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Unprogrammed abandonment of female genital mutilation/cutting

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ABSTRACT

The sparsity of historical data on Female Genital Mutilation/Cutting (FGM/C) poses a challenge for researchers who seek to identify long-term trends in FGM/C participation or evaluate the role of macro-level factors that may predict FGM/C abandonment. This study introduces a means of overcoming this barrier and provides a new cross-national dataset of FGM/C prevalence over time. We compile self-reported FGM/C data from more than 700,000 women born in 23 African countries between 1940 and 2002 who subsequently participated in Demographic and Health Surveys (DHS) or Multiple Indicator Cluster Surveys (MICS). These data allow us to estimate the proportion of women born in each country-year who eventually underwent FGM/C. We then use these estimates to assess country-level trends in FGM/C prevalence and to explore macro-level factors that may contribute to the persistence or decline of the practice, including population density, female education rates, political stability, laws banning the practice, economic development, democratization, and international exposure. Our exploratory analysis suggests that population density, female education, and laws banning FGM/C are associated with FGM/C prevalence. Our results and approach should facilitate additional research on the mechanisms through which economic growth, institutional changes, and international engagement can influence the abandonment of FGM/C and other harmful social norms.

1. Introduction

In 1938 Jomo Kenyatta, leader of the Kenyan anti-colonial movement and later the country's first president, described female genital mutilation/cutting[1] as "an institution which has enormous educational, social, moral and religious implications" for the Kikuyu people, whose "moral code... [is] bound up with this custom" (Kenyatta, 1961). Despite Kenyatta's claim, the prevalence of FGM/C in Kenya began to decline in the 1960 s and cutting rates among Kikuyu girls aged 0–14 now approach zero (see Fig. 1). Kenya's long-term reduction of FGM/C is not unique—other countries, such as Burkina Faso and Nigeria, have observed similar declines in the practice (See Figs. 2 and 3). Neither, however, are these downward trends universal. In Guinea, Mali, Sudan, and many other countries, FGM/C continues at much the same levels as it has for decades (See Figs. 2 and 3). Why has a practice that was once considered an essential part of life across many communities diminished in some locations but persisted in others?

Roughly three million young girls are at risk of undergoing FGM/C each year (WHO, 2008). Non-governmental organizations (NGOs) and other members of the international community spend tens of millions of dollars in efforts to understand and address the practice. Sizable literatures explore the prevalence of FGM/C (e.g. Adeokun et al., 2006), its deleterious health consequences (e.g., Berg, Underland, & Odgaard-Jensen, 2014; Reisel & Creighton, 2015), and the covariates associated with its practice at the individual and community level (e.g. Achia, 2014; Setegn, Lakew, & Deribe, 2016). Despite broad scholarly interest in FGM/C, however, limited research identifies factors that predict sustained participation in the practice across countries over time (see Kandala, Ezejimofor, Uthman, & Komba, 2018 for a recent exception). The few studies that analyze cross-national variation in FGM/C prevalence focus on individual- and household-level characteristics without considering macro-level factors that may affect entire countries (Hayford & Trinitapoli, 2011; Modrek & Liu, 2013).

One reason for the dearth of attention to macro-level characteristics is the paucity of historical data on FGM/C. Because surveys asking about FGM/C are a relatively recent phenomenon, researchers face significant barriers when they seek to identify long-term trends in FGM/C prevalence or to evaluate the influence of historical and country-level factors on FGM/C participation. This study

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[1] Henceforth FGM/C, also sometimes known as female circumcision or cutting.

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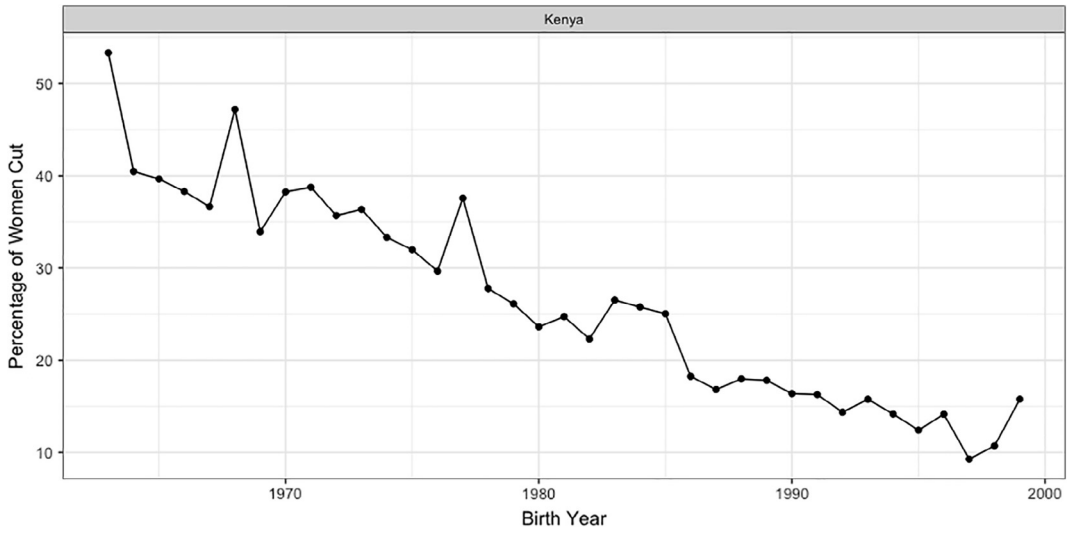

Fig. 1. Estimated FGM/C Prevalence in Kenya by Survey Birth Cohort**.** Fig. 1 plots estimated FGM/C rates among Kenyan women born between 1960 and 1999, using DHS data gathered in 2003, 2008, and 2014. The line plots the weighted mean after combining equivalent birth-cohorts from overlapping surveys. For a full explanation of how we created this figure, see the "Data and Methods" section.

introduces a means of overcoming this barrier. Although we lack contemporaneous evidence of cutting during earlier time periods, we compile self-reported FGM/C data from more than 700,000 women born between 1940 and 2002 who subsequently participated in Demographic and Health Surveys (DHS) or Multiple Indicator Cluster Surveys (MICS).[2] Because survey responses regarding FGM/C status are highly reliable (Morison et al., 2001; UNICEF, 2013), these data allow us to estimate the proportion of women born each year within each surveyed country who were eventually cut. We use these estimates to assess country-level trends in FGM/C prevalence and to explore several macro-level factors that may contribute to the persistence or decline of FGM/C over time.

