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Keywords: Institution, Democracy, HIV, Health, Kenya

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Does democracy reduce the HIV epidemic? Evidence from Kenya*

Antoine Marsaudon† Josselin Thuilliez‡

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Abstract

Does democracy help Kenyan citizens to struggle against the HIV epidemic? Yet, very little attention has been devoted to establish whether political regimes react differently to the HIV infection. Using an electoral definition of democracy makes a contribution in understanding which aspects of political rules matter to manage the disease. Using a difference-in-difference design that draws upon pre-existing variations in HIV intensity and cohort's exposure to democracy, we find that a person living under democracy is less likely to have a HIV infection. Further, we present some evidence of ethnic favoritism and gender disparities during periods of non-democracy.

Keywords: Institution, Democracy, HIV, Health, Kenya.

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1 Introduction

HIV continues to be a major global public health issue, having claimed more than 34 million lives so far. In 2014, 1.2 million people died from HIV-related causes globally. There were approximately 36.9 million people living with HIV at the end of 2014 with 2.0 million people becoming newly infected globally. Sub-Saharan Africa is the most affected region[1], with 25.8 million people living with HIV in 2014. Also Sub-Saharan Africa accounts for almost 70% of the global total of new HIV infections[2]. HIV/AIDS remains a major concern in Kenya because of relatively high prevalence rates reported among adult population and significantly higher rates among younger ages[3].

This epidemic constitutes an economic and social tragedy. HIV/AIDS has caused increasing mortality, lower life expectancy and slow down human capital accumulation. These had adversely affect growth and development as a consequence (Bonnel (2000); Robalino, Voetberg and Picazo (2002); Gezahegn and Upadhyay (2014)).

Despite these affects, very little attention has been devoted to establish whether political regimes react differently to the HIV infection. This paper proposes to bridge this gap. It improves upon the existing literature in three ways. First, it gives some insights whether democratic or non-democratic regimes[4] had responses differently to the spread of the infection. Second, progress is made concerning our understanding of what features of democracy contribute to impact the HIV infection, which would be infeasible if democracy synthetic scores were used. Third, results indicate that a person living under democracy is less likely to have a HIV infection, and present some evidence of ethnic favoritism and gender disparities during period of non-democracy. Besides these specific estimates, this paper also contributes to a large empirical literature that tries to identify the effect of democracy on development or other socio-economic outcomes. It then contributes to the debate on the sources of development in developing countries (Acemoglu, Francisco and Robinson (2014); Acemoglu and Johnson (2014)). Overall, this paper may encourage the belief that democracy may be an

[1] To address the question of why Africa has been so heavily affected by HIV and what explains the variation within Africa, see: Oster (2005).

[2] http://www.who.int/mediacentre/factsheets/fs360/en/.

[3] Central Bureau of Statistics (CBS) [Kenya], Ministry of Health (MOH) [Kenya], and ORC Macro. 2004. Kenya Demographic and Health Survey 2003 and 2008. Calverton, Maryland: CBS, MOH, and ORC Macro.

[4] This papers refers to the term non-democracy to alternatives, such as dictorship or authoritarian regime, since it has less specific connotations that any of these words.

important means of promoting development in some of the poorest countries in the world.

As democracy has many dimensions, we defined a democratic regime has a combination of multiparty election and chief executive change as proposed by (Powell (2000); Przeworski et al. (2000)), and extended by Kudamatsu (2012). In this perspective, four reasons may explain how democratic governance performs in health provisions, relatively to a non-democratic system.

