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Fertility decline in Kenya: Did financial inclusion play a role?

Maren Duvendack and Richard Palmer-Jones

Abstract

Kenya has seen unprecedented declines in fertility since the 1960s, which stalled during the decade from the mid-1990s, only to resume in the early 2000s when Kenya experienced rapid growth in financial inclusion, which has been linked to women's empowerment. In this paper we explore possible causal mechanisms between fertility, women's empowerment and financial inclusion. The Kenyan context presents some unique challenges to establishing such connections; regional geographic and ethnic differences, rural - urban differences, spatial and temporal uneven economic growth, diverse legacies of colonialism, and an HIV/AIDS epidemic, all of which may have affected how fertility trends, women's empowerment and financial inclusion activities played out. We find that while modernisation variables such as urbanisation, education, employment and wealth are strongly related to lower fertility levels, there is little plausible evidence of a role of financial inclusion as yet. More plausible explanations for changing fertility patterns may be found in the country's colonial history, which in turn shaped modernisation variables, women's empowerment, ethnic identities and financial inclusion.

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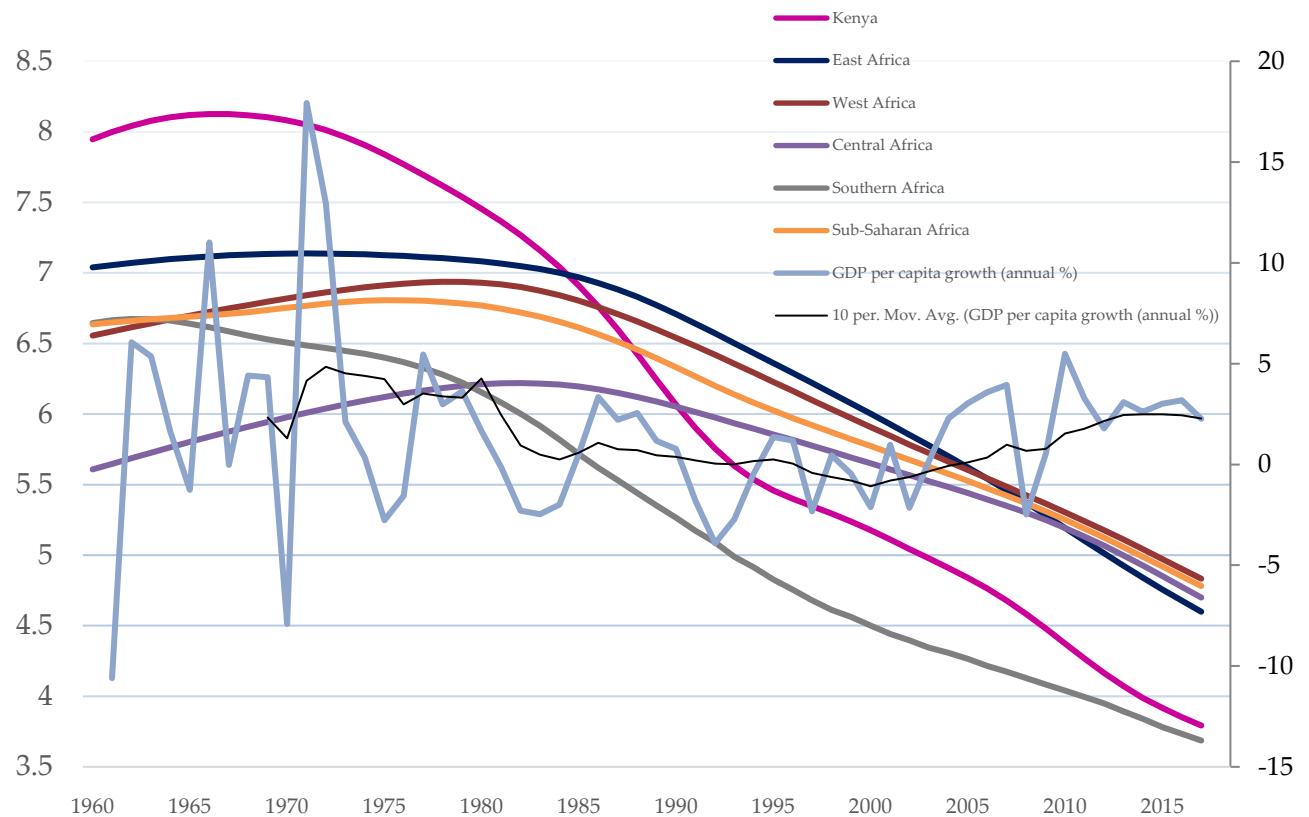
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Introduction

Kenya has seen a steep decline in fertility from the late 1970s onwards making it a leader in achieving family planning successes in Sub-Saharan Africa (see Figure 1) but fertility reduction stalled in the decade from the mid-1990s only for it to resume in the early 2000s (Askew et al, 2017). The earlier decline is widely attributed to family planning programmes and the stalling to changed policy and programme emphasis on HIV/AIDs (*ibid*). Subsequently fertility seems to have declined further, at the same time as Kenya experienced an increase in financial inclusion from the mid-1990s, accelerating dramatically from the mid-2000s with a widely acclaimed expansion of digital financial services, especially with the establishment of M-PESA in 2007 (Suri and Jack, 2016) making Kenya the success story for financial inclusion as well as fertility decline in Sub-Saharan Africa.

Figure 1: Total fertility rates (births per woman) in Sub-Saharan Africa and GDP per capita growth in %, 1960 to 2017

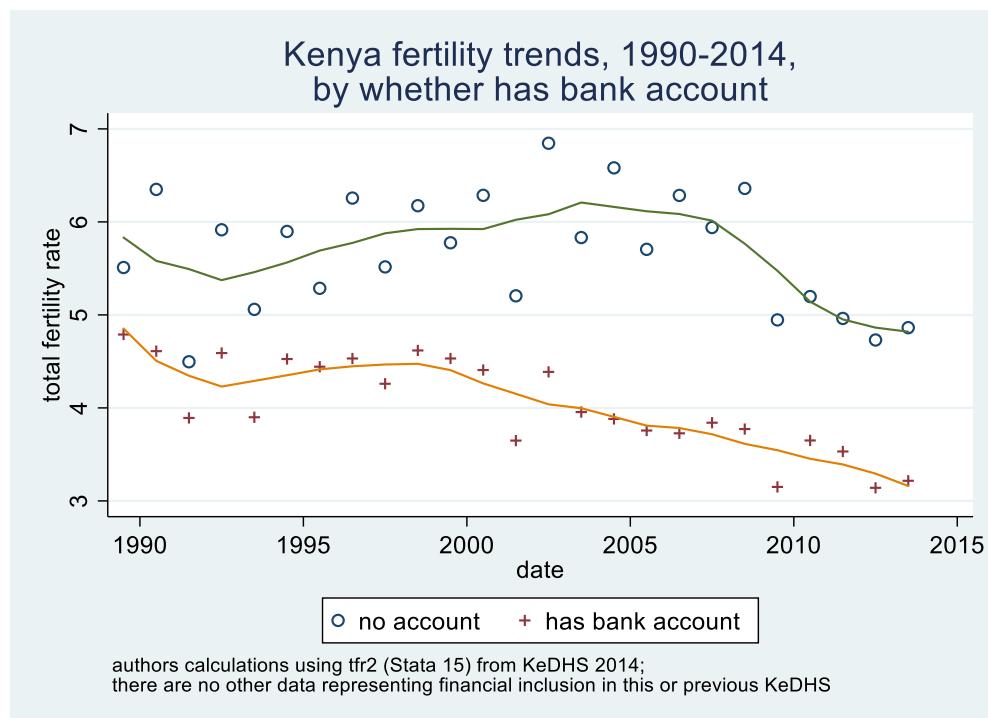


Source: World Development Indicators, 1960 - 2017. Notes: A 10 year moving averages trendline for GDP per capita growth in annual % has been added.

In the face of an apparent widespread fertility stalling in Sub-Saharan Africa (Bongaarts, 2008), it has been argued that horizontal approaches¹ integrating health and economic interventions, such as family planning and financial inclusion programmes, can lead to beneficial outcomes for households in low-and middle-income countries (Kim et al, 2007; Leatherman et al, 2012; Cleland et al., 2006; Cleland, 2009). Orton et al (2016), for example, argue that group-based microfinance increases women's empowerment which in turn improves contraceptive use and thus lowers total fertility rates. Brody et al (2015) support this view suggesting that membership in

self-help groups has positive effects on women's control over family sizes. Mayoux (1999) and Desai and Tarozzi (2011) further support these claims arguing that family planning and financial inclusion programmes are mutually reinforcing as the latter can function as entry points or complements to community development programmes focusing on family planning services. Figure 2 below provides evidence that women in households having a bank account have considerably lower total rates of fertility than women without having a bank account.

Figure 2: Fertility trends in Kenya by financial inclusion, 1990-2014



Source: Authors calculations using tfr2 from KDHS 2014. There are no other data representing financial inclusion in this or previous KDHS. The variable 'has bank account' is used as a proxy for financial inclusion.

Figure 2 also indicates a stalling of fertility from the mid-1990s to the early 2000s (Askew et al, 2017; see also Bongaarts, 2008, also evident in Figure 1) before a further decline resumes – identification of these three phases in fertility decline in Kenya

motivates this paper. We are particularly interested in whether the drivers of the first phase of fertility decline also account for the subsequent phases; in particular we attempt to focus on links between fertility and financial inclusion during the latest phase when fertility reduction resumed, via the route of women's empowerment to which the literature has drawn attention. For the empirical work, we draw on secondary data including the World Fertility Survey (WFS, 1977-78), Kenyan Demographic and Health Surveys (KDHS, from 1989 to 2014), Kenya Census (1962 and 1999), and FinAccess data (2006 to 2018)².

Similar explorations linking financial inclusion to fertility via women's empowerment have been made in the case of South Asia in particular in Bangladesh which has been characterised by both exceptional fertility decline and intensification of financial inclusion (Chowdhury et al, 2013; Schuler and Hashemi, 1994). Conventional narratives attribute fertility decline to family planning programmes and women's empowerment particularly through microfinance-oriented development interventions (Amin at al, 1995; Nanda, 1999; Schuler et al, 1997); however this conventional narrative does not fit the time pattern of fertility decline, or interrogation of statistics of women's empowerment (Duvendack and Palmer-Jones, 2017). Notwithstanding attempts to "learn from South Asia", the Sub-Saharan African context is evidently different from South Asia in continuing relatively high fertility and fertility preferences among many groups, in terms of meaning and measurement of female

empowerment, the diversity of ethnic and social groups, and the later development of a financial inclusion industry.

Sub-Saharan Africa has seen slower declines in total fertility rates (TFR) which remain higher than in South Asia; Bongaarts (2017) calls this the 'Africa effect' (see also Bongaarts and Casterline, 2013). Bongaarts argues that fertility transitions in Africa are later and slower than in other regions of the developing world because of "...pronatalist social, economic, and cultural practices..." (p. 55) Caldwell and Caldwell (1987) also assert that population trends in Africa are influenced by cultural factors (see also Caldwell et al, 1992; Iyer and Weeks, 2009). This is problematic for the argument that fertility decline is associated with women's empowerment. Mayoux (1999), for example, following the gender and development literature of the last two decades of the 20th century which argues that empowerment is associated with employment in productive spheres, suggests that women in Sub-Saharan Africa may already be more empowered than their South Asian counterparts due to their engagement in agricultural production and marketing and possibly due to the prevalence of polygamous family structures which allows women to have more control over household resources. Hence, extending the arguments made in South Asia in relation to explaining the links between financial inclusion, women's empowerment and fertility to Sub-Saharan Africa may be problematic – not dissimilar to the arguments that Sub-Saharan Africa can learn from South Asia presented in the

context of the Green Revolution (see for example, Voortman, 2013; Otsuka and Muraoka, 2017; Frankema, 2014).

The case of Kenya is of particular interest as it was one of the first countries in Sub-Saharan Africa to adopt a formal family planning programme in 1967³ (Caldwell and Caldwell, 1987; Chimbwete et al 2005; Crichton, 2008) showing rapid declines of TFRs especially when compared to the rest of Sub-Saharan Africa (see Figure 1), while the growth of the African population is still high, relative to, for example, Bangladesh which experiences near replacement level TFRs (2.076 - World Development Indicators, 2017) meaning that Sub-Saharan African populations will continue to grow rapidly for decades.