This study makes several contributions. First, by providing more granular measures of historical trends in FGM/C participation, this paper draws attention to the process of *unprogrammed* FGM/C abandonment—that is, declines in FGM/C participation that occurred prior to the widespread introduction of large, programmatic efforts by NGOs, donor states, and the international community. While the process of FGM/C abandonment is complex and often context-specific, our analysis provides evidence that declines at the national level have in many cases occurred prior to sustained intervention by governments, NGOs, and other external actors. This study emphasizes the importance of studying mechanisms that motivate shifts away from long-held traditions even in the absence of significant governmental or external pressure.

Second, this study should draw attention to and facilitate future research on the question of whether macro-level factors influence FGM/C participation. To this end, we provide an initial, exploratory analysis of whether various country-level conditions contemporaneous to a women's birth predict the rate at which she and other members of her birth-cohort will undergo FGM/C. Although the findings are exploratory and intended primarily to motivate further research, they nevertheless provide suggestive evidence that country-level changes in FGM/C are associated with levels of population density, changes in female education, political stability, and laws banning the practice. In contrast, we find little support for popular theories that economic development, democratization, or international pressure and assistance are associated with declines in FGM/C. These results raise important questions about the mechanisms through which economic growth, institutional development, and international engagement may influence social behavior and the abandonment of harmful social norms.

Finally, by demonstrating that researchers can construct reliable measures of historical processes using contemporary survey data, this paper showcases a promising means by which researchers might address important issues related to politics and develop-

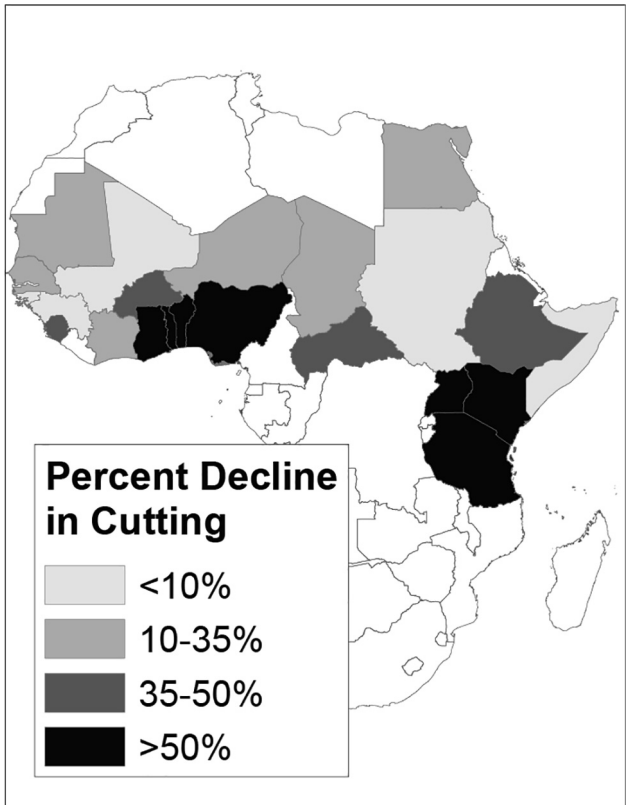

Fig. 2. Percentage Decline of FGM/C over Time. Found by taking one minus the quotient of prevalence in 1960 and most recent cohorts for each country.

[2] We use data from 75 distinct DHS and MICS surveys conducted between 1994 and 2017. See Appendix B (Supplementary data) for a full list of surveys and countries included.