First, democratic regimes need to accommodate and satisfy a larger part of the electorate to ensure political survival. As a consequence, political leaders have to be more responsive to the needs of the population, especially the needs of the poorer segments of the population, and even more if these citizens constitute a large number (Bueno de Mesquita et al. (2002); Carles Boix (2003); Robinson and Acemoglu (2006); Acemoglu and Robinson (2008); Sen (2008); Yamin (2008); Sen (2009)). Moreover, democracies tend to distribute more public goods, such as public health, comparatively to non-democracies, resulting in higher life expectancies (Lake and Baum (2001); Alvaro, Alvarez Dardet and Ruiz (2004); Besley and Kudamatsu (2006)), bigger resources allocated to human capital accumulation (George Avelino (2005)) and decrease infant mortality (Kudamatsu (2012))[5].

Second, media freedom allows citizens to learn about government performances. Therefore, combined with contested elections, free media may create a greater incentive for politicians to improve citizens' welfare. Sen (1989), for instance, stresses the importance of free media for the prevention of famine. Besley and Burgess (2002) find that the government is more responsive to the need for disaster relief if more people read newspaper in India. Ferraz and Finan (2008) show that Brazilian vote out the incumbent if they learn that the government is more corrupt than expected.

Third, a democratic government is more likely to provide anti-retroviral (ART) drugs to seropositive persons (Justesen (2012)). The World Health Organization (WHO) estimates that by the end of 2005, in Kenya, 55.000 people received treatment with ARV drugs through public sector clinics, and private sectors covered an additional 8.000 individuals[6]. Moreover, government is not the only relevant actors in terms of combating HIV/AIDS, non-government organizations and foreign donors are very important for providing resources for and access

[5]The strength of the results on infant mortality, however, are challenging by Ross (2006).

[6]World Health Organization, 2006. Scaling Up HIV/AIDS Prevention, Treatment and Care. World Health Organization, Geneva.

to treatment of HIV/AIDS (Jakimow (2007)).

Fourth, democracy may reduce ethic favoritism[7]. This refers to a situation where co-ethnics benefit from payoff and public policy decisions, and thus receive a disproportionate share of public resources when member of their ethnic group control the government. Thus, African country leader could improve the health of their co-ethnic groups in expanding immunization coverage, increase the availability of vital drug, and raise the number of skilled birth attendants in their ethnic areas (Jones et al. (2003)). In Kenya, districts that share the ethnicity of the current dictator receive twice as much expenditure on roads and have five times the length of paved roads built (Burgess et al. (2015)). Further, Kenyans who are co-ethnic with the education or the health Minsters are more likely to attend and complete primary and secondary school (Franck and Rainer (2012); Kramon and Posner (2014)). An ethnic leader might has strong claims of the need for schools, health cares, or jobs for his community this is, however, less likely to be the case for AIDS treatments because it would stigmatized his own ethnic group. Ethnic leaders are likely to claim that such policies are not needed, simply to avoid loss of status (Lieberman (2007)).

These assumptions that democratic policies to respond to HIV/AIDS may, however, apply only conditionally. Similarly, HIV/AIDS has disproportionally affected small groups in society (women, or homosexual men). Thus, voter groups affected by HIV/AIDS may constitute a small proportion of the electorate, and then incentives for democratic governments to respond to demands for HIV treatment may be limited. Further, democratic regimes allow for more sexual liberties (Allanah (2008)) that may lead to an increase of the infection due to more unprotected sexual intercourses.

The objective of this paper is to examine whether democracy has reduced the HIV infection. To assess the impact and the magnitude of this institutional change, we use a difference-in-difference approach, similar to other studies (Bleakley (2010); Nunnenkamp and Ohler (2011); Hussey, Nikolsko-Rzhevskyy and Walker (2014); Baranov, Bennett and Kohler (2015)). The difference-in-difference design exploits pre-existing variations in HIV intensity and variation in citizens' exposure to democracy. Evidence suggests that areas with higher pre-existing HIV intensity benefit relatively more from democracy than areas with

[7]Ethnic favoritism has been argued by historians, political scientists, and economists as a factor hampered the economic performance of many countries, particularly in Africa (Easterly and Levine (1997); Alesina and La Ferrara (2005); Posner (2005)).

lower pre-existing HIV intensity. We rely on two Demographic and Health Survey (DHS) rounds: one that is pre-democracy and the other is post-democracy. Our purpose is to collect information on unexposed and exposed Kenyans to democracy. Consequently, exposure to democracy varies along two dimensions: across age for a single DHS round and across DHS rounds for a single age cohort.