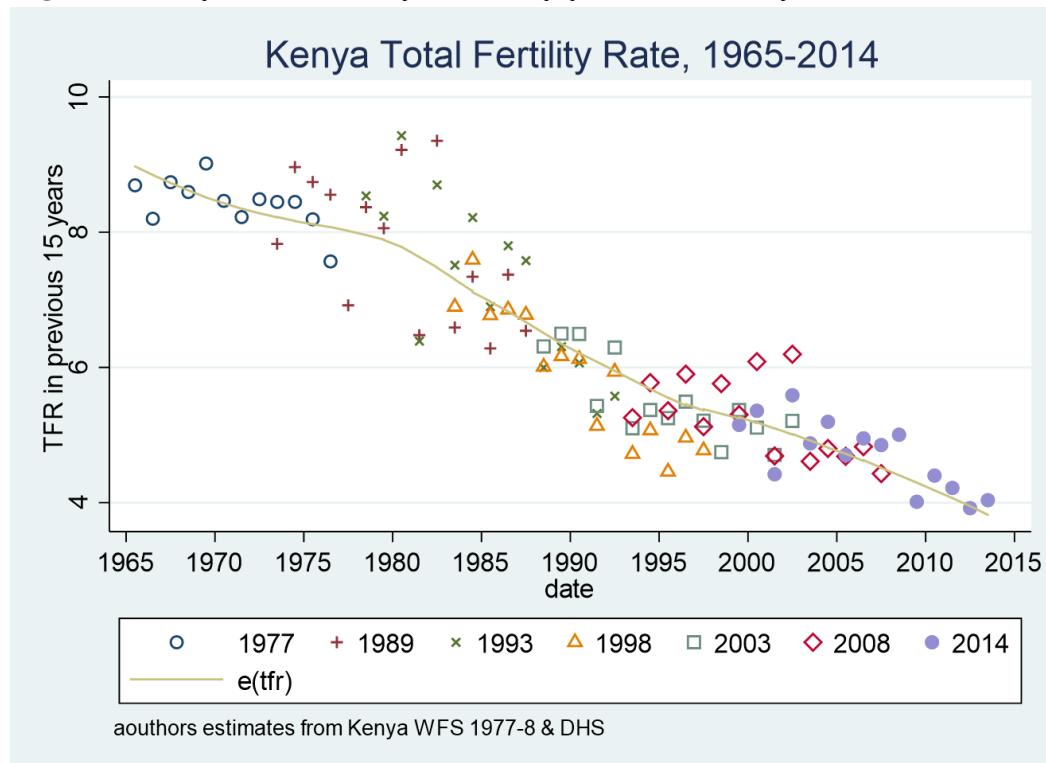
The initial focus of this paper is on discussing the extensive literature on fertility, women's empowerment and financial inclusion, and how colonial legacies and ethnic belongings may have shaped these relationships before moving on to discussing our findings and concluding remarks.

Literature Review

Fertility trends, ethnic belonging and colonial legacies in Kenya

Kenya was one of the first countries in Sub-Saharan Africa to adopt a national family planning programme in 1967 (Caldwell and Caldwell, 1987; Chimbwete et al 2005; Crichton, 2008). Since then, fertility in Kenya has fallen from a TFR of over 8 in the mid-1960s to a TFR of just under 4 in 2014 (Figure 3).

Figure 3: Kenya total fertility trends by year and survey, 1965-2014

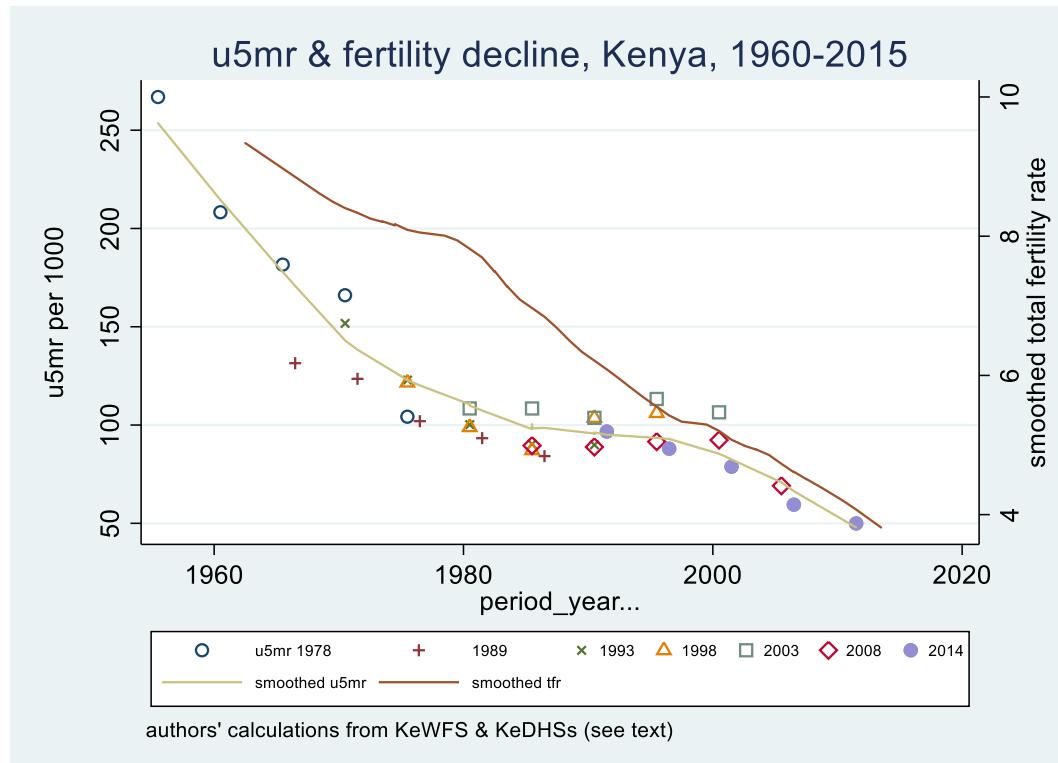


Source: Authors calculations. WFS 1977-78, KDHS 1989-2014.

Between the late 1990s and early 2000s, a stalling of fertility occurred (see Figure 3 see also Askew et al, 2017; Bongaarts, 2008). According to Askew et al (2017, p. 303) shifting government priorities are partially to blame for this stall as scarce resources were used to address the HIV/AIDS pandemic which came to prominence in the mid-to late 1990s; donor commitments also changed and less financial and technical support was provided to family planning programmes. In addition, the Kenyan economy was strongly affected by structural adjustment programmes that were first imposed by the World Bank in the early 1980s (see Gibbon, 1992 for a critique of those programmes). At the same time, the economy and polity were adversely affected during the later years of the presidency of Daniel Arap Moi. Moi, who was from the

Kalenjin ethnic group, lost power to a Kikuyu, Mwai Kibaki, in 2003 – shortly before the apparent start of the 2nd phase of fertility decline in the early 2000s. We should note that fertility decline followed declines in child mortality rates which started from the mid-1950s, in a familiar demographic transition pattern (see Figure 4).

Figure 4: Child Mortality and Fertility Decline, Kenya 1960-2014



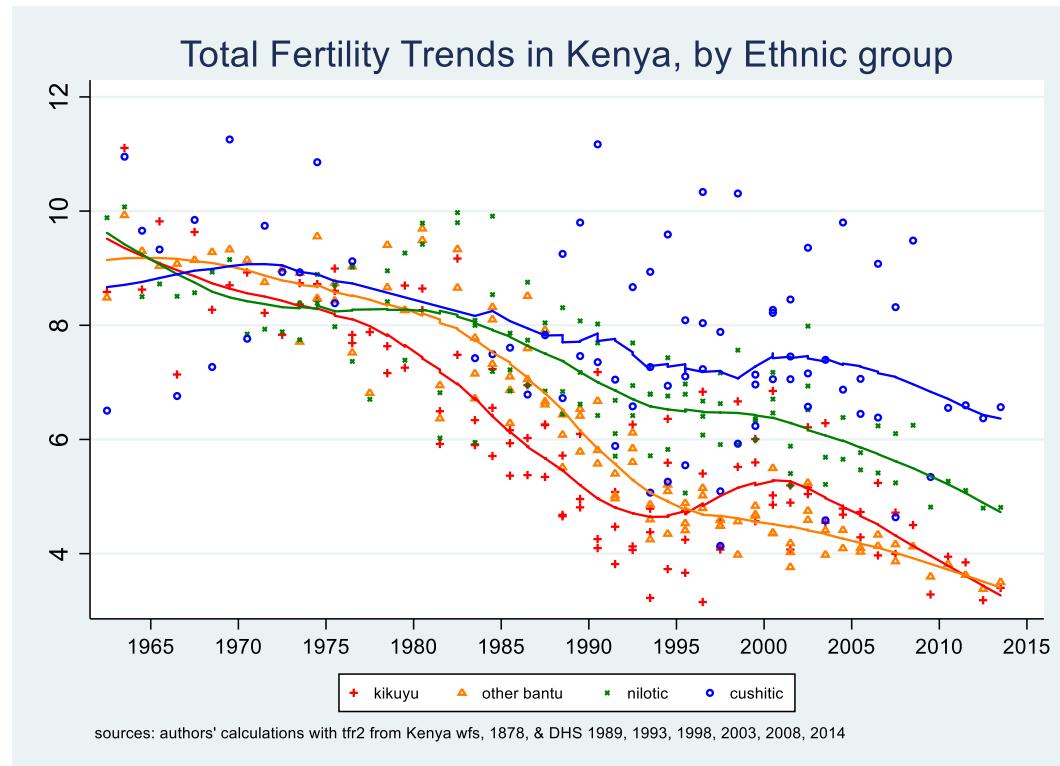
Source: Authors calculations. WFS 1977-78, KDHS 1989-2014. Children under 5 mortality rate (U5MR) is used to present child mortality.

Bongaarts (2017; see also Kokole, 1994) questions the effectiveness of family planning programmes as explanations of slow fertility transitions in Sub-Saharan Africa (especially compared to South Asia) but the reference to the pronatalist nature of African societies is consistent with widely held views (e.g. Kokole, 1994; Caldwell and Caldwell, 1987) that the varying cultural practices of the numerous ethnic groups found in Kenya can partially explain why fertility rates remained high (see also Iyer

and Weeks, 2009; Bauni et al, 1999). For example, the Kikuyu, Embu and Meru (Bantu speaking) groups are thought to favour smaller family sizes compared to the Kalenjin, Luo or Masaai (Nilotic speaking) perhaps because of the tradition of cattle keeping, for which children are more useful than in settled agriculture (Bauni et al, 1999). As indicated in Figure 5 below, fertility rates differ considerably by ethnic groups⁴ with Bantu speaking groups (excluding Kikuyu) starting their declines in fertility and still having lower fertility rates than Nilotic or Cushitic speaking groups. We should note that the fertility decline started earlier and more rapidly among the Kikuyu, followed by other Bantu groups, and Nilotic and Cushitic at a lower rates in the late 1980s. Fertility continued to decline for the latter groups through to the mid-2010s, but the trend among the Kikuyu seems to have reversed in the early 1990s before resuming in the early 2000s. It may, or may not be a coincidence that the Kikuyu were privileged in the regime of Jomo Kenyatta (head of state 1963-1978) and, arguably in the earlier periods of the presidency of Daniel Arap Moi (1978-2002, who was Kalenjin); Weinreb (2001) suggests that the politically dominant ethnic group tends to enjoy privileges, e.g. favourable access to state resources such as family planning. Plausibly, during the later years of Moi's presidency Kikuyu lost their privileged status, and thus access to state resources. Moreover, they may have feared losing ethnic dominance based on population (an argument made by Goliber, 1985), perhaps further contributing to a reversal of fertility decline. The dominance of the Kikuyu returned under the regime of Mwai Kibaki (2002-2013; a Kikuyu), especially after the ethnic disturbances of 2007-

8, and was likely to have been enhanced when Uhuru Kenyatta (more explicitly associated with the Kikuyu) became president in 2013, a period when fertility decline resumed among the Kikuyu.

