely that most maternal and community characteristics are reasonably stable over this time, although some may be more variable (e.g., mother's current work status). Longitudinal data are needed to fully confirm these findings.

CONCLUSION

Research on effective interventions around FGMC is limited to date (Berg and Denison 2012), but our results suggest continued support is needed for interventions that address both individual attitudes and normative expectations. The influence of community ethnic diversity in this analysis suggests more generally that communities with a high degree of social cohesion may be less willing to give up practices such as FGMC, and that this characteristic of communities exerts an independent influence, above and beyond FGMC norms and opportunities for women. Such findings suggest the importance of understanding the social fabric of communities as a way to identify the processes of social change with respect to practices like FGMC.

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NOTES

1. Inspection of our missing data suggests that missingness is more common for daughters of mothers opposed to FGMC, which would bias our results toward zero. However, missingness also is more common among 15-year-olds, suggesting that it may be related to confusion about who met the birthday cut-off during survey administration.

2. We examined single-year exposures in an exploratory analysis. Based on the results and prior knowledge of FGMC in Kenya, we chose to use age-groupings of discrete-time risk sets. A post-hoc sensitivity test showed that the overall results were virtually identical when using the single-year dummy variables compared to grouped ages.

3. Multilevel hazard models assume proportional errors and parallel logit hazard curves because the community characteristics affect only the level of the hazard but not the shape of the hazard. We attempted to test the proportionality of level-2 errors, but these models did not converge, even after repeated efforts to simplify the model and use alternative estimation strategies. Reardon et al. (2002) experienced similar difficulties.

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Table 1. Weighted Sample Characteristics for Women and their Daughters in Kenya, DHS 2014 (*N* = 7,535)

	Mean	*SD*	Range
Daughters			
Age in years	6.61	4.38	0 to 15
Proportion of Daughters Cut	.02	.15	0 to 1
Age at FGMC	7.53	2.31[a]	0 to 15
Birth Year	9.04	4.38	1 = 1999, 16 = 2014
Maternal Demographics			
Age in years	31.91	7.46	15 to 49
Religion: Christian/Catholic	.91	.29	0 to 1
Ethnicity			
Large size, ≥10% moms cut (CM)	.45	.50	0 to 1
Large size, <10% moms cut (CM)	.26	.44	0 to 1
Small size, ≥10% moms cut (CM)	.22	.41	0 to 1
Small size, <10% moms cut (CM)	.08	.26	0 to 1
Completed Primary School or Higher	.62	.49	0 to 1
Completed Secondary School or Higher	.23	.42	0 to 1
Works for Cash/Cash & In-Kind	.60	.49	0 to 1
Marital Status			
Never married	.06	.25	0 to 1
Not Married Currently (includes never married)	.19	.40	0 to 1
Not in a Polygamous Union (includes unmarried)	.89	.32	0 to 1
First Union 18+	.66	.47	0 to 1
Household Wealth Quintiles			
Poorest	.18	.39	0 to 1
Poorer	.19	.40	0 to 1
Middle	.20	.40	0 to 1
Richer	.21	.41	0 to 1
Richest	.21	.41	0 to 1
Maternal FGMC Status and Attitudes			
No FGMC Experienced	.74	.44	0 to 1
FGMC *Not* Required by Religion	.95	.23	0 to 1
FGMC *Not* Required by Community	.91	.29	0 to 1
FGMC Should be Stopped	.91	.28	0 to 1
Community Characteristics			
Living in Urban Area	.37	.48	0 to 1
Number of Ethnic Groups in the Community	2.07	1.31	1 to 8
Ethnic Diversity Index	.35	.38	0 to 1
Factor Scores			
Maternal FGMC Status and Attitudes	.01	.55	-1.50 to .35
Community FGMC Norms	.23	.66	-3.19 to .55
Community Extra-Familial Opportunities	.16	.81	-2.53 to 1.39

[a]Daughter's age of FGMC is weighted without design factors because there was a stratum with a single sampling unit.