The rest of the paper proceeds as follow. Section 1 describes the history of democracy in Kenya. Section 2 presents our empirical strategy and data. Section 3 explains the results and reports the effectiveness of the identification strategy through the robustness check. The last section concludes the paper and highlights avenues for future research.

2 Background

2.1 Political and leaders transition in Kenya, 1957-2007

Since 1957, the link between ethnicity and politics could be clearly identified. Indeed, British authorities allowed district level political activities, leading to the formation of numerous parties focusing on specific ethnic groups. In 1960, national parties were permitted, and two political parties emerged and still continued to target specific ethnic groups. The Kenya African Nation Union (KANU) aims to defend the interest of the Kamatusa group (Kalenjin, Maasai, Turkana and Samburu), and the Kenya African Democratic Union (KADU) protects the Luo and Kikuyu ethnic groups. The KANU was formed and led by Jomo Kenyatta (Kikuyu), and the KADU was led by Daniel arap Moi (Kalenjin) (Gutierrez-Romero (2010); Kagwanja and Southall (2013)).

Kenya gained independence from Britain in 1963, and from then until 2002, the country was ruled by KANU, which secured its dominance by banning opposition parties in 1969. In 1991, pressuring from Kenyan activists and the international community[8], multiparty elections were introduced. Even if several opposition parties emerged, KANU remained in power, winning the 1992 and 1997 elections. KANU exploits ethnic attachment, and ethnic affiliations became a dominant factor in explaining voting patterns, how resources and public services were distributed (Widner (1992)).

[8]In the early 1990s, external pressures were at stake for African leaders in order to introduce democracy (Barkan (1979)). For example, the Paris Group of Donors participated to legalize opposition parties.

In 2002, several ethnic groups formed the National Rainbow Coalition (NARC), headed by Mwai Kibaki. His victory in 2003 represented the end of the KANU's one-party dominance since independence. He introduced free primary education, a number of institutions to tackle corruption and small programs to decentralize fund across regions (Barkan (1994); Yieke (2010)).

2.2 Measuring democracy

We take the Kudamatsu (2012)'s procedure to construct the definition of democracy[9]. To be considered as democratic, the following conditions as to be satisfied. First, the chief executive assumes office by winning elections, or by constitutionally succeeding the predecessor who was elected in a contested election. Second, elections were contested by opposition parties. Third, elections were conducted with universal suffrage. Fourth, opposition parties were legal at the beginning of the campaign period. Fifth, if the chief executive identity differs before and after an election, then it is democratization.

In other words, a democracy in this paper refers to the following two conditions: First, the chief executive of the government has been elected in multiparty elections with universal suffrage, without banning opposition parties. Second, a new chief executive has assumed office by winning multiparty elections. This definition allows us to make some progress in our understanding of what features of democracy contribute to development, which would be infeasible if we used scores to measure democracy (Cheibub, Gandhi and Vreeland (2010)).

Using this definition, Mwai Kibaki won the Nation election in 2003 and became president, making the country's first democratic transition of power (see figure 1).

[9]Although the definition of democracy adopted in this paper closely follows Przeworski et al. (2000)'s dataset, their dataset covers the period up to 1990, after which most episodes of democratization took place in Africa. Therefore, Kudamatsu (2012) constructed the missing data himself using Nohlen et al. (1999) and Africa South of the Sarah by Europa Publications (various years). This dichotomous regime classification extends the one first introduced by Alvarez et al. (1996) and improved by Cheibub, Gandhi and Vreeland (2010).