Figure 5: Historic fertility trends by ethnic groups



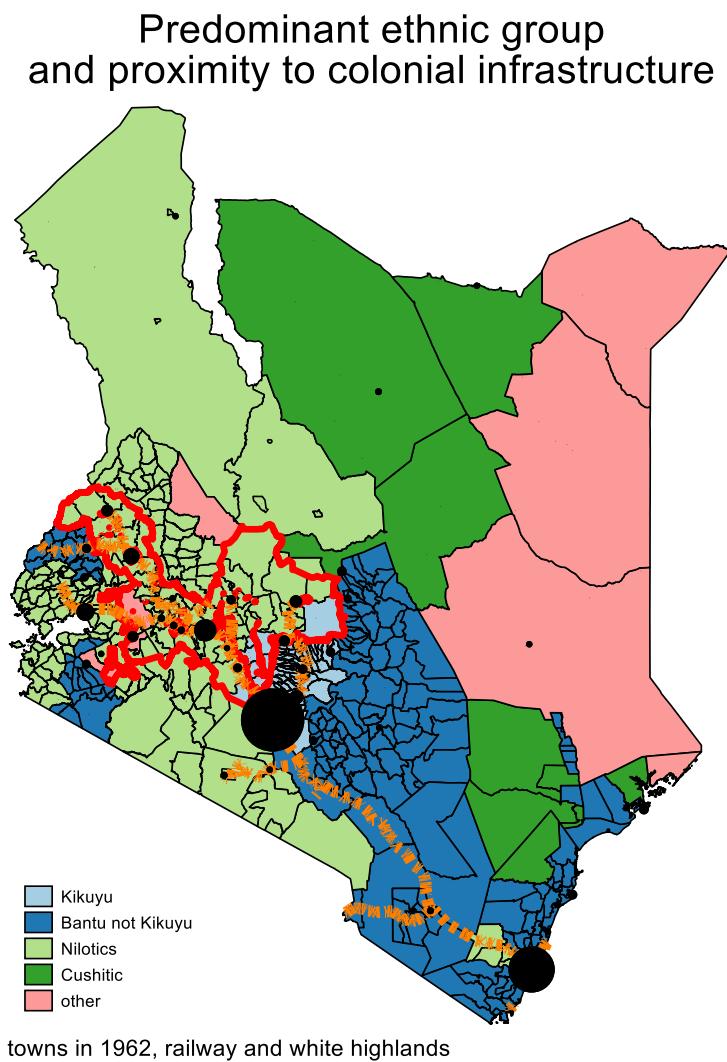
Source: Authors calculations using tfr2 from WFS 1977-78, KDHS 1989 – 2014.

Iyer and Weeks (2009) suggest that the differences in fertility in Figure 5 can be further explained by overlapping ethnic and geographical boundaries, residential patterns, clan organisation, education and the politics of ethnicity. Understanding ethnic and geographical boundaries which sit alongside administrative and political boundaries with their origins in the colonial past may be particularly important in explaining fertility differentials as these have shaped economic and educational opportunities of Kenya's different ethnic groups. In the Kenyan context, colonial investments,

settlements and policies brought about numerous trends which could affect fertility, particularly urbanisation, education, commercialisation of agriculture, population growth, and so on. These trends were themselves affected by geographical features including the potential for commercial crops, but also, importantly, by European and associated Asian settlement patterns that were strongly influenced by the location of the railway linking the port of Mombasa with the interior in the early 1900s. The railway construction and its location was strongly influenced by British imperial objectives to enable troop movements. Historical events such as the Mau Mau rebellion in the early 1950s and subsequent colonial development plans, particularly the "Swynnerton Plan" that allowed and then promoted growing of cash crops – pyrethrum, coffee, tea – by Africans which had previously been prohibited, further commercialising the livelihoods of ethnic populations differently based on their geographic location involvement in the Mau Mau disturbances. These developments were spatially concentrated in specific regions, close to the railway built primarily for imperial military ends and areas of high agricultural potential (for Europeans). Thus colonial infrastructure developments and settlements had profound but very uneven effects on the diverse African population. As Jedwab et al (2017), show, the location of the railway⁵ strongly influenced the development of towns, and associated urban developments including schooling of the African population. They show further that these influences, particularly the pattern of location of towns, were lasting. Alwy and Schech (2004) argue that ethnic groups residing near colonial settlements, ports or railway lines had

better access to employment and educational opportunities and this in turn shaped their fertility preferences and behaviour. This is illustrated by Figure 6 below which suggests that the Kikuyu in particular were located near and thus impacted by colonial settlements; the Kikuyu not only experienced greater disruption and dislocation due to colonial land appropriation within their territories, but, as the colonial polity grew, they had relatively more access to educational and employment opportunities (Kokole, 1994, p. 79) and are considered to be the best educated ethnic group (Iyer and Weeks, 2009, p. 10) which may contribute to explaining why their fertility rates are lower than those of other ethnic groups (Bauni et al, 1999, also Figure 5 above).

Figure 6: Predominant ethnic groups and proximity to colonial infrastructure



Source: Authors calculations. Notes: Orange dotted line = Railways; Red solid line = Boundaries of White Highlands; Black dots = Towns in 1962.

It is well established in the literature that urbanisation and, especially, education is an important driver of fertility behaviour (e.g., Caldwell, 1980; Jejeebhoy, 1995). In addition, the type of economic activities the different ethnic groups have traditionally and currently engage in may also play a role in fertility preferences and outcomes. For example, the Kikuyu but also the Embu and Meru, other Bantu groups, who

predominated in areas of or close to colonial settlements, were drawn into work as wage labourers or as clerks for the colonial government which exposed them to Western influences which in turn may have shaped their values and fertility preferences (Iyer and Weeks, 2009; Bauni et al, 1999). The Kalenjin (belonging to the Nilotc group) also lived in close proximity to colonial settlements but their relationship with the colonial government was more fraught as they were involved in forbidden cattle raiding activities stealing cattle not only from other ethnic groups but also from European settlers (Anderson, 1986). Their fertility was considerably higher than those of the Kikuyu or other Bantu groups (Figure 5). Thus, understanding the drivers behind Kenya's fertility decline is challenging as fertility is confounded by colonial legacies, ethnic belonging, along with urbanisation, education, and employment, among other things including family planning programmes. Recent work noting links between education, (women's) employment and fertility emphasises the role of women's empowerment as a key determinant of fertility (Upadhyay et al, 2014; Hindin, 2000; Woldemichael, 2009). Caution should also be exercised when attempting to give a causal interpretation to ethnicity in fertility outcomes, however plausible from the ethnographic literature, because of confounding interactions with urbanisation and education, and in the case of Kenya (and in many other former colonial areas), were profoundly influenced by colonialism. Geographical features of the localities in which different ethnic groups reside may also have impacts on fertility through the effects of these geographical features on

livelihoods and economy and hence on fertility decisions and outcomes. The next section discusses the link between women's empowerment and fertility in more depth to better understand whether empowering women is an effective route to reducing fertility. We note that male education and employment are also linked to fertility decline, consequently, male roles in fertility (decline) warrants more attention. Following this we proceed to discuss putative links with financial inclusion.

Women's empowerment, fertility and male involvement

Studies examining fertility have mainly focused on women as reproductive health issues are considered to be a woman's domain (Hindin, 2000; Story and Burgard, 2012; Becker, 1996). Some literature suggests that women's status and role in society are often linked to their fertility, i.e. their status is enhanced by the number of children they have born and the sex of their children, a preference for males is often observed (Hindin, 2000). This view is rooted in the 1960s rise of Western feminism which stresses a woman's desire for employment and education which enhances her status and therefore influences her fertility (Germain, 1975). It is thus not surprising that many studies have tried to unpack the causal relationships between women's status and health-related topics (e.g. Balk, 1994; Basu and Koolwal, 2004).

Women's status is a term that is often used interchangeably with women's autonomy and or empowerment but without much consensus in the literature on how best to understand and conceptualise these concepts (Malhotra et al, 2002). One definition of women's empowerment, however, has been widely used in recent years:

“Empowerment thus refers to the expansion in people’s ability to make strategic life choices in a context where this ability was previously denied to them” (Kabeer, 2001, p. 19).

She emphasises that empowerment is not a static concept but a process that requires agency, i.e. women themselves have to get involved in the process in order to achieve change. A seminal paper by Kabeer (1999) argues that empowerment cannot be achieved by the agency of the individual alone but that collective action is required to address structural inequalities. The complexities surrounding empowerment, and its definition as a process, has implications for its measurement which we discuss in more detail below.

There are many studies that draw on DHS data to examine the link between empowerment and fertility in the African context (e.g. Upadhyay and Karasek, 2012, Upadhyay et al, 2014; Woldemicael, 2009), many of them show that, drawing on non-causal correlational evidence, empowering women has positive effects on contraceptive use, birth spacing and on reducing fertility (e.g. Schuler et al, 1997; Hindin, 2000). However, there are other enabling factors, such as women’s education and their employment opportunities that may influence the causal relationship between empowerment and fertility (e.g. Mason, 1986). Some scholars such as Balk (1994) and Vlassoff (1992) acknowledge that women’s education and work status as proxies for women’s empowerment are important indicators but their relationship to fertility is more complex than previously thought as issues such as age at marriage and

sex preferences among other things will also play a role. Similarly, Woldemicael (2009) suggests that education and employment are not always crucial for influencing fertility decisions and other factors such as pressure from society may play a role. Hindin (2000) supports these views and shows that there is no causal link between education and fertility but is less clear about the relationship between employment and fertility. Balk (1994) further argues that regional effects can also influence fertility decisions.

As a result of these debates, many studies now focus on decision-making (and acceptability of wife-beating or domestic violence), as the main metric to measure women's empowerment which is then linked to fertility decisions (Malhotra et al, 2002; Upadhyay et al, 2014). In the context of decision-making, it is important to illuminate the role of males. As mentioned above, the literature (and data) tends to focus on women when discussing fertility preferences, and assumed that women are most empowered who report themselves as "sole" decision makers; however this view has been challenged in so far as some decision, relating to conventional (subordinated) female roles are not likely to indicate empowerment (Basu and Koolwal, 2005). More recently, some studies have emphasised the involvement of males in the reproductive decision-making process suggesting that male participation may lead to improved reproductive health outcomes for women in particular (Beenhakker et al, 2005; Story and Burgard, 2012). Upadhyay and Karasek (2012) suggest that men's attitudes have a strong influence on family size, claiming that attitudes of Ghanaian men towards family size explain the large nation-wide declines in fertility rates in Ghana. They

further argue that women in Sub-Saharan Africa express a desire for smaller family size but subsequently fail to adopt contraceptive practices – low contraceptive use may be more affected by traditions, situation and context.

The review of the literature so far has demonstrated that attributing the changes in fertility to women's empowerment, possibly via the route of education and employment, is a complex and challenging task, since many social, economic and cultural factors are likely to influence fertility decisions (Livi-Bacci and de Santis, 1998), this task is further complicated by adding the financial inclusion discourse into the narrative.