Table 2. Discrete-Time Hazard Models Predicting Daughter's Risk of FGMC

	Model 1		Model 2	
Included Variables	AOR	CI	AOR	CI
Daughter Age Cut (ref=0 to 5)				
6 to 7	14.53 ***	[10.27, 20.60]	11.78 ***	[8.26, 16.78]
8 to 9	39.60 ***	[26.71, 58.70]	29.35 ***	[19.55, 44.05]
10 to 11	67.11 ***	[41.67, 108.07]	45.49 ***	[27.64, 74.88]
12 to 15	32.10 ***	[15.79, 61.28]	18.96 ***	[9.38, 38.34]
Level 1 Maternal Explanatory Variable				
FGMC Status & Attitudes Factor (CM)	.25 ***	[.14, .43]	.30 ***	[.17, .54]
Level 2 Maternal Explanatory Variables				
Comm. FGMC Norms Factor (GM)	.03 ***	[.02, .05]	.03 ***	[.01, .05]
Comm. FGMC Norms Factor (GM)^2	.58 ***	[.49, .69]	.60 ***	[.50, .71]
Comm. Opportunities Factor (GM)	2.16 ***	[1.53, 3.05]	2.58 ***	[1.72, 3.86]
Comm. Ethnic Diversity Index (GM)	.25 ***	[.13, .49]	.29 **	[.14, .60]
Cross-Level Interactions				
FGMC Status & Attitudes (CM) x Comm. FGMC Norms (GM)	.83	[.43, 1.57]	.77	[.39, 1.54]
FGMC Status & Attitudes (CM) x Comm. Opportunities (GM)	.80	[.40, 1.60]	.90	[.43, 1.89]
FGMC Status & Attitudes (CM) x Comm. Ethnic Diversity (GM)	.29 *	[.09, .97]	.42	[.11, 1.56]
Level 1 Daughter Covariates				
Birth Year (GM)			.88 ***	[.83, .93]
Level 1 Maternal Covariates				
Age in years (GM)			1.01	[.99, 1.04]
Religion (ref=Muslim/other/none)				
Christian/Catholic (CM)			1.45	[.56, 3.71]
Education (ref=none/incomplete primary)				
Complete Primary School or Higher (CM)			.80	[.49, 1.30]
Work (ref=none/only in-kind)				
Works for Cash/Cash & In-Kind (CM)			.87	[.60, 1.28]
Marital Status (ref=Ever married)				
Never Married (CM)			.95	[.26, 3.50]
Age at First Union (ref= <18)				
First Union 18+ (CM)			.78	[.56, 1.08]
Polygyny (ref=polygynous union)				
Not Polygynous Union/Unmarried (CM)			.89	[.64, 1.24]
Ethnicity (ref=Large size, ≥10% moms cut)				
Large size, <10% moms cut (CM)			1.61	[.19, 13.57]
Small size, ≥10% moms cut (CM)			10.72 **	[2.63, 43.69]
Small size, <10% moms cut (CM)			3.21	[.29, 35.50]
Wealth Index (ref. = bottom 60%)				
Top 40% (CM)			.63	[.35, 1.16]
Level 2 Maternal Covariates				
Prop. living in an Urban Area (GM)			1.17	[.69, 2.00]
Wealth Index: Prop. Top 40% (GM)			.36 *	[.15, .86]
Level 2 residual variance	1.83	[1.14, 2.61]	1.80	[1.19, 2.73]
Chi-Square	550.40		523.98	
AIC	2731.41		2699.45	
BIC	2856.47		2949.57	

*$p < .05$, **$p < .01$, ***$p < .001$, two tailed

Note: Models are unweighted because level-2 weights are not provided with the DHS. CI = 95% confidence intervals; CM = cluster mean centered; GM = grand mean centered; Comm = community

Table 3. Alternative Discrete-Time Hazard Model Predicting Daughter's Risk of FGMC

Included Variables	AOR	CI
Daughter Age Cut (ref=0 to 5)		
6 to 7	11.66 ***	[8.19, 16.60]
8 to 9	29.16 ***	[19.43, 43.74]
10 to 11	45.34 ***	[27.54, 74.65]
12 to 15	19.05 ***	[9.42, 38.55]
Level 1 Maternal Explanatory Variable		
FGMC Status & Attitudes Factor (CM)	.30 ***	[.16, .54]
Level 2 Maternal Explanatory Variables		
Comm. FGMC Norms Factor (GM)	.03 ***	[.02, .06]
Comm. FGMC Norms Factor $(GM)^2$	.57 ***	[.48, .68]
Prop. Completed Primary School or Higher (GM)	7.78 ***	[2.53, 23.92]
Prop. Works for Cash/Cash & In-Kind (GM)	.39	[.14, 1.10]
Prop. First Union 18+ (GM)	1.49	[.61, 3.67]
Prop. Not Polygynous Union/Unmarried (GM)	4.12 *	[1.08, 15.72]
Comm. Ethnic Diversity Index (GM)	.32 **	[.15, .66]
Cross-Level Interactions		
FGMC Status & Att. (CM) x Comm. FGMC Norms (GM)	.80	[.44, 1.46]
FGMC Status & Att. (CM) x Prop. Primary School or Higher (GM)	3.33	[.35, 31.56]
FGMC Status & Att. (CM) x Prop. Works Cash/Cash & In-Kind (GM)	.24	[.03, 1.93]
FGMC Status & Att. (CM) x Prop. First Cohabited 18+ (GM)	1.32	[.15, 11.25]
FGMC Status & Att. (CM) x Prop. Not Polygamous/Unmarried (GM)	.02 *	[.00, .98]
FGMC Status & Att. (CM) x Comm. Ethnic Diversity (GM)	.27	[.08, .92]
Level 1 Daughter Covariates		
Birth Year (GM)	.87 ***	[.83, .93]
Level 1 Maternal Covariates		
Age in years (GM)	1.01	[.99, 1.04]
Religion: Christian/Catholic (CM) (ref=Muslim/other/none)	1.58	[.61, 4.09]
Education (ref=none/incomplete primary)		
Completed Primary School or Higher (CM)	.79	[.48, 1.29]
Work: Works for Cash/Cash & In-Kind (CM) (ref=none/only in-kind)	.87	[.59, 1.28]
Marital Status: Never Married (CM) (ref=Ever married)	1.06	[.28, 4.00]
Age at First Union: First Union 18+ (CM) (ref= <18)	.78	[.56, 1.08]
Polygyny (ref=polygynous union)		
Not Polygynous Union/Unmarried (CM)	.87	[.62, 1.22]
Ethnicity (ref=Large size, ≥10% moms cut)		
Large size, <10% moms cut (CM)	1.45	[.17, 12.75]
Small size, ≥10% moms cut (CM)	10.68 **	[2.60, 43.93]
Small size, <10% moms cut (CM)	3.18	[.29, 34.43]
Wealth Index: Top 40% (CM) (ref. = bottom 60%)	.62	[.34, 1.14]
Level 2 Maternal Covariates		
Prop. living in an Urban Area (GM)	1.12	[.66, 1.90]
Wealth Index: Prop. Top 40% (GM)	.39 *	[.16, .93]
Constant		
Level 2 residual variance	1.68	[1.09, 2.59]
Chi-Square	528.56	
AIC	2698.76	
BIC	3002.47	