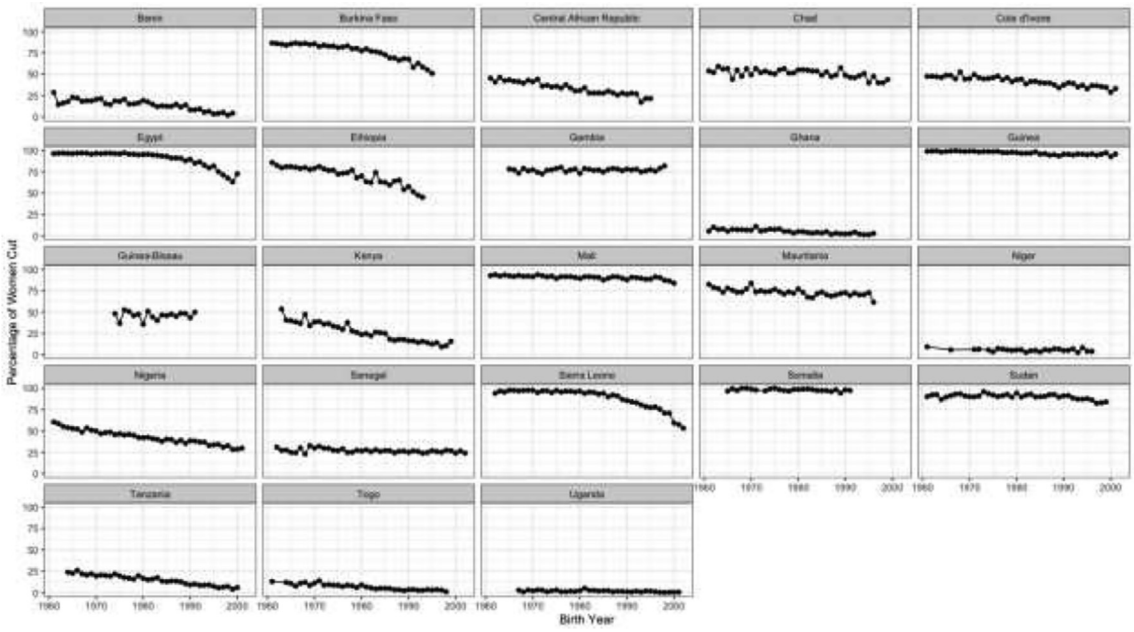

Fig. 3. Cross-National FGM/C Prevalence Over Time. The figure displays all survey-birth-cohort estimates with at least 100 individual respondents. The black line in each plot maps the weighted proportion of FGM/C after combining responses from all overlapping surveys and excluding birth cohorts with<100 total respondents. To allow for ease of comparison the figure presents a consistent temporal range for all countries beginning in 1960 and ending in 2000, although data coverage extends in some cases as early as 1940 and as recent as 2002.

ment in situations where data has thus far proven difficult to obtain. In short, when historical data regarding important indicators are scarce, recent surveys that ask respondents to describe historical experiences can provide valuable opportunities to gather information about long-term conditions and trends. Our estimates of FGM/C prevalence could prove useful to scholars interested in understanding FGM/C, and our wider approach to documenting historical trends may serve as a helpful starting point for future studies.

2. Understanding FGM/C

2.1. Distribution and implications

According to the World Health Organization (2008, 1), FGM/C, "refers to all procedures involving partial or total removal of the external female genitalia or other injury to the female genital organs for non-medical reasons." While cases of FGM/C are reported throughout the world, they are concentrated in West and East Africa.[3] The specific nature and method of implementation varies little within a community, but significantly across communities.[4] For example, while many girls are cut before the age of five—and even during infancy—in some communities cutting is performed during rituals associated with puberty, and in a few upon marriage or first childbirth. However, cutting is almost always performed on girls below the age of 18, varying by group from infancy to adolescence. Likewise, although cutting is often conducted by traditional practitioners, in some countries it is increasingly common for it to be performed by medical professionals (Modrek & Sieverding, 2016).[5]

There is considerable research on the serious health risks associated with FGM/C (Berg et al., 2014, Reisel & Creighton, 2015). Immediate consequences include severe pain and bleeding, shock, urinary infections, and damage to surrounding organs. Long-term effects include gynecological, obstetric, psychological, and sexual complications. Beyond the public health consequences, international organizations and NGOs increasingly focus on FGM/C as a violation of human rights or a moral wrong (UNICEF, 2013; WHO, 2018). The basis for this claim, according to Nussbaum's (1999) capabilities argument, is that FGM/C irreversibly reduces a valued human capacity in the absence of meaningful consent. If the practice were reversible—or if the decision were made by a consenting adult—there would be less cause for moral concern. The argument is not that FGM/C is wrong because women should pursue sexual experiences, but rather because they should retain the *freedom* to choose as adults whether to do so or not. FGM/C also violates international human rights obligations endorsed by most countries where the procedure is performed.[6] Of the FGM/C-affected countries in Africa and the Middle East, 27 have enacted laws or decrees to prohibit the practice (Shell-Duncan, Naik, & Feldman-Jacobs, 2016).

3. FGM/C as a social norm

FGM/C is often understood by scholars and policymakers as a *social norm* (Mackie & LeJeune, 2009; UNICEF, 2013, 14-21). In this

[3] FGM/C is also found in Yemen, in scattered groups elsewhere in the Arabic Middle East, in Kurdish populations, in Deobandi South Asia, and in Islamic Southeast Asia—as well as among recent emigrants to the West (UNICEF, 2013).

[4] The World Health Organization (2008) breaks FGM/C practices into four different types. The first, type I (clitoridectomy) is partial or total removal of the clitoris. Type II (excision) includes the partial or total removal of the clitoris and labia minora. Type III (infibulation) is commonly described as the most severe form of FGM/C, includes creating a seal or cover by cutting the labia minora or majora. Finally, type IV is a residual category including all other practices. Variation within communities is limited.

[5] While implementation by medical professionals may mitigate some health concerns of FGM/C, it may partially legitimize the practice, undermining abandonment efforts (Shell-Duncan, 2001).

[6] These include the rights to life, to physical and mental integrity, to be free from violence and gender discrimination, to not be subjected to torture or inhuman or degrading treatment or punishment, to the highest attainable standard of health, and of the child.

view, FGM/C is held in place within a given reference group by the typical family's beliefs that others do it, others approve of doing it, and others would disapprove of not doing it (Mackie, Moneti, Shakya, & Denny, 2016).[7] Disapproval can also include loss of family respectability within the reference group, denial of adult status to uncut daughters, peer teasing and insult of girls or cowives for being uncut, and the like.[8] In some groups FGM/C is also considered a religious obligation.