Financial inclusion, women's empowerment and fertility

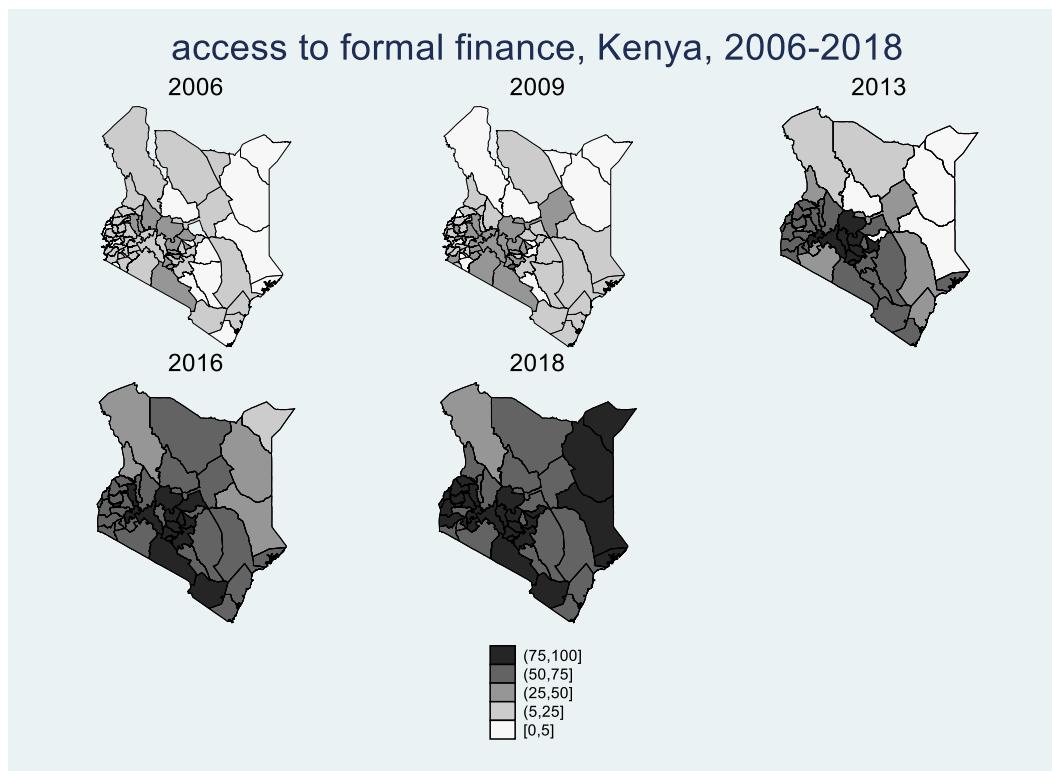
Financial inclusion interventions claim to have had beneficent impacts on a range of socio-economic outcomes mainly via empowering women and thus supposedly reducing fertility (Schuler et al, 1997; Amin and Ahmed, 1996). Financially including women putatively raises their experience of the world and incomes, and thus changes their preferences and strengthens their bargaining power vis-à-vis men in the household, which in turn may shape the power balance and social status of the woman within the household and the community. As a result, these changed gender relations influence fertility, generally, it is expected, downwards.

As shown above, Kenya's fertility reduction stems from its earlier reductions in child mortality, among other factors, and is associated with education, formal sector employment, urbanisation, and economic growth, which in turn were associated with

proximity to European influence, and colonial impacts. Kenya also has a long history of financial inclusion, the International Labour Office report on Kenya (1972) first recognised that the informal sector can be an important contributor to employment and economic growth but at the same time acknowledging that many informal sector actors struggle to obtain credit. Since then, credit providers to the informal sector in Kenya have risen steadily. Initially heavily subsidised church-based NGOs were the main providers of credit but this soon changed and more specialised institutions such as the Kenya Rural Enterprise Programme (K-REP) and Kenya Women's Finance Trust (KWFT) emerged in the early 1990s, the microfinance industry was initiated with most of Kenya's credit providers adopting a basic Grameen style approach. However, penetration of credit services delivered by specialised microfinance institutions remained limited well into the mid-2000s and households continued to rely on merry-go-rounds, family and friends, Savings and Credit Cooperative Societies (SACCOs) and church groups for their financing needs (Hulme et al, 1999, also Shipton, 2010). This rapidly changed with the event of the digital finance revolution led by the establishment of M-PESA in 2007. The nominal rate of financial inclusion has risen from 26.7% in 2006 to 82.9% in 2019 (FSD Kenya, Central Bank of Kenya and Kenya National Bureau of Statistics, 2019: p.8). As of 2017, Kenya's microfinance industry has 13 microfinance banks with well over 7 million borrowers (Central Bank of Kenya, 2018, Association of Microfinance Institutions, 2018) and especially digital finance is now pervasive with at least one individual in 96% of Kenyan households using digital

financial service providers such as M-PESA reducing poverty as a result (Suri and Jack, 2016). Figure 7 supports these arguments and illustrates how access to financial inclusion has changed over time, resulting in near universal access to formal finance in the mid- to late 2010s.

Figure 7: Access to financial services



Source: Authors calculations. FinAccess data 2006 – 2018.

However, doubts have arisen over the efficacy of financial inclusion as the silver bullet (c.f. Kabeer, 2005) to achieve improvements in key well-being indicators (Duvendack and Mader, 2019), especially in Sub-Saharan Africa (Stewart et al, 2010), or in regard to women's empowerment (Vaessen et al, 2014). In the Kenyan context, dramatic falls in fertility from the 1970s to the mid-1990s occurred without financial inclusion. The

decline may have been interrupted by stagnation of fertility in the mid-1990s and early 2000s (Askew et al, 2017) at a time when financial inclusion was starting to expand. The resumption in fertility decline in the mid-2000s occurred at the time that (nominal) financial inclusion was rising rapidly. Superficially, these trends may qualify the naïve narrative that suggests that financial inclusion universally has positive effects on fertility preferences via women's empowerment.

As argued above, financial inclusion promotes enterprise thereby raising incomes and consumption, and empowers women by raising the resources they control, exposing them to modern influences, and facilitating collective action, which, together may raise their bargaining power within households. This account of the ways of measuring and advancing women's empowerment and its beneficent effects is widely repeated, for example recently by Alkire et al (2012), but also strongly criticised (Okali, 2011, 2013). While, generally, but not always, increased incomes could increase demand for children, any increased work, perhaps in financial inclusion supported enterprises, especially of women, might offset income effects by raising the opportunity cost of female time and increasing their bargaining power relative to more pro-natalist members of their household (Buttenheim, 2006; Desai and Tarozzi, 2011). Rising demand for "quality" (education) may also substitute for "quantity" of children income effects in household. Furthermore, financial inclusion exposes women to modernising influences which may well alter tastes for the number and quality of children (and their sex) as well as demand for non-traditional goods as substitutes for

children. In other words, the direction of the impact of financial inclusion on fertility is unclear (Desai and Tarozzi, 2011). Increased household incomes and income under female control, together with their empowerment may reduce foetal, infant and child mortality, because of a shift in expenditure patterns to more mother and child friendly patterns (Lundberg and Pollak, 1993), also reducing demand for births as more pregnancies are expected to result in viable children.

Notwithstanding the apparently strong theoretical associations between financial inclusion and empowerment and empowerment and fertility, these studies report contradictory findings. The failure to find strong and robust empirical relationships between these variables casts doubts on the logic of the empowerment chain of causation which is supposedly directionally unambiguous. Of course, there may be offsetting income effects, but even these are not unambiguously positive. Nevertheless, the logic of a causal relation between fertility reduction, women's empowerment and financial inclusion seems so strong that absent empirical evidence of such an association must cast doubt on at least one, if not both links in this causal chain. Either there is no link between financial inclusion and women's empowerment, or, between women's empowerment and fertility, or neither.

We discuss our empirical strategy, data sources and measurement issues in subsequent sections, and attempt to test key link in the causal chain to understand the underlying mechanisms of how financial inclusion can potentially cause women's empowerment and how this can affect fertility decisions in the context of Kenya.

Data and measurement challenges

Data

Our analysis is based on a range of nationally⁶ representative surveys, the WFS of 1977-78, the KDHS (1989, 1993, 1998, 2003, 2008 & 2014), Kenya Census (1962 and 1999) and FinAccess surveys (2006, 2009, 2013, 2016 and 2018). We also make use of the data sets accompanying Jedwab et al (2017). The KDHS survey data sets, contain birth histories of representative samples of women, which can be used to compute fertility (number born and number alive); the data on respondent and household characteristics, specifically empowerment and financial inclusion and or use, differ considerably. FinAccess survey data are used to complement the KDHS data where necessary, discussed below⁷. These data sets separately, and in conjunction, have many limitations for our purpose.

Measurement

We describe below some measurement challenges we have faced while attempting to unpack the causal relationships between financial inclusion, women's empowerment and fertility.

Fertility measurement: It is well known that fertility cannot be measured accurately largely due to poorly administered questionnaires; Schoumaker (2011) argues that enumerators may drop or shift births to make additional sections of questionnaires for recently born children more manageable. There is some evidence of birth omissions and displacements of births in the KDHS. Fertility estimates from census abstract data

are thought to be unreliable, particularly only reporting total number of children born, not their dates of birth, and under reporting recent births (Moultrie et al, 2013). We combine estimates over the longer periods attempting to reduce errors that may be introduced by omissions or shifting of recent births.

Women's empowerment measurement: The diversity in conceptualizing women's empowerment makes it notoriously difficult to measure. Commonly, scales are derived from answers to survey questions which are usually used to measure the different dimensions of empowerment. However, these answers are self-reported answers mediated by the interviewer and the survey instrument (the location in the questionnaire and wording of the question, and so on). Such instruments can be subject to a number of cognitive and response biases. The DHS surveys are examples of the instruments used to assess empowerment, e.g. numerous authors have used DHS data to measure empowerment and its correlates, often in different ways⁸. Some of the most commonly used questions in these studies relate to the acceptability of wife beating, decision making within the household, ability to go outside the house, and use of media. The acceptability of wife beating questions are dichotomous (1 = yes, not otherwise) ask in relation to infidelity, neglect of children, poor cooking, arguing with husband, going out without permission. The decision making questions are generally polytomous, from no role through joint to sole role in decision making, resulting in scales derived from principal component analysis or multiple correspondence analysis. Many, especially feminist, researchers argue that women are

more empowered when they have sole decision-making power in the household. However, Carter (2002) provides an example from Guatemala showing that women who have sole decision-making power are often pitied. Supportive husbands are now widely considered vital in improving well-being outcomes for women and thus it is important to measure decision-making in such a way that it represents the voices of both husband and wife (Carter, 2002; Story and Burgard, 2012). Mobility questions are also generally polytomous (not allowed, allowed accompanied, allowed unaccompanied). Generally, or at least in the DHS, the questions are asked sequentially. It should also be noted that empowerment questions in the DHS surveys have been influenced by how empowerment is understood in South Asia. E.g., women's autonomy in South Asia is restricted by purdah which may not apply to Sub-Saharan Africa. This begs the question as to how relevant these variables are for the African context especially when it is widely understood that context-specific gender systems shape notions of empowerment (Schatz and Williams, 2012; Kishore, 2005). A recently proposed and simplified index of empowerment, called SWPER, has been trialled by Ewerling et al (2017) using DHS data from 34 African countries. There are these variables in the last three KDHS (2003, 2008 and 2014) which are commonly used to address women's empowerment. Following Ewerling et al (2017), we use principal component analysis where 15 survey questions on empowerment are used to estimate principal components; we retain the first three components which, as in Ewerling et al

(2017) seem to reflect attitude to acceptability of violence, social independence, decision making⁹.

Financial inclusion measurement: Common measures of financial inclusion include amount and timing of borrowing, usage of financial services and products, changes in access to financial services and products (e.g. Suri and Jack, 2016). KDHS 2014 has a single variable (“has a bank account”); FinAccess surveys have more extensive access and usage of financial products variables but lack variables on household demography; we use the “access” variable constructed by the survey organisation.