*$p < .05$, **$p < .01$, ***$p < .001$, two tailed

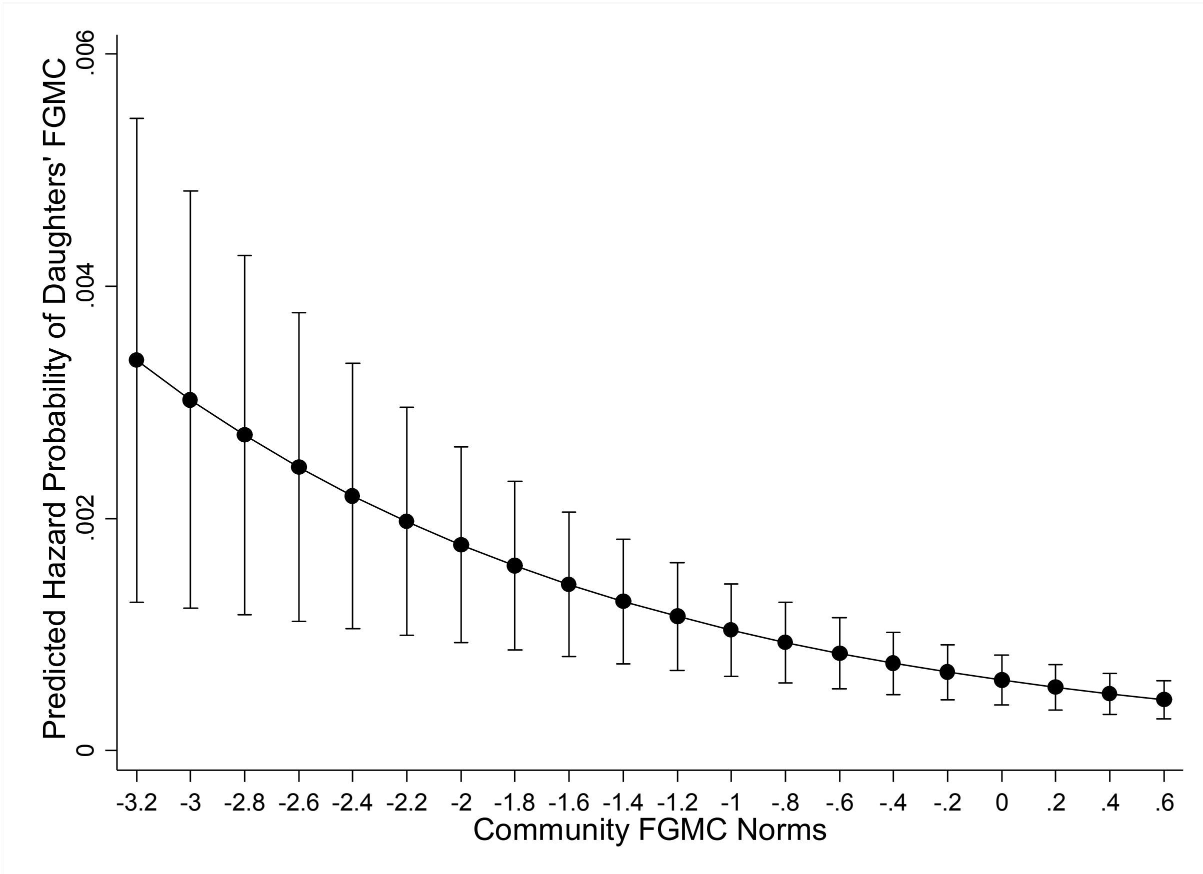

Figure 1. Predicted hazard probability of daughters' FGMC according to community FGMC norms with 95% confidence intervals, based on Model 1, Table 2. All characteristics besides community norms set at sample mean.