Individual responses to cross-national surveys are largely consistent with the social norm account of FGM/C. The most common response to questions about the benefits of FGM/C among women and men is social acceptance (UNICEF, 2013, 67-68). For instance, Wagner (2015) aggregates women's responses from surveys in 13 West African countries: 40% said social approval was a reason to cut, 16% expressed a religious requirement, 11% sought to promote virginity, and 10% of respondents referenced better marriage prospects. Likewise, in an analysis of Kenya's 2014 DHS survey, Grose et al. (2019) find daughters are less likely to be cut in ethnically diverse communities where an individual is more likely to encounter other groups who do not cut.[9]

Because FGM/C is an interdependent action within a reference group, it is difficult for one or a few families to change behavior on their own. A family contemplating abandonment of FGM/C may anticipate strong social disapproval and be deterred from abandoning the practice even if the family members themselves oppose it. Survey data show that, "many girls who are cut are daughters of women who oppose the practice" (UNICEF, 2013, 78-79), indicating actions motivated by social norms rather than by personal attitudes. To give up an interdependent action within a group, enough people within it must believe that enough other people are changing. In short, change is social; the community must be brought around. Part of our motivation in this study is to better understand which macro-level forces may predict changes in social behaviors and may therefore facilitate transitions away from FGM/C.

Although scholars devote significant attention to understanding both the consequences of FGM/C as well as factors that predict cutting at the individual and community levels, less work seeks to measure or account for changes in national FGM/C prevalence over time. Recent work has begun to consider these topics but is either limited to specific countries (e.g. Kandala & Shell-Duncan, 2019) or temporally circumscribed (Kandala et al., 2018). This study presents a novel measure that provides data for 23 different countries with a median temporal coverage of 48 years per country. The earliest year for which we provide estimates of FGM/C prevalence is 1940, with the latest year being 2002. As a result, our measure enables researchers to analyze trends in FGM/C prevalence that existed prior to the introduction of large-scale programmatic abandonment efforts, providing a potentially powerful tool that should enable scholars and practitioners alike to better understand the decline or persistence of FGM/C even in the absence of outside interventions.

4. Measuring FGM/C prevalence

To estimate changes in the prevalence of FGM/C over time, we draw from 75 separate DHS and MICS surveys featuring more than 700,000 female respondents in 23 African countries.[10] To assemble our data, we begin by identifying all available DHS and MICS surveys in which women reported their FGM/C status.[11] We exclude surveys that lacked a national sampling frame (e.g. Kenya's 1998 DHS) or that fell outside the geographic scope of this study (e.g., surveys fielded in Iraq and Yemen), as well as surveys in which the data quality is suspect.[12] For the remaining surveys, we assign respondents to country-birth-cohorts based on their country of residence and year of birth. Roughly three percent of respondents do not answer a direct question regarding birth year. For these, we calculate a birth year using self-reported age and the year the survey was fielded. To account for the possibility that migration across borders could impede us from assigning respondents to appropriate country-birth-cohorts, we remove all respondents who indicate they lived "abroad" during childhood.

Because we seek to estimate the lifetime prevalence of FGM/C within each country-birth-cohort, we next identify the distribution of ages at which women reported experiencing FGM/C and then exclude from subsequent analysis all respondents who were younger than the 95th percentile of this measure at the time they were surveyed.[13] Our motivation for this step is to avoid underestimating lifetime FGM/C prevalence, as could occur if we misclassify relatively young women who had not yet undergone the procedure at the time of interviewing but eventually will.[14] We then calculate the proportion of remaining respondents in each survey-birth-cohort who report experiencing FGM/C when asked. Figure 3 provides a visual depiction of the resulting data, with the estimated lifetime cutting prevalence from each survey-birth-cohort plotted separately for each country. To assess precision across surveys, we identify country-birth-cohorts that appeared in multiple surveys, finding a median absolute difference between overlapping estimates of 2.8%.[15]

Given the similarity of these estimates, we next pool individual responses for birth cohorts that appear in multiple surveys. When combining survey waves, we follow DHS recommendations for

[7] By reference group we refer to all others whose participation in and approval of the action influence one to comply with the social norm. Although we also use the term *community* within the text, with this we refer not to a territorial unit but rather the relevant reference group.

[8] Mackie (2000) introduces a model of marriageability coordination as a likely explanation for the persistence of FGM/C and its near universality within intramarrying groups. Mackie and LeJeune (2009) update the model of marriageability convention within a broader social-norm account to better fit observations, such as groups in West Africa among whom marriageability has declined in regulatory importance while the practice is maintained by other strong forms of community approval and disapproval (e.g., Shell-Duncan, Wander, Hernlund, & Moreau 2011).

[9] The incidence of FGM/C across its distribution is variably associated with ethnicity, religion, female honor, and adolescent initiation rites, but these factors each are influential in only some groups. More widely, it is associated with higher age, lower education, lower income, and rural residence. Multi-level models (e.g., Hayford, 2005, Modrek & Liu, 2013) tend to show strong cluster-level effects, consistent with the social-norms hypothesis.

[10] This study provides all code necessary to replicate this process. Appendix B (Supplementary data) provides a list of surveyed countries and DHS and MICS datasets used.

[11] While some may worry that women may be uncertain of their own FGM/C status—or, alternatively, that social desirability bias may undermine the accuracy of direct questioning regarding FGM/C—studies that pair surveys with clinical examinations find that questions regarding FGM/C status are highly reliable (Morison et al., 2001; UNICEF, 2013).

[12] For example, we excluded surveys with insufficient responses for the construction of accurate estimates, as well as surveys in which the proportion of women cut in each birth-cohort differed systematically from several other surveys fielded in the same country, e.g. Nigeria's 2003 DHS.

[13] Thus, if 95% of women who experienced FGM/C in a country did so prior to the age of 17, we discarded respondents in that country who were younger than 17 when they were surveyed.

[14] FGM/C is generally performed before the age of 15, but women in some countries undergo the procedure at later ages.