Results and discussion

Proximate “causes” of fertility

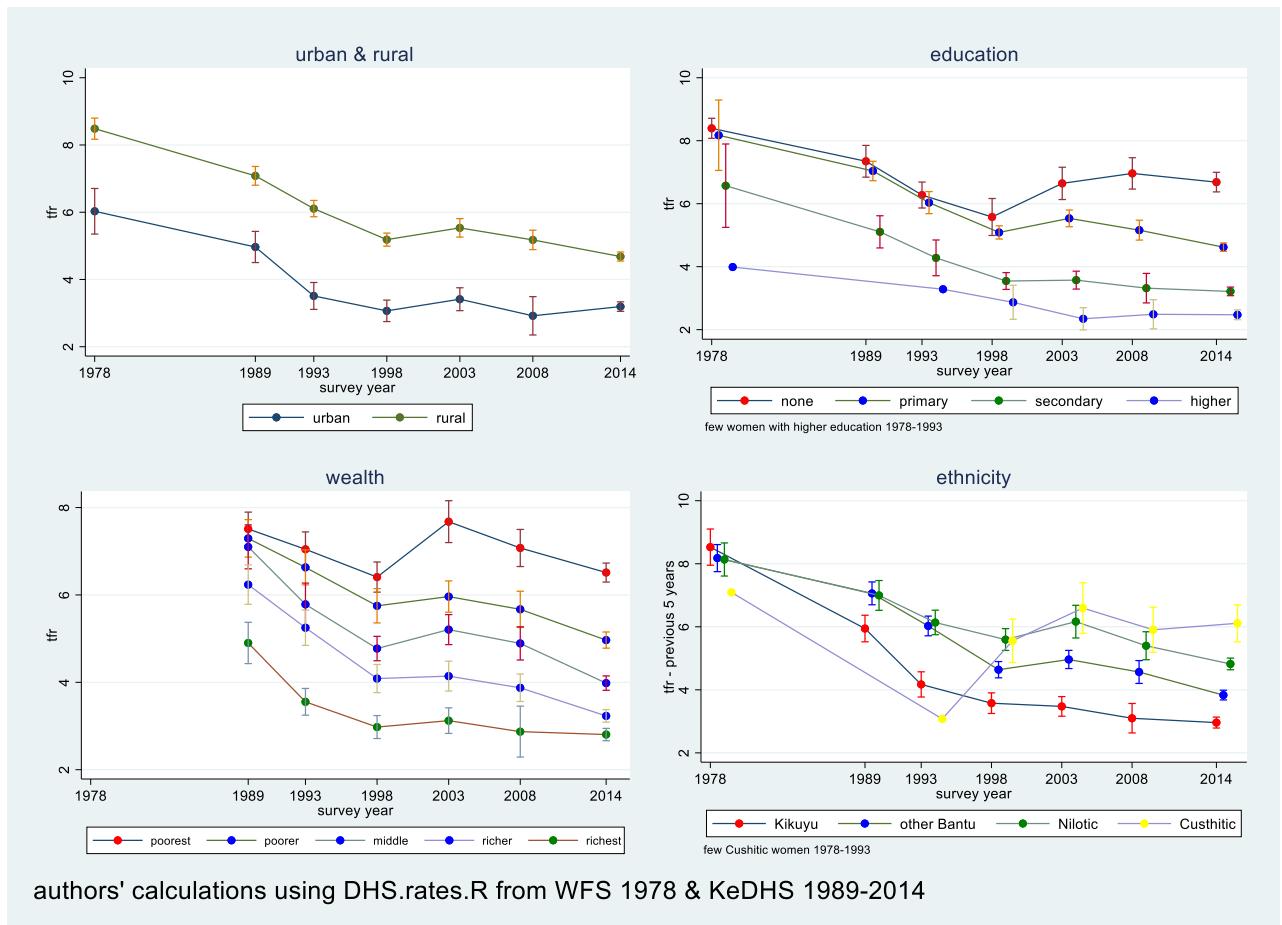
Our analysis attempts to understand the first phase of fertility decline in terms of the proximate and underlying factors and to assess whether these could account for the three phase of fertility decline (decline, stagnation, and resumption), and their association with women’s empowerment, or whether other factors, especially financial inclusion played a role in the later phase.

Education and employment, both associated with urbanisation, are the most prominent variables associated with fertility and empowerment (Balk, 1994; Mason, 1986; Upadhyay et al, 2014; Woldemicael, 2009), but these are only proximate correlates since they themselves are “caused” by other, underlying variables. Thus we show that education, employment, and urbanisation are plausibly causally related along with wealth and ethnicity, to colonial impacts, proxied by distance to loci of

colonial presence including railways, urban centres and white settlements. This implies that at least the first phase of fertility decline was “caused” by colonialism; however, unlike Jedwab et al (2017), we cannot identify these effects since the data do not allow us to construct a pseudo-panel of fertility by location over an extended period¹⁰.

Thus our ability to disentangle relationships among urbanisation, education, employment, wealth, ethnicity and fertility at different points in time is limited. KDHS data do not provide us with adequate employment information¹¹, hence, although we include the variable “whether employed in the last year” in the principal component analysis, we cannot further examine the role of employment. Figure 8 below summarises these proximate correlates of fertility and how they evolved over time drawing on KDHS data.

Figure 8: Proximate “causes” of fertility over time



Source: Authors calculations. WFS 1977-78, KDHS 1989 – 2014. Notes: No data for wealth available for 1978.

Urbanisation: Figure 8 shows that fertility levels for the rural population are higher than those for the urban and that TFRs have declined for both rural and urban dwellers. Rural fertility rates are consistently above urban from the 1970s, but the gap may have declined recently. Both show increases in fertility between 1998 and 2003 reflecting the fertility stalling reported earlier.

Education: As suggested by the literature, (e.g. Askew et al, 2017; Odwe, 2015; Odwe et al, 2015), Figure 8 above confirms that TFRs among the most educated women was relatively low, around 4 in 1978, and had fallen to around 3 by 1998, but did not decline

further up to 2014. Fertility is highest among women with no, or only primary education; their TFR declined from approximately 8 to 6 in 1998, then rising again to close to 7 in 2003 before starting to decline again.

*Wealth*¹²: A similar pattern can be observed for differences in fertility between poorest (most fertile) and richest (least fertile), with increases in fertility among the poorest to middle wealth groups and stagnation among the richer and richest groups between 1998 and 2008 (see also Askew et al, 2017; Odwe, 2015 among others).

*Ethnicity*¹³: Ethnicity as a correlate of fertility is underexplored, but it may be important for several reasons; as noted above; ethnic dominance may lead to privileged access to services such as family planning (Weinreb, 2001) which enables families to better implement fertility preferences. Fulfilling these fertility preferences could themselves be facilitated by access to education and or urbanisation, and or may be promoted by greater economic well-being (i.e. wealth) and poverty reduction also consequent on access to valued services. On the other hand, ethnic competition may lead to pronatalist sentiments if ethnic dominance is associated with relative population size (or growth) (Goliber, 1985). Figure 8 above shows that the TFR for the Kikuyu was no different to that of other ethnic groups in 1978, but fell more rapidly and to lower levels from 1993 onwards. While Figure 5 suggests a strong reversal in fertility among the Kikuyu¹⁴ during the period of national fertility stalling, Figure 8 suggests that it was among the other groups that fertility actually rose while that of the Kikuyu only stalled in that period (as indicated by Figure 5¹⁵). Fertility is highest among the Cushitic and

Nilotic groups; Cushitic, Nilotic and other Bantu groups on average resided further away from colonial infrastructure and settlements (discussed further below in more depth, also see Tables 4 and 6) and hence we would expect their fertility rates to be higher than those of the Kikuyu as indicated in Figures 5 and 8.

The analysis thus far has indicated that factors conventionally seen as playing significant roles in demographic transitions – urbanisation, education, and economic development (e.g. wealth) – have played significantly roles in explaining the three phases of fertility decline – decline, subsequent stalling, and resumption of decline. In addition to these variables we have identified ethnicity as strongly associated with each phase and alluded to the importance of living in proximity to colonial infrastructure. As many studies (e.g. Hindin, 2000, Story and Burgard, 2012) have suggested that fertility is linked to the status of women in society, we now turn to exploring the role of women's empowerment and its relationship to fertility, ethnicity and colonial legacies before integrating the financial inclusion discourse into these discussions.

Women's Empowerment

We use the SWPER index (Ewerling et al 2017) to explore women's empowerment and its relationship to the proximate "causes" of fertility in more depth. To recap, the SWPER index comprises variables relating to three domains of empowerment: attitudes to domestic violence (acceptability of beating women); social independence (reading of newspapers, education age of first birth and first cohabitation, recent

employment, and age and education difference between partners); and participation in decision making¹⁶.

Examining these three domains of empowerment by level of educational attainment and rural location, we see that in the years 2003 to 2014 more educated women had higher scores on the (un)acceptability of being beaten by their husbands, and on the social independence component. The results for participation in decision making are less clear cut (Table 1 below).

Table 1: SWPER index - empowerment components, educational attainment, and rural location

Educational Attainment	2003			2008			2014		
	Acceptability of beating	Independence	Decision-making ¹	Acceptability of beating	Independence	Decision-making	Acceptability of beating	Independence	Decision-making
None	-1.303*** (0.000)	-0.479*** (0.000)	0.511*** (0.000)	-0.702*** (0.000)	-1.148*** (0.000)	-0.115* (0.093)	-0.702*** (0.000)	-1.150*** (0.000)	-0.165** -0.015
Primary	0.081 -0.218	-0.061 -0.237	0.166*** -0.003	0.070 (0.181)	-0.164*** (0.000)	0.022 (0.593)	0.069 -0.182	-0.165*** (0.000)	0.01 -0.787
Secondary	1.695*** (0.000)	0.305*** (0.000)	-0.226*** (0.000)	1.185*** (0.000)	0.511*** (0.000)	0.233*** (0.000)	1.179*** (0.000)	0.501*** (0.000)	0.242*** (0.000)
Higher	3.259*** (0.000)	0.891*** (0.000)	-0.554*** (0.000)	2.263*** (0.000)	0.891*** (0.000)	0.821*** (0.000)	2.265*** (0.000)	0.879*** (0.000)	0.872*** (0.000)
Rural	-0.466*** (0.000)	-0.006 -0.907	-0.100* -0.076	-0.514*** (0.000)	0.080** (0.039)	-0.153*** (0.001)	-0.512*** (0.000)	0.087** -0.035	-0.143*** -0.001
N	4477	4477	4477	5041	5041	5041	8195	8195	8195

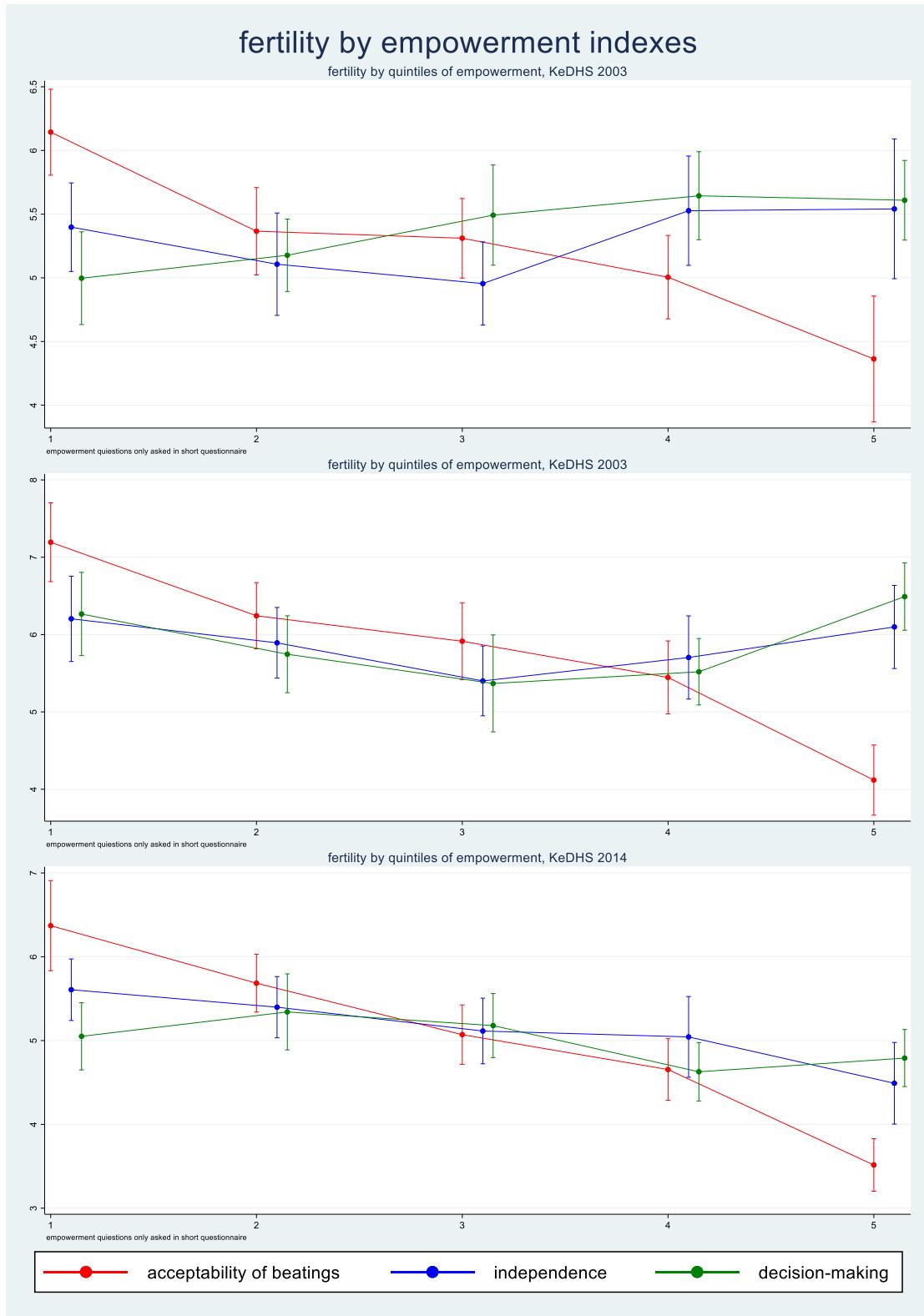
Source: Authors OLS calculations from KDHS 2003-2014. t-statistics in parenthesis.