3 Empirical strategy

3.1 Baseline specification

We now turn to our research question to isolate the impact of the democracy on the HIV infection. Our empirical strategy is a difference-in-difference approach. We exploit regional pre-variations in HIV intensity: in some regions, HIV infection was higher than in others. As a consequence, if democracy leads to a decrease in the HIV infection, then the higher the initial level of regional HIV infection, the stronger should be the decrease in periods following the start of democracy. To carefully disentangle this effect, we estimate the following linear probability model[10] in equation (1):

$$\mathrm{y}_{iajt} = \alpha + \beta.(\mathrm{HIV}_j \times \mathrm{exposure}_i) + \gamma.\mathrm{HIV}_j + \delta.\mathrm{exposure}_i + \mathbf{X_{ija}}'.\mathbf{\Xi} + \phi_a + \phi_j + \phi_t + \epsilon_{iajt}. \quad (1)$$

In equation (1), the dependent variable[11], y_{iajt}, is the HIV status for an individual i, of a cohort a (the group of individuals born in year a) in a region j and interviewed in year t; $\mathbf{X_{ija}}$ are individual-level controls (age, age^2, wealth[12], education attainment[13], religion[14], ethnicity[15] and gender[16].); ϕ_a are cohort fixed effects; ϕ_j are region fixed effects; and ϕ_t are DHS year fixed effects. The coefficient of interest, β, is the interaction term between HIV_j and $\mathrm{exposure}_i$. Variable $\mathrm{exposure}_i$ is a continuous variable. It is equal to zero if individual i lives under the non-democratic regime and a percentage otherwise. Variable HIV_j captures

[10] Conditional fixed effects logit estimation requires no serial correlation in the error term for consistency, which is unlikely to hold in the present context (see Zenger (1993) or Angrist (2001)). In addition, the coefficient estimates in fixed effects logit models are difficult to interpret (Caudill (1988)).

[11] The present estimation does not make any difference between a HIV-1 and a HIV-2 contamination. Taking this clarification, y_{iajt} equals one in both cases of a HIV-1 and a HIV-2 infection. An indeterminate result is removed from the sample.

[12] Wealth in an asset-based index ranging from one (poorest) to five (richest). More precisely 1, stands for "poorest", 2 for "poorer", 3 for "middle", 4 for "richer" and 5 for "richest".

[13] Education attainment contains six measures of an individual education. Specifically 0 stands for "no education", 1 for "incomplete primary", 2 for "complete primary", 3 for "incomplete secondary", 4 for "complete secondary" and 5 for "higher"

[14] In Kenya, individual who identify them as "Roman Catholic" are coded 1, as "Protestant or other Christian" are coded 2, "Muslim" are 3 and "Agnostic" are 4.

[15] The ethnic groupe/tribe is coded as follow: 1, stands for "Embu", 2 for "Kalenjin", 3 for "Kamba", 4 for "Kikuyu", 5 for "Kisii", 6 for "Luhya", 7 for " Luo", 8 for "Masai", 9 for "Meru", 10 for "Mijikenda/Swahili", 11 for "Somali", 12 for "Taita/Taveta" and 96 for all the "other ethnic/tribe groups".

[16] Gender is a dummy that values one for women and zero for men.

pre-variation in HIV infection in region j. The expected sign of this interaction term is negative, meaning that a person living under democracy is less likely to have a HIV infection.

To capture the democracy exposure, we construct the following variable (equation (2)):

$$\text{exposure}_i = \left(\frac{\text{year of the survey}_t - \text{year of the democratization}}{\text{year of the survey}_t - \text{year of birth}_i} \right) \tag{2}$$

Consequently, variation in exposure_i depends on the variation in DHS rounds and on the variation in individuals' date of birth. This variation is interpretable as the percentage of lifetime spent under the democratic government for each individual. Exposure_i is used either as a dummy, equals to 0 for cohorts living before democracy and 1 for those living after, nor as a continuous variable. The coefficient β should therefore capture the impact of democracy on the HIV infection. Thus, if democracy induced changes in HIV-related behaviors, we would expect to observe a larger decrease in the incidence of the infection in regions where the HIV was more prevalent.