[15] See Appendix A (Supplementary data) for more information on differences between surveys. One explanation for this gap may be that women who undergo FGM/C experience higher mortality rates throughout their lives than women who have not undergone the procedure. If this occurs, surveys fielded in earlier years should yield higher cutting estimates for the same birth cohort than surveys that are fielded in later years. To test for this possibility, we regressed the difference between FGM/C birth-cohort-estimates for overlapping surveys on the number of years that elapsed between survey rounds. The relationship was substantively small: a ten-year gap between surveys is associated with, on average, 0.5% lower estimates of FGM/C for overlapping birth cohorts in the more recent survey.

Descriptive Evidence

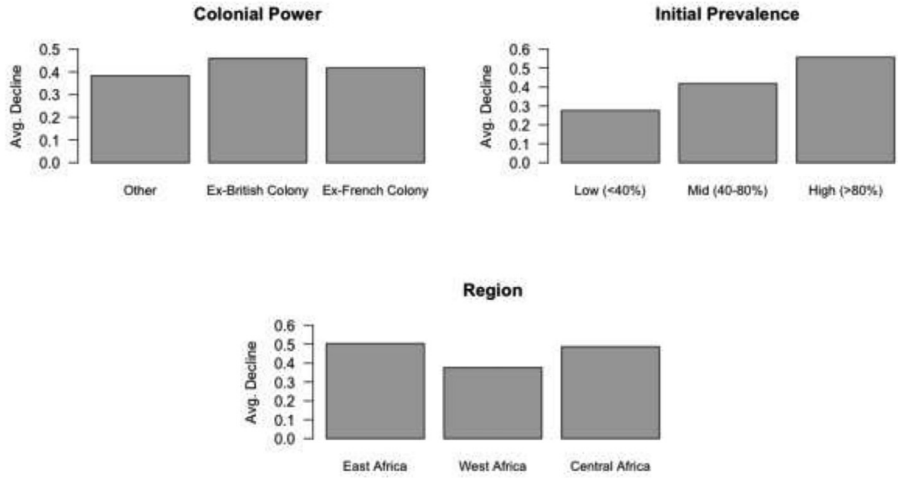

Fig. 4. Average Yearly Decline in FGM/C. Found by calculating the average yearly decline for each country, and then combining and averaging different country estimates according to their colonial history, initial prevalence of cutting, and region.

weighting observations across surveys.[16] We use this pooled sample to calculate the overall lifetime prevalence of FGM/C among women from each country-birth-cohort. For example, ignoring weights, if 1000 female survey respondents were born in a particular country in 1965 and 700 of those respondents reported experiencing FGM/C, our calculation of FGM/C prevalence among that country's 1965 female birth-cohort would be 70 percent. Finally, we removed FGM/C prevalence estimates for country-birth-cohorts with<100 total responses.[17]

5. An exploration of macro-level predictors

5.1. Descriptive evidence

Our measure of historical FGM/C prevalence reveals several interesting trends in cutting over time. Overall, the country with the largest decrease in cutting is Sierra Leone. Over 94 percent of Sierra Leonean women born in 1962 are cut during their lifetimes, while roughly 53 percent of women born in 2002 experience FGM/C. Similarly large declines are observed in Ethiopia, Kenya, and Burkina Faso. It should not be too surprising that these countries have seen the largest declines—they historically had some of the highest levels of cutting—but the progress in these cases is nonetheless encouraging. Our measure likewise highlights Uganda and Togo as two countries where cutting was not widespread historically and where rates are virtually zero among the most recent birth cohorts.

In contrast to cases where FGM/C participation has decreased or continues at relatively low levels, our measure also reveals numerous countries that exhibit minimal declines in cutting. For example, we estimate that 99 percent of Guinean women born in 1958—the year of Guinea's independence—underwent FGM/C during their lifetimes, making it the country with the highest rate of cutting. As of 2001, the most recent year for which we can construct an estimate for Guinea, our data suggests that this figure had declined only slightly and still exceeded 95 percent. Similar levels of persistence are apparent in other countries, including Somalia and Guinea-Bissau. Of greater worry, perhaps, our measure shows that the prevalence of cutting in Gambia is, if anything, increasing over time. Collectively, these results highlight the work left to be done in reducing FGM/C.

Figure 4 illustrates the average yearly decline in the percentage of women cut according to several time-invariant criteria. First, it does not appear a country's former colonial power is related to trends in cutting. Second, declines in cutting have been fastest in countries where FGM/C was more widespread historically. Finally, it appears that declines in cutting are slower in West Africa than other regions.

6. Correlates of cutting

To highlight the type of analysis that our new measure of FGM/C should facilitate, we offer an exploratory investigation of several theories that predict changes in FGM/C prevalence. Using a series of bivariate linear regressions, we explore several macro-level country characteristics that may be associated with overall FGM/C participation within a country (see Appendix A (Supplementary data) for variable descriptions and sources). The unit of analysis across all models is the country-birth-cohort, which can be more easily interpreted as the country-year.[18] For each model, our outcome variable is the measure of lifetime FGM/C prevalence we developed in the previous section. To facilitate comparisons across models, we restrict the dataset to the set of observations for which we have complete data for all independent variables.[19] We likewise normalize all continuous independent variables to facilitate ease of

[16] The normalized weights that are included in DHS surveys are not appropriate to use when pooling data from multiple surveys because the population of potential respondents changes across survey waves. We therefore constructed denormalized survey weights that account for each respondent's distinct sampling likelihood, given the population of potential respondents—i.e., the population of women aged 15–49—in the country and year in which each survey wave was conducted. We obtained relevant population size estimates from World Bank data. For further discussion of this procedure, see the explanation by Ruilin Ren (senior technical specialist and sampling expert at ICF International, an organization that implements DHS surveying) in "Note on DHS standard weight de-normalization."