Note: ¹ the ‘participation in decision making’ index in 2003 seems unreliable; values for the less educated are larger for the less than the more educated. This is questionable as it is both counter-intuitive and not consistent across surveys.

Empowerment and fertility

Figure 9 shows how these different domains of empowerment are related to fertility; those most likely to reject acceptability of beatings have lower fertility than others, and those for whom beatings are most acceptable have higher fertility. The other dimensions of empowerment have no clear relationship with fertility.

Figure 9: Fertility by quintiles of empowerment



Source: Authors calculations (with imputations of missing values of age at first marriage, age at first birth, and difference in age between respondent and partner), KDHS 2003-14.

Examining the links between women's empowerment and fertility further in a multivariate context, Table 2 reports multivariate analysis of the KDHS data; it shows that fertility was somewhat lower among those reporting higher participation in decision making, different from the single variable analysis reported in Figure 9, compared to the other two domains of empowerment which were statistically not significant. Otherwise the results are consistent with the single variable analyses.

Table 2: Relative fertility by dimensions of direct and indirect empowerment, 2014

Dimensions of empowerment	Fertility rate ratio
Acceptability of beating	1.002
Social independence	1.023
Participation in decision making	0.960***
Rural	1.234***
Highest Educational Attainment: Primary	0.764***
Highest Educational Attainment: Secondary	0.686***
Highest Educational Attainment: Higher	0.567***
Employed in last year	0.873****
Has bank account	0.795***

Source: Authors calculations. KDHS 2014. * p<0.05, ** p<0.01, *** p<0.001.

Empowerment and ethnicity

The findings so far suggest that more educated women are likely to be more empowered and more empowered women are more likely to have lower rates of fertility. Table 3 below tests whether empowerment is associated with ethnicity.

Table 3: SWPER index - empowerment components, ethnicity and rural location

Ethnic Group	2003			2008			2014		
	Acceptability of beating	Independence	Decision-making	Acceptability of beating	Independence	Decision-making	Acceptability of beating	Independence	Decision-making
Kikuyu	1.299*** (0.000)	0.400*** (0.000)	0.211*** (0.000)	1.211*** (0.000)	0.206*** (0.000)	0.436*** (0.000)	1.218*** (0.000)	0.211*** (0.000)	0.462*** (0.000)
Other Bantu	0.670*** (0.000)	0.026 (0.577)	0.077* (0.061)	0.714*** (0.000)	0.319*** (0.000)	0.122*** (0.006)	0.702*** (0.000)	0.292*** (0.000)	0.102** -0.02
Nilotic	0.394*** (0.000)	0.159*** (0.007)	-0.044 (0.408)	0.354*** (0.000)	0.013 (0.827)	0.089* (0.069)	0.346*** (0.000)	0.01 -0.882	0.076 -0.126
Cushitic	-0.701*** (0.000)	-0.016 (0.837)	-0.471*** (0.000)	-0.379** (0.010)	-0.423*** (0.000)	-0.237*** (0.000)	-0.389*** -0.009	-0.433*** (0.000)	-0.269*** (0.000)
Rural	-0.956*** (0.000)	-0.204*** (0.000)	-0.095** (0.025)	-0.899*** (0.000)	-0.209*** (0.000)	-0.242*** (0.000)	-0.893*** (0.000)	-0.196*** (0.000)	-0.237*** (0.000)
N	8155	8155	8155	5041	5041	5041	8195	8195	8195

Source: Authors OLS calculations from KDHS 2003-2014. t-statistics in parenthesis.

We find that the Kikuyu are generally more empowered in terms of all three of the indexes (especially the (un-)acceptability of being beaten, but also for social independence, and participation in decision-making), than other groups. The other Bantu groups are generally more empowered than the Nilotic, while women from the Cushitic groups are least empowered (Table 3). The Kikuyu also have lower fertility rates than the other ethnic groups (discussed earlier, see also Figures 5 and 8), with the Nilotic and the Cushitic having higher fertility rates than the Kikuyu - see Figure 8 (and acceptability of beatings). It is not clear whether the higher values on empowerment indexes among the Kikuyu reflect underlying cultural (or geographic) characteristics or greater exposure to modernising influences.

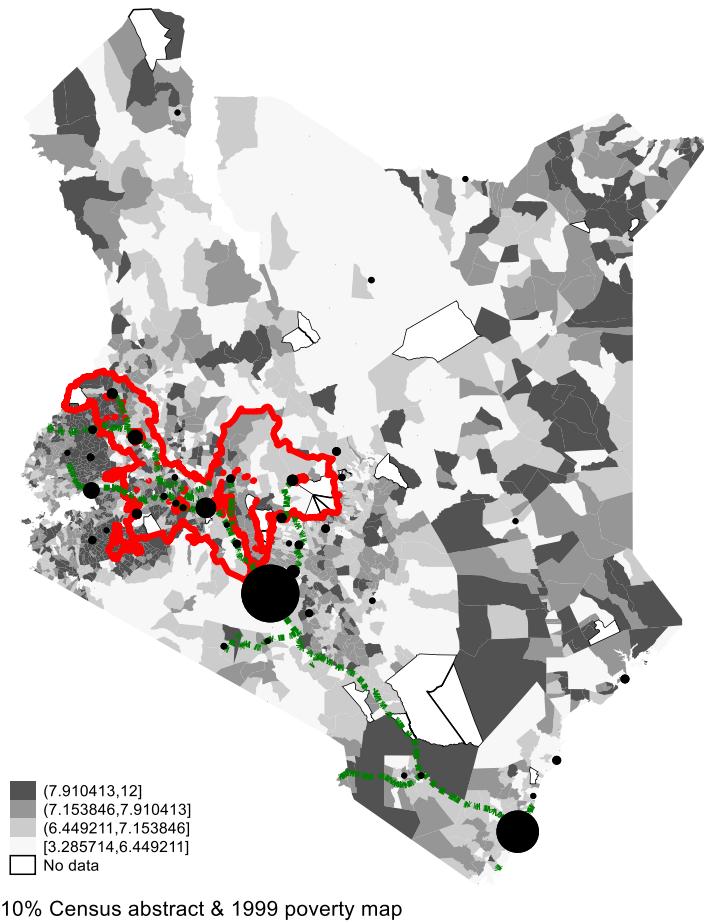
Colonial legacies

Previous sections have enhanced our understanding of the way fertility evolved over recent decades drawing attention to the evidence suggesting that urbanisation, education, employment and being Bantu, especially Kikuyu, is associated with lower fertility. Casual observation and historical understanding makes it clear that at least in the first two phases of fertility decline – up to 2003, these “proximate causes of fertility” would have been strongly associated with the influence of colonialism.

To illustrate these connections, we use census data from 1999 to strengthen the arguments made above, namely that fertility decline among the African population was associated with urbanisation and education, two important proximate “causes” of fertility, which in turn were associated in the early years of fertility decline with

proximity to colonial infrastructure and settlement, specifically distance from the railway lines (see Figure 10 below).

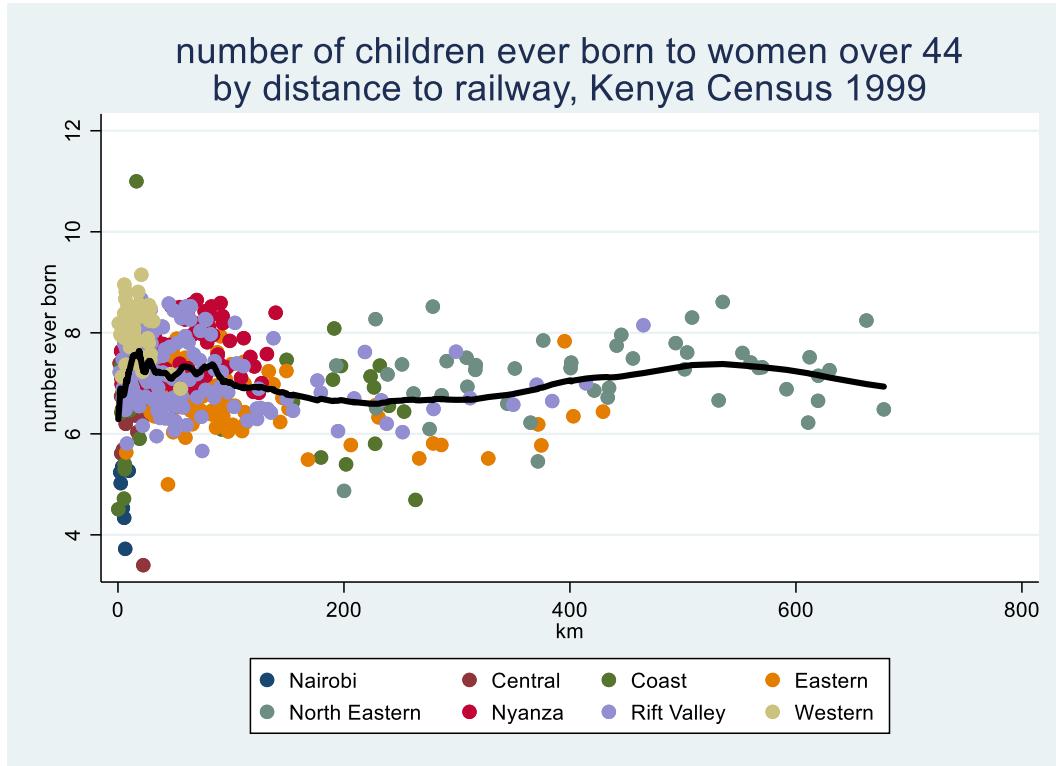
Figure 10: Number of children¹⁷ and colonial infrastructure
Number of children ever born, Kenya, 1999



Source: Authors calculations. Notes: Red solid line = Boundaries of White Highlands, Green dotted line = Railways, Black dots = Towns in 1999. Kenya census abstract 1999.

As expected, Figure 10 indicates that the number of children ever born were lower near colonial settlements (light shaded grey areas) and the more fertile locations were further away (dark shaded grey areas). This is confirmed by the lowess¹⁸ plot of the number of children ever born to older women by distance to railway, i.e. the lowest number of children in divisions¹⁹ closest to the railway (Figure 11).

Figure 11: Number of children ever born to women over 44 by distance of division to railway



Source: Authors calculations. Kenya census abstract 1999.

To recapitulate, earlier rounds of KDHS data prior to the 2000s show that lower levels of fertility were most obvious in urban areas, for those with higher education and more wealth while those with primary education were more fertile, but there were small differences among ethnic groups including the Kikuyu. Since the late 1970s, fertility has declined especially for the Kikuyu and other Bantu groups but less so for the Nilotic group. By the 2014 KDHS we find that the Kikuyu score higher on nearly all proximate correlates of fertility decline, and they were also more likely to be closer to railways which date from the colonial period (Table 4).