[17] We selected this cutoff because it equates to a maximal standard error of 5% if the observed FGM/C rate among respondents was 50%. Prior to exclusion, the median number of observations in each country-birth-cohort was 1181, and the mean was 1392.

[18] Our dataset contains one observation for each birth-cohort-year in each country.

[19] Reliable historical data is difficult to obtain for many of the countries in our sample on measures such as female empowerment, trade, and ODA. We use multiple imputation methods in Appendix C (Supplementary data) to show that missing data is not substantively affecting our results.

Table 1
Bivariate Regressions of FGM/C Prevalence.

	Model 1	Model 2	Model 3	Model 4	Model 5
GDP Per Capita	−0.41				
	(0.81)				
Population Density		−1.58+			
		(0.89)			
Net ODA			−0.44		
			(0.47)		
Trade				−0.10	
				(0.17)	
Female Education					−1.25+
					(0.70)
R^2	0.67	0.68	0.68	0.67	0.68
Adj. R^2	0.66	0.67	0.66	0.66	0.67
Num. Obs.	463	463	463	463	463
Num. Clusters	20	20	20	20	20

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$
Models use OLS regression with country-year as the unit of analysis, country fixed-effects, normalized independent variables, and country-clustered standard errors in parentheses. All models include a lagged dependent variable and constant, which are not shown.

comparison between coefficients. Finally, to help account for omitted variables and temporal dependencies, all models include country fixed effects as well as a lagged measure of the dependent variable.[20]

The first set of macro-level factors we include relate to economic development and modernization. One commonly-cited argument for socio-political changes contends that countries abandon traditional practices as they become more developed and gain exposure to other communities (Lipset, 1959). This theoretical approach therefore suggests measures of economic development and international engagement may predict whether FGM/C persists or declines (e.g., Boyle, McMorris, & Gómez, 2002; Modrek & Liu, 2013).

To test for the existence of such a relationship, we include two measures of economic development: *Gross Domestic Product per capita* and *Population Density,* defined as a country's population divided by its size in square kilometers. We also include two measures of international economic engagement: *Official Development Assistance (ODA)* as a percentage of GDP and *Trade* as a percentage of GDP. We obtained annual data for all four of these measures from the World Bank. Table 1 illustrates the relationship between these variables and rates of cutting.

We next consider feminist theories of gender bargaining and women's empowerment, which highlight structural inequalities between men and women. These hierarchical relationships may predict the persistence or abandonment of FGM/C if the continuation of FGM/C is related to power imbalances within countries placing women at a disadvantage. With greater female empowerment, women may be able to secure more favorable agreements, including reductions in FGM/C.[21] To account for a country's level of female empowerment, we include a measure of *Female Education*, a continuous measure that represents the percentage of primary school students who are female. Parallels between education and FGM/C prevalence have been forwarded by Yount (2002), who argues increases in education may contribute to reductions in the proportion of parents who choose to cut their daughters. We obtained the measure of enrollment parity by gender from the World Bank.[22]

Our next set of variables relate to the political environment and level of political stability within a country. Because autocratic governments are commonly associated with less robust human rights protections than democracies, we include a dichotomous measure of *Autocracy* from the commonly used Polity IV dataset.[23] We also include a measure of *Regime Durability,* measured as the number of years elapsed since the country's most recent change of Polity score, and *Political Instability*, measured as change in Polity score of two or more within the last three years.

Beyond the lack of regime stability, other significant disruptions to a country's social fabric could similarly influence the persistence of FGM/C. Acute forms of instability such as civil wars may directly affect the prevalence of FGM/C by threatening women's safety and making citizens more risk-averse about abandoning social norms. This theory suggests active conflict or instability within a country should predict higher levels of FGM/C than in places without violence. To explore this possibility, we include *Civil Conflict*, which indicates the presence of civil conflict within a country.

Finally, many countries have outlawed FGM/C, an action that may contribute to the practice's decline by deterring participation in the practice and raising the costs to individuals who persist in conducting it (e.g. Kandala & Komba, 2015).[24] To reflect these arguments, we include a dichotomous indicator of whether *FGM/C is Outlawed* in a given country-year.[25] Table 2 provides a summary of results relating to our political and legal variables.

[20] Due to the country fixed-effects, coefficients can be interpreted as within-country associations.

[21] Implicit in this argument is the assumption that men favor FGM/C as a way to cement their dominant position and repress female sexuality (Mpofu, Odimegwu, Wet, Adedini, & Akinyemi, 2017). Nevertheless, although general social norms relating to gender are often hypothesized to affect violence towards women (Alesina, Brioschi, & Ferrara, 2016), the opinions of men regarding FGM/C are not so straightforward. Although many couples disagree about whether FGM/C should end or continue, men often *favor* abandonment and are often *less* supportive of continuing the practice than women (Varol, Turkmani, Black, Hall, & Dawson, 2015; UNICEF, 2013). In particular, substantially more men than women oppose FGM/C in Chad, Guinea, and Sierra Leone (UNICEF, 2013).

[22] In Appendix C (Supplementary data) we include a number of robustness checks and extensions that include (1) sub-setting the data to avoid potential programmatic efforts, (2) changing the lag a three year rolling average, (3) running beta regressions on the cohort estimates to account for the fact our dependent variable is a proportion, and (4) using multiple imputation to address missing data. Our results are generally consistent across all models, but we discuss differences between results both later in this text as well as in the appendix.

[23] In keeping with the literature, we code countries as *autocracies* when their Polity 2 values range between −10 and −6.

[24] The question of legal obedience is complex. Our intention is merely to study it in relation to cross-national variance in political conditions.

[25] Outlawing FGM/C is arguably an example of a programmatic response to the practice. We include it as an independent variable because of its potential importance in patterning FGM/C trends, because most laws against FGM/C considered were not the result of international pressure, and because our study's timeframe still largely predates large, international programmatic efforts.

Table 2
Bivariate Regressions of FGM/C Prevalence.

	Model 6	Model 7	Model 8	Model 9	Model 10
Autocracy	0.50				
	(0.36)				
Regime Durability		−0.47**			
		(0.20)			
Political Instability			0.42+		
			(0.24)		
Civil Conflict				−0.29	
				(0.21)	
FGM/C Outlawed					−1.26***
					(0.30)
R^2	0.67	0.68	0.67	0.67	0.67
Adj. R^2	0.66	0.66	0.66	0.66	0.66
Num. Obs.	463	463	463	463	463
Num. Clusters	20	20	20	20	20

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$.
Models use OLS regression with country-year as the unit of analysis, country fixed-effects, normalized independent variables, and country-clustered standard errors in parentheses. All models include a lagged dependent variable and constant, which are not shown.

7. Discussion and interpretation

This exploratory analysis suggests that the predictors of FGM/C are complex and context-specific, with few strong relationships that generalize across countries. Nonetheless, our evidence highlights several patterns that merit further investigation. Table 1 shows the results from our first set of bivariate regressions. Although only marginally significant, these results suggest that higher levels of population density and higher levels of female enrollment are associated with lower levels of FGM/C. On average, a one standard deviation increase in population density—roughly 26 people per kilometer—is associated with a nearly one and a half percent lower rate of cutting. Population density could be proxying for various underlying mechanisms, such as development or contact with diverse communities, and we leave it to future researchers to better understand how population density may influence FGM/C. Similarly, a one standard deviation increase in female primary school participation—eq uivalent to a 15 percent rise in the proportion of students who are female—is associated with nearly one and a quarter percent lower cutting rates. This result merits future research, as it suggests that international programs aiming to increase access to education for women may also encourage declines of harmful practices as a side effect. On the other hand, our models exploring per capita GDP and international exposure—either in terms of official development assistance or international trade—are not associated with changes in the prevalence of FGM/C.

Our second set of models focus on potential political and legal correlates of FGM/C. First, we find little evidence that autocratic regimes are associated with the prevalence of FGM/C. Similarly, we fail to detect a significant relationship between FGM/C prevalence and civil conflict. While civil conflict may introduce social upheaval, it does not seem to be strongly associated with FGM/C prevalence. Our results do suggest a potential relationship between political stability and FGM/C, however. More durable political regimes, whether they are authoritarian or democratic, are associated with lower levels of cutting. Each additional decade of regime durability is associated with a 0.5 percent decline in FGM/C. Measured differently, episodes of political instability that follow changes in the type of ruling regime are associated with slightly higher rates of cutting. Finally, our results indicate that places where FGM/C is outlawed are associated with lower rates of FGM/C prevalence. Although this is perhaps encouraging news for those who seek to bring about an end to FGM/C, we caution that we cannot say with any certainty why outlawing FGM/C is associated with decline. The results may, for instance, result from increased fear of legal sanctions, the spread of information campaigns regarding the ban of FGM/C, or shifting social expectations around the practice's future. Alternatively, governments may be most likely to pass laws banning the practice in places where FGM/C is already on track to decline. Regardless, the relationship between FGM/C legality and its prevalence warrants greater scholarly attention, and the data we provide should facilitate such research in the future.

Although our results remain correlational and descriptive in nature, they highlight how our approach to estimating historical FGM/C prevalence advances our understanding of long-term trends in cutting while also facilitating research on the various macro-level factors that may predict its decline. Nevertheless, we are careful not to place too much policy emphasis on any of the relationships we highlight in this study, as several potential problems may limit our ability to draw firm conclusions. For example, our estimates of FGM/C prevalence may be biased downwards systematically. In short, the health consequences of FGM/C may result in a process whereby women who have been cut are less likely to survive to adulthood or to participate in DHS and MICS surveys. While this would deflate our estimates of FGM/C prevalence, our estimates of the magnitude of this effect are small, as we discuss in Footnote 18.

Second, although our method of using contemporary surveys to identify historical trends in FGM/C enables us to assess long-term trends in participation rates across countries, missing data remains a persistent problem in both our dependent and independent variables. For many countries, our data on FGM/C prevalence becomes spotty beginning in the 1990's, and almost non-existent after the year 2000. This is due to either a lack of available surveys or the existence of young respondents who still face the possibility of being cut in the future at the time they are surveyed. Historical data on our explanatory variables of interest in FGM/C countries dating back to the 1960s, when our measures of prevalence begin, are at times also spotty. Our method of compiling data from DHS and MICS respondents should allow for both straightforward expansions of temporal coverage and improvements in existing annual estimates as additional survey waves become available.

To ease interpretation, we limited our main analysis to observations with complete data across all variables, but in Appendix C (Supplementary data) we repeat our analysis both with all available cases for any given variable as well as using multiple imputation methods. Across both approaches, the results for population density, female education, and laws against FGM/C are consistent in direction, magnitude, and significance, while the variables measuring political stability are less consistent in statistical significance across specifications.