Table 4: Summary statistics for proximate “causes” of fertility by ethnicity

Ethnicity	Proportion urbanised	Mean years of education	Proportion currently working	Mean wealth score	Relative average distance to railway		
					2003	2008	2014
Kikuyu	0.55	9.97	0.71	9.0275	1	1	1
Other Bantu	0.40	8.78	0.64	3.2522	3.05	3.47	3.11
Nilotic	0.30	7.92	0.58	1.173	3.76	3.33	3.98
Cushitic	0.46	2.92	0.15	-2.6249	15.86	19.80	17.73

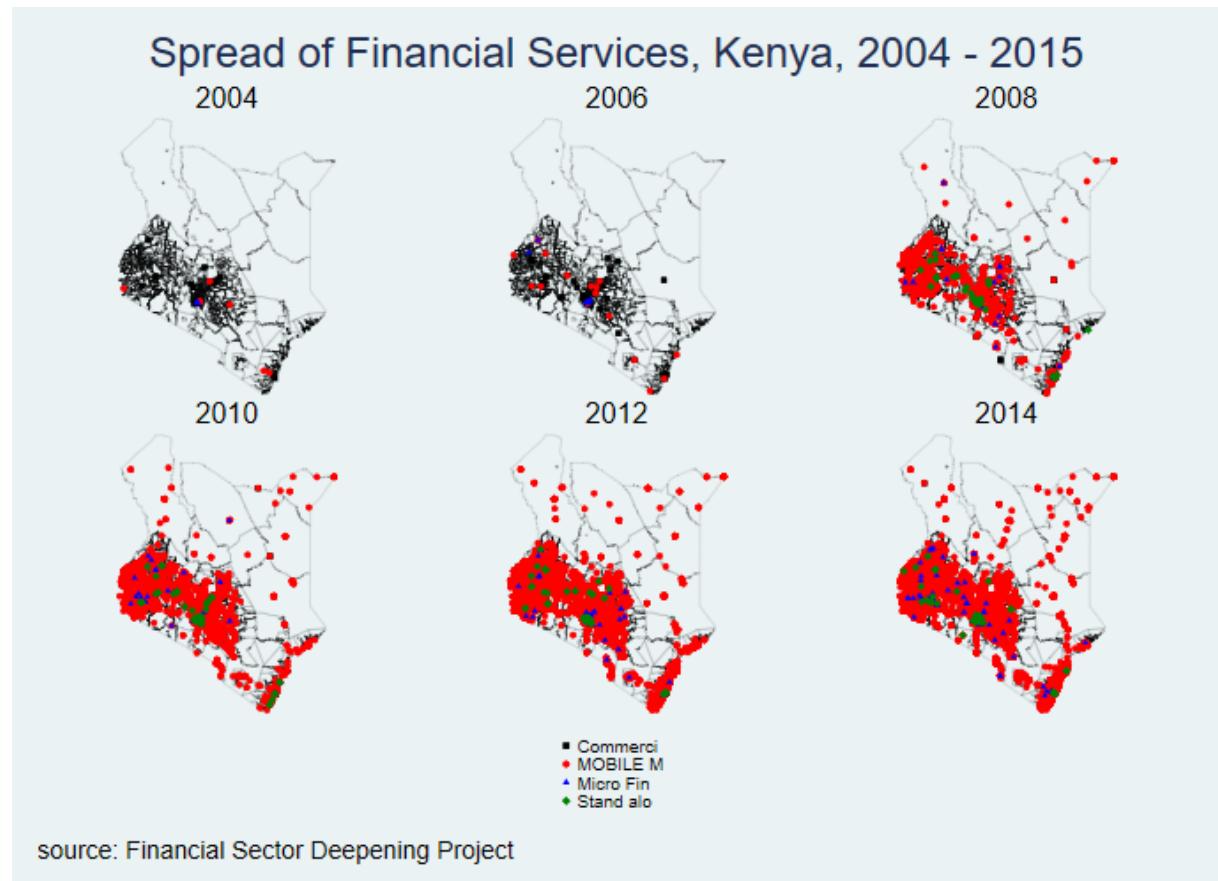
Source: Authors calculations. KDHS 2003, 2008 and 2014.

As shown in Table 4, the Kikuyu were more likely to have primary, secondary or higher education (we show mean years of completed education) than other Bantu or Nilotic groups. Those having worked after marriage had lower fertility (and were more likely to be educated and live in urban area). Unwanted fertility²⁰ was low in urban areas, among those with secondary and above education, and among the higher wealth quintiles. Since we do not have GPS data or small area codes for most of the KDHS or Kenya census extracts data (except for the KDHS 2003, 2008 and 2014, and 1999 census abstract), we can make only limited use of these data to explore further the relation of fertility in this survey to proximity to colonial infrastructure (other than the already established importance of proximity to the railways for urbanisation and education (Jedwab et al, 2017); we have demonstrated the evident lower fertility of those closest to colonial infrastructure), and the greater proximity of Kikuyu and Kikuyu dominated locations to colonial infrastructure²¹. The missing link in our discussions so far is the relationship of fertility and its correlates (including ethnicity and colonial legacies) to financial inclusion which we explore in the next section.

Financial inclusion, colonial legacies and ethnicity

Early stages of financial inclusion were associated with proximity to the same transport and urban locations established in the colonial era. This can be demonstrated by data on the timing and location of banks and other institutions up to the early 2000s (see Figure 12). However, mobile money outlets, which have spread mainly since the early 2000s follow a slightly different spatial pattern being more associated with the road network which developed largely since decolonisation (see Figure 13 below).

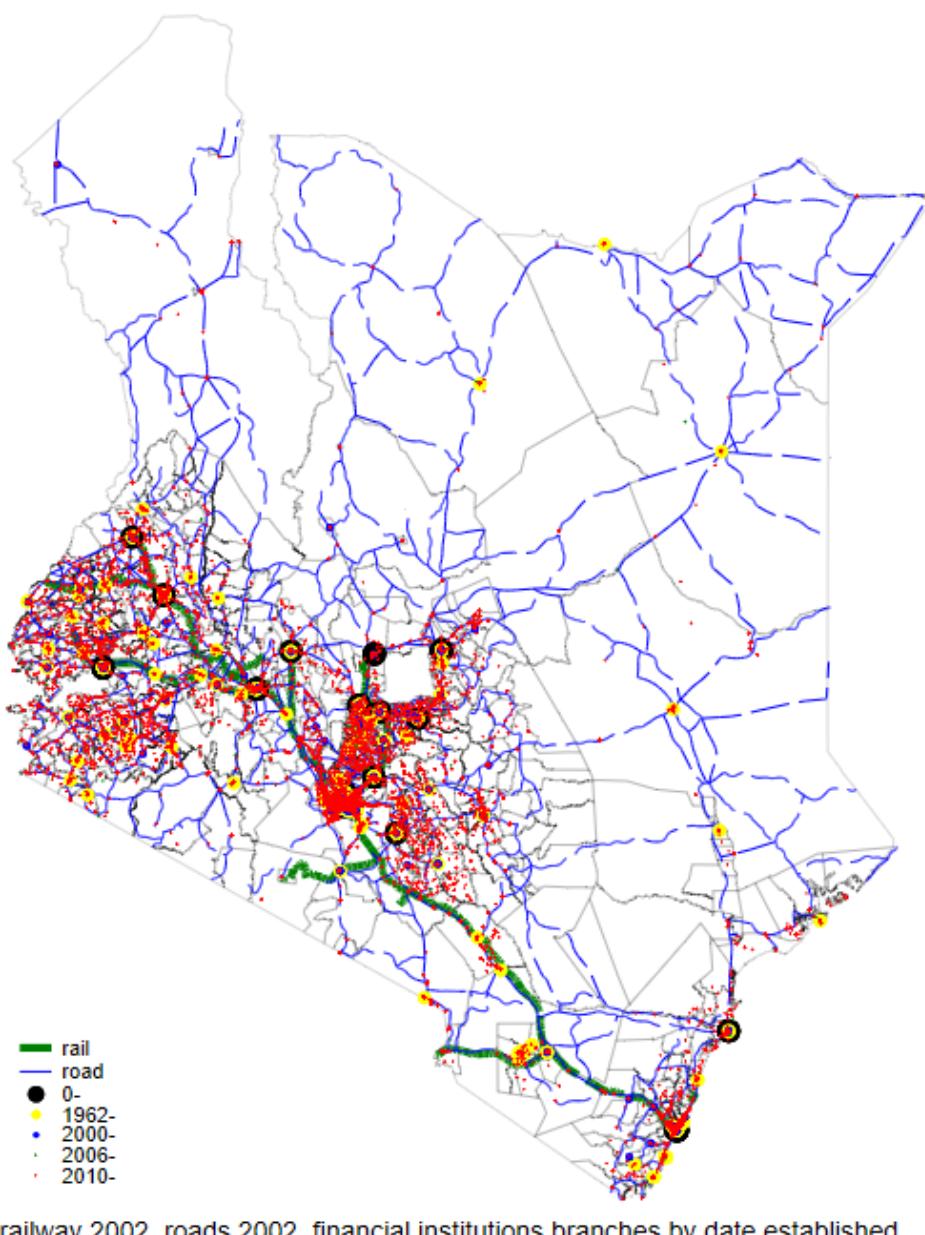
Figure 12: Spread of financial services (mobile money outlets) from 2006-2014



Source: Financial Sector Deepening project and authors calculations.

Thus, while up to about 2005-06 financial service providers such as commercial banks and other formal financial organisations were largely located in established towns, the mobile money outlet locations were more likely to spread along the road network as indicated by Figure 13.

Figure 13: Colonial infrastructure and financial institutions



Source: Financial Sector Deepening project and authors calculations.

We do not have geographically detailed information on access to or use of formal and informal financial services (commercial banks and other financial organisations)²²; however, we can use 2014 KDHS data²³ which has a proxy variable for financial inclusion²⁴ and a GPS location variable²⁵ which allows us to relate financially included households to their distance from the railway. While the data relate to quite a late stage in the spread of financial services, and refer to only one measure of such access (i.e. having a bank account), the results confirm that having a bank account is less likely as distance from the railway increases (see Table 5). The further away from railways a household lives, and whether living in a rural location, the less likely they are to have a bank account.

Table 5: Financial inclusion (“has bank account”) by distance from railway

	(1)	(2)
	Has bank account	Has bank account
0-9 km	0	0
	(.)	(.)
10-19 km	-0.00673	-0.0584
	(-0.15)	(-1.03)
20-29 km	-0.108*	-0.135*
	(-2.16)	(-2.11)
30-39 km	-0.221***	-0.217**
	(-3.94)	(-2.89)
40-49 km	-0.379***	-0.250**
	(-6.71)	(-3.22)
50-100 km	-0.334***	-0.0395
	(-8.11)	(-0.64)
100 - 250 km	-0.554***	-0.272***
	(-16.51)	(-6.12)
250-500 km	-1.057***	-0.148**
	(-28.79)	(-2.91)
> 500 km	-0.754***	-0.217
	(-6.85)	(-1.08)
Rural		-0.573***
		(-7.61)
Education (in single years)		0.134***
		(58.23)
N	31013	31013

Source: Authors calculations. KDHS 2014. t-statistics in parentheses. * p<0.05, ** p<0.01, *** p<0.001.

Notes: 0-9km is the base category hence 0.

We continue to draw on 2014 KDHS data showing that fertility among those women who live in households with a bank account is lower than for those without a bank account (as already indicated by Figure 2), among those in urban areas, with education, in higher wealth groups, and among the Kikuyu, and other Bantu groups. Table 6 shows that those households classified as Kikuyu were more likely to be

financially included than other ethnic groups, and had shorter distances to railway lines than other ethnic groups.

Table 6: Financial inclusion (“has bank account”) and relative average distance to railway by ethnic group

Ethnicity	Has bank account (in %)				Relative average distance to railway
	No	Yes	Don't know	Total	
Kikuyu	29.63	69.64	0.73	100.00	1.00
Other Bantu	51.62	47.52	0.86	100.00	3.11
Nilotic	56.76	42.38	0.85	100.00	3.98
Cushitic	69.77	30.07	0.16	100.00	17.73

Source: Authors calculations. KDHS 2014.

We also find that households with more education were more likely to be financially included, and were more urbanised and lived closer to railways (see Table 7).

Table 7: Financial inclusion (“has bank account”) and distance to railway by educational attainment

Educational attainment	Has bank account (in %)				Relative average distance to railway
	No	Yes	Don't know	Total	
Less than completed primary	0.72	0.27	0.0075	100.00	3.07
Completed primary	0.49	0.050	0.0084	100.00	1.52
Completed secondary	0.27	0.72	0.0104	100.00	1.18
Higher	0.10	0.90	0.0013	100.00	1.00

Source: Authors calculations. KDHS 2014.

Thus, the conventional correlates of demographic transition are all correlated with having a bank account and with proximity to colonial railroads (and towns). Similarly, the Kikuyu have lower fertility and were (and are) both more likely to have bank accounts, have higher values of conventional correlates of demographic transition, and lived in closer proximity to colonial infrastructure. Thus, at least in terms of having a

bank account, colonial legacies clearly play a role. Furthermore, the Kikuyu, according to these metrics, were more likely to have been affected by colonialism, even more than 50 years after independence, and over the course of several post-colonial regimes.