It is possible that some birth-cohorts included in our analysis—particularly those from more recent years—are influenced by international programmatic efforts against the practice. To account for this possibility, in Appendix C (Supplementary data) we repeat our analysis limiting our observations to those born before 1985. We find, if anything, a stronger association between population density, female education, and political stability and declines in FGM/C. The largest difference between the results we present in Table 2 and those that limit temporal coverage to years prior to 1985 is that civil conflict, which was not strongly associated with FGM/C levels in the main table, is positively and significantly associated with FGM/C prevalence in the pre-1985 data. Future researchers may wish to investigate this discrepancy further. Although speculative, it is possible that post-1985 increases in humanitarian assistance and support for conflict-affected populations has helped to combat the spread of FGM/C in civil conflict zones, thereby reducing the relationship between conflict and FGM/C in recent decades.[26]

Aside from our exploratory results, our approach of using birth-cohort estimates to construct historical measures of FGM/C prevalence opens up a number of potential avenues for future research. Nevertheless, we acknowledge this study suffers from several limitations on our ability to draw definitive interferences. Perhaps most significantly, our study is limited in scope to macro-factors and macro-effects. It is likely individual and community-level variables are also of substantive interest. Unfortunately none of the data sources we consult include potential individual-level covariates from before a woman is cut. We focus on macro-factors associated with changes in FGM/C prevalence, but our approach could similarly be used to consider how different *meso*-level factors, at the level of ethnic, religious, or subnational community, may be associated with changes in FGM/C prevalence. This dovetails several other works discussing the explanatory power of individual level measures in explaining the persistence of FGM/C (e.g. Kandala, Nwakeze, & Kandala, 2009).

8. Future research

The results of this study highlight the need for more research into trends in FGM/C prevalence, particularly historical trends predating major programmatic efforts to end the practice. Our initial results provide some evidence that population density, female education, political stability, and laws banning FGM/C are associated with lower levels of cutting, but these results are tentative at best, with different modeling decisions influencing their magnitude and degree of significance. Future scholars should build upon our data and exploratory results to more directly explore specific hypotheses using alternative approaches and additional tests.

For example, using our approach future researchers could evaluate how cultural differences associated with different ethnic groups influence rates of cutting by creating cohort-estimates for each ethnic group within a set of countries. Potential research could, for example, assess how different groups may be more open to change than others, and whether more open groups are more willing to abandon FGM/C. Similarly, research could consider whether matrilineal groups differ from patrilineal groups in their rate of cutting. Differences at the level of cultural group could work either independently or in interaction with different macro or international processes. Efforts to outlaw FGM/C may be more effective among certain groups, for instance.

In addition to ethnic groups, future research should consider subnational variation in FGM/C prevalence. Assuming limited migration, our approach could similarly be used to construct an estimate of FGM/C prevalence for subnational regions. It could then be seen if certain regions are especially likely to abandon the practice, or if subnationally varying factors are associated with changes in FGM/C prevalence either directly or interacting with other variables. Such research could consider if efforts to outlaw FGM/C are more effective closer to national capitals and other centers of political power, or if geographically-focused efforts to promote FGM/C abandonment have succeeded in the communities where they were implemented. Using historical measures, future research could also measure how long-running factors such as a region's exposure to colonizing powers, missionaries, or the transatlantic slave trade may have catalyzed long-run processes that continue to shape trends in FGM/C prevalence today.

9. Concluding remarks

Why has the prevalence of FGM/C declined in some countries but remained high in others? Whereas previous researchers have identified variables that explain individual attitudes toward the practice (e.g. Hamilton & Kandala, 2016) and individual decisions to participate in FGM/C (e.g. Achia, 2014; Setegn et al., 2016), this paper is the first to explore national-level mechanisms that predict variation in observed abandonment across countries over time. We develop a novel measure of FGM/C prevalence in 23 African countries for time periods ranging from 1940 to 2002. This new measure, the first of its kind, enables us to better understand long-run trends in FGM/C, including the countries where the practice has seen its sharpest declines, and the countries where FGM/C has seen little or no decline in prevalence.

In analyzing changes in FGM/C prevalence, this study also provides initial evidence that greater population density, equality in access to education, efforts to outlaw the practice, and political stability are all associated with lower levels of cutting. On the other hand, we find that economic development, regime type, and international pressure are less strongly associated with the decline of the practice than researchers sometimes assume.

Although our findings are in many cases consistent with the theoretical mechanisms we outline, we emphasize that these patterns we identify should be subjected to additional study before any conclusive claims or policy decisions are made. Our analysis is exploratory in nature and the relationships we highlight are correlational rather than causal. While our empirical approach—using a combination of fixed effects, a lagged dependent variable, and clustered standard errors—helps bolster inferences by controlling for potential omitted variables and more accurately estimating the uncertainty in our explanatory coefficients, we are limited by the use of observational data and bivariate regression techniques. We hope this study serves as the first of many that use contemporary surveys to identify historic trends in FGM/C, and that future researchers will implement creative strategies that facilitate causal identification.

Finally, although our goal in this project is to understand trends in national-level FGM/C participation, our approach of using recent survey responses to obtain data on historical outcomes suggests several avenues for future research. More broadly, asking survey respondents to report information about historic conditions and events may be a fruitful means of gathering data about other historical variables when reliable evidence from a time period of interest is difficult to obtain. Just as researchers use interviews with key subjects to construct historical accounts of earlier peri-

[26] Finally, to account for extraneous variation related to measurement error, we include an alternative specification in the Appendix C (Supplementary data) in which we replace the one-year lag of FGM/C prevalence with a three-year rolling average. Coefficients from these models are directionally consistent with those presented in Tables 1 and 2 but are not significant at conventional levels. We discuss this in greater detail in Appendix C (Supplementary data).

ods, we may use large survey responses to construct a broader picture of history where none would otherwise exist.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.worlddev.2019.104845.

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