Financial inclusion and fertility via women's empowerment

To recap, the indirect indicators of empowerment – urbanisation, education, employment, wealth – and also having a bank account - are quite strongly associated with lower fertility; however, the conventional direct indicators of empowerment such as the SWPER index show little association with fertility levels. The Kikuyu, who have lower fertility and greater financial inclusion, appear to be somewhat more empowered in disapproving of wife beating than the other ethnic groups (Table 3), but the components thought to represent women's independence and participation in decision-making, while also relatively high among the Kikuyu, other Bantu groups and Nilotics, do not show such a relationship with lower fertility levels (except in a multivariate but non-identified analysis); it is likely that any association of the acceptability of wife beating with lower fertility is because wife beating is less acceptable to Kikuyu who have lower fertility, but this has not been shown to be a causal relationship. However, since the indirect and direct indicators of empowerment and having a bank account are all themselves higher the closer to colonial railways (and towns), it is what determines these variables (education, urbanisation, economic progress) that affects fertility, since they appear as mediating rather than exogenous or moderating variables in the determination of fertility. Thus, in regard to the direct

(empowerment) indicators of fertility, it is more likely that having a bank account is caused by these (and other indirect) indicators rather than a cause of them.

Nevertheless, there has been a rapid expansion in access to financial services in the last decade and a half (as indicated by Figure 7) with the rapid spread of new financial institutions, especially mobile money service providers (e.g. M-PESA). We have largely focused on establishing links between financial inclusion, colonial settlements and ethnicity but whether these influences operate through women's empowerment and how the spread of these new financial organisations might affect these variables, remains largely unexplored. Unfortunately, while FinAccess datasets contain a large set of variables on financial characteristics of respondents, the data available through surveys recording this expansion have limited contextual information, meaning that they can throw limited light on these complex inter-connections; also, these data have very limited information of ethnicity (language of interview²⁶) and only provide information at a coarse spatial resolution (above county level). This prevents a credible attempt to untangle relationships potentially underlying and endogenous variables correlated with financial access and fertility via women's empowerment. The FinAccess surveys provide little information on fertility (only family size) and none on family planning, but there is sufficient information with which to construct a wealth index.

The FinAccess surveys do show that access to formal²⁷ finance providers has increased for the less educated and the poorer groups between 2006 and 2018. In 2006, in the

lowest wealth quintile less than 34% reported access to informal finance and only 3% reported access to formal finance, and 60% were reported as excluded. In 2018, 60% of the poor and those with no or only primary education reported having access to formal (prudential or non-prudential) finance providers and only 25% were classified as excluded. These figures point towards a success story, however, access to formal and or informal finance providers does not entail use of financial services, or use of financial services in ways that are likely to reduce fertility. If we take a closer look at how households use financial products, loans in particular, we find that the main reasons are to cover day-to-day needs (57.3% of respondents in FinAccess 2016) and to pay for education expenditure (21.5% of respondents in FinAccess 2016). This raises questions as to the sustainable impact of financial inclusion on reducing poverty when financial products are for consumption and not for productive purposes²⁸. A systematic review of reviews examining financial inclusion impact (Duvendack and Mader, 2019) finds that the net effects of financial services on especially the poorer households may not be statistically meaningful and that these services (irrespective of access and use) may only be one of many determinants of the socio-economic wellbeing of the poor. If this is the case, along with the lack of spatial and fertility information in the FinAccess surveys, untangling the complex causal relationships between fertility, financial inclusion, direct and indirect indicators of empowerment as well as ethnicity and colonial legacies remains problematic.

Conclusion

We attempted to unpack plausible causal mechanisms between fertility, women's empowerment and financial inclusion. This task was complicated by the unique Kenyan context, e.g. regional, geographic and ethnic differences, pace of urbanisation, uneven economic growth, an HIV/AIDS epidemic, political upheavals, colonial legacies and the late intensification of financial inclusion. All these factors, among others, shape the relationship between fertility and financial inclusion possibly via empowering women. We find that modernisation variables such as urbanisation, education, employment, and wealth, play a significant role in (proximately) explaining fertility trends in Kenya while the role of women's empowerment is less clear. The importance of colonial legacies and ethnic belongings should not be underestimated in terms of enhancing our understanding of changing fertility levels over time. We cannot say with certainty whether financial inclusion "caused" recent changes in Kenya's fertility rates via direct or indirect indicators of women's empowerment, as financial inclusion "boosters" might well have been inclined to assert, based on the simple correlations that we report, or whether advancements in these indicators in fact "caused" the intensification of financial inclusion. The limitations of the data at our disposal did not allow us to say much more about the causal relationships between financial inclusion, fertility and women's empowerment.

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Endnotes

¹ Adapting the terminology for health policy analysis sector, vertical programmes are within-sector, while horizontal programmes attempt to exploit synergies by coordinating programmes across sectors.

² These data sources have many limitations discussed in the empirical sections in more depth, e.g. the sample sizes only allow limited sub-group analysis (for example by ethnic group, or small geographic area), the data have limited socio-economic correlates, and generally neglect men. Limitations to most of the available Kenya census data (including lack of ethnicity and or small area designations), limit the use of through small area analysis to mitigate some of these limitations.

³ Though Kenya formally adopted a family planning policy in 1967, the policy was not actually implemented until the early 1980s, reasons for this gap between adoption and implementation are outlined by Chimbwete et al, 2005 and Crichton, 2008.

⁴ We acknowledge that we perhaps use a contentious classification of ethnic groups in Kenya largely by linguistic group, but separating the Kikuyu from other Bantu speaking groups, however, this allows us to detect the unusual fertility trends among the Kikuyu.

⁵ The colonial railway was initially built to provide ready military access to Lake Victoria which was seen as a key to imperial interests; it so happened that the route passed through or near areas which would become of agricultural interest to settlers from the colonial power, partly through deliberate colonial policies aimed to make the railways pay. The thrust of Jedwab et al (2017) is that towns set up to support and administer first the initial colonial railway and then settler interests had lasting effects on the pattern of urbanisation.

⁶ The early KDHS excluded the North-east of the country.

⁷ We explored the use of Kenya Integrated Household Budget surveys (KIHBS) 2005-06 and 2015-16 but found the variables representing fertility, financial inclusion and indirect indicators of empowerment such as education and employment insufficiently detailed for our purposes. KIHBS does not have a dedicated empowerment module and also no information on ethnicity. The location variables were not sufficiently granular either.

⁸ E.g., Basu and Koolwal (2005) for India and Story and Burgard (2012), Balk (1994) for Bangladesh.

⁹ The questions on acceptability and decision making are particularly likely to invoke normative responses, and are asked at the same point in the questionnaire; hence it is not surprising that they emerge as factors in principal component analysis, multiple correspondence analysis or factor analysis.

¹⁰ Jedwab et al (2017) construct a pseudo panel of urban population for 473 administrative areas in order to identify the impacts of colonial railways controlling for various geographical or pre-existing variables (populations of various ethnic groups; urban population for some 250 (of the 473) areas are regularly reported in the printed reports of the decennial censuses (1969-2009)). This option is not open to us since fertility variables, where available in the census samples cannot be related to administrative areas below counties or equivalent areas, with the exception of the 1999 census, which does not include an ethnic variable. Kenya has employed various administrative area designations that have changed over time. In the most recent change to facilitate the process of devolution, the 2010 Constitution of Kenya sets out a large scale re-organisation where provinces and districts were re-organised into 47 counties. This change came into effect in March 2013. The smallest area for which fertility variables can be estimated is the county giving a potential for some 44-47 observations per census. Because counties are quite large areas (from 205 to 182505km² - from about twice the area of Paris to just under that of Wales).

¹¹ Variables reflecting employment are not well conceptualised in the KDHS; this is partly because much employment of females is on household or own account farming or gathering, and none of the relevant variables seems to reflect a sharp divide between women predominantly involved in these types of work and those who may be involved in “empowering” types of employment – for wages and or in the

formal sector. The variable v731 reporting work in last year is positively correlated with the independence component of empowerment but does not independently affect fertility (results available from authors).

¹² The WFS 1977-78 does not contain information on which to calculate a wealth index. KDHS do not report wealth indexes for 1989 to 1998, for which surveys we compute asset indexes based on multiple classification scores (in preference to principal components scores) using the household assets reported in those surveys.

¹³ We classify the ethnic groups reported in the WFS and KDHS along conventional ethno-linguistic lines in Bantu, distinguishing Kikuyu as the nationally most numerous among the Bantu, Nilotic, merging Eastern, Southern and Western Nilotic groups, and Cushitic groups (Greenberg, 1948). Such a classification encounters problems with some relatively small groups which are either outside these groups, or are groups of mixed ethnic heritage (former slaves, and so on).

¹⁴ There are insufficient number of Cushitic people in 1977-78 WFS and KDHS 1989 which were not conducted in the regions of Kenya where these groups predominate. There are also few Cushitic in KDHS 1993.

¹⁵ Figure 8 reports fertility only for the five years prior to the survey date, while Figure 5 reports annual fertility for the 15 years prior to the survey. Error bars for Cushitic are suppressed in 1978-1993 in order to reduce the range of TFR levels – y-axis – for legibility.

¹⁶ Many variables in the SWPER index were only asked of some households (these questions were asked only in the short questionnaire to the small sample of ever married women, and in the man's questionnaire).

¹⁷ To women aged 45 and above.

¹⁸ Locally Weighted Scatterplot Smoothing to show the relationship between fertility and proximity to colonial infrastructure more clearly.

¹⁹ In the 1999 census, Kenya was divided into 8 provinces which were divided into 69 districts and further subdivided into 497 divisions. This administrative set up changed under the 2010 Constitution.

²⁰ Calculated using DHS Stata code from Github modified by the authors, as the difference between all and wanted fertility.

²¹ This is the “average” distance of a location where the predominant group is Kikuyu – as derived by Jedwab et al (2017), from the Murdock map (1959) of ethnicities - from the line of rail or nearest railway station (1938). Using the KDHS 2014 GPS locations we find that Kikuyu households are closer to colonial infrastructure. Location where the proportion of the African population is Kikuyu is high is closer to railways than where the proportion of Kalenjin is high. We cannot use other data sources such as the censuses since, none contain both location and ethnicity variables.

²² The FinAccess surveys only report county as the smallest identifiable location; as there are only some 47 counties there are not really enough data points to conduct spatial analysis.

²³ Given the problems associated with all the other data sources, only the KDHS data of 2014 includes variables linking fertility, empowerment and financial inclusion. This survey includes a single variable representing financial inclusion, having a bank account. All the other data sources lack one or more relevant variables. The possibility of a pseudo panel or cross section using spatial data is not possible because the financial inclusion and other data sources cannot be combined at a low enough spatial resolution. Even the county, of which there are too few for sensible multi-variate analysis (44-47), is too small an area for the financial inclusion data. It is interesting that the 10% sample from the Kenya censuses has too few observations at location level (400-2400) for sensible analysis of fertility (from census data – fertility from census data has to be estimated from the total number of births by age group, rather than birth histories, and there are too few women in many age groups in many locations to provide sensible estimates of fertility).

²⁴ The data have a variable called “Has bank account” while we agree it is an imperfect proxy of financial inclusion, it is the only variable we have allowing us to link financial inclusion to fertility and women’s empowerment. Having a bank account also does not say much about ‘use’.

²⁵ Note that the GPS position reported is not the true location of the household but has a random distance added to prevent identification of interviewed households.

²⁶ In FinAccess 2006, predominantly Swahili was the main language of interview for the unbanked, and English (and Swahili) for the banked. In FinAccess 2013, Swahili was the main language of interview for the unbanked and banked, followed by English and Kikuyu for the ‘formally banked’. From the variable ‘main language used for interview’ we cannot infer the ethnic group which makes it a poor proxy for ethnicity.

²⁷ FinAccess surveys 2006 and 2009 use 4 categories for access to finance: Formal, Formal other, Informal, Excluded. FinAccess surveys 2013, 2016 and 2018 adopt a more refined classifications for formal finance: 1. Prudential, 2. Non-prudential, 3. Registered in addition to Informal finance and Excluded as a separate categories as before.

²⁸ Although it is possible that expenditure on consumption, or indeed leisure, can be productive in contexts of poor health and or fatigue.