Note that, for coefficient β in equation (1) to capture the causal impact of democracy on HIV infection, it should not be the case that, prior to democracy, HIV-status of individuals in the treatment group (i.e. those living in regions with higher pre-regional HIV infections) already converge to those of individuals in the control group (i.e. those living in regions with lower pre-regional HIV infections). If such catch-up effects were at work prior to the democracy, we would not be able to disentangle whether β measures the impact of democracy or the pursuit of this pre-regional trend (see figure 2a and 2b).

Similarly, in the absence of this regime change, we assume that there are no other differential changes correlated with initial levels of HIV. This would be the case if a decline in the number of death related to HIV appears simultaneously with democracy. This decline could not be attributed to the democracy, but would be assigns to the natural disease history. Thus, any decline in the number of HIV-infected persons in 2003 would be the result of previous infection and not due to democracy[17].

A HIV/AIDS education program implemented by the 2003 democratic regime would be one the channel through the infection could have diminished. In 2002 the Kenya government started a large-scale effort to train teachers on HIV education. In 2003, the non-profit ICS

[17]The most advanced stage of the AIDS takes from 2 to 15 years to develop depending on individuals (see more on: http://www.who.int/mediacentre/factsheets/fs360/en/).

Africa[18] helped implement the national training program for 184 primary schools by providing logistical and financial support. In this program, three teachers in each primary school received government-provided training to help them deliver Kenya's national HIV/AIDS curriculum. Like many other curricula in Africa, it emphasizes abstinence until marriage as the way to prevent infection. This, combined with an education subsidy program, reduced the Herpes Simplex Virus types 2 (HSV2, hereafter), a sexually transmitted disease. Girls who received the combined program were 20% less likely to be infected with HSV2 after 7 years. There was no significant impact on the HSV2 infection rate among boys (Benta Achieng' Opul and Simatwa (2010); Duflo, Kremer and Dupas (2015)). Further, Kenya National HIV/AIDS Strategic Plan 2000-2005 provided a policy and institutional framework to ensure that multi-sectorial policies and strategies are integrated into government priorities[19]. Jointly with international support to provide ART treatment, this policy could illustrate how Kenyan government responses to the HIV/AIDS epidemic.

3.2 Identifying assumptions

The key assumption in the identification strategy argues that, if democracy leads to a decrease of HIV infection, then cohorts born before the democratization should be less infected than cohorts born after. Similarly, pre-democratization areas with initially higher HIV infections should benefit relatively more from the democratization than pre-democratization regions with lower HIV infections.

The primary conceptual challenges in identifying the effects of the democracy on the HIV infection includes both the direction of causation and the potential correlations with unobservable regional characteristics.

For coefficient β in equation (1) to capture the causal impact of the democratization on the HIV infection, the interaction term ($\text{HIV}_j \times \text{exposure}_i$) must be exogenous. But, several factors may compromise such exogeneity. First, because of the construction of the exposure variable, an individual's exposure to the democratic regime depends on his or her age. As a consequence, a correlation exists between ($\text{HIV}_j \times \text{exposure}_i$) and ($\text{HIV}_j \times \text{age}_i$).

[18] ICS stands International Christian Support fund (1980-2003) and for International Child Support (2004-2010). See more one: www.icsafrica.org.

[19] The government established the National AIDS Control Council in November 1999 to lead the multi-sectorial responses to HIV/AIDS. See more on the following website: http://www.nacc.or.ke.

To avoid this omitted variable bias, we include this last interaction term in equation (1). Second, an individual's exposure to democracy depends on his or her date of birth[20]. To limit this problem, we add an interaction term between individuals' date of birth and region fixed effects in equation (1). Third, we control for the interaction term between exposure and region fixed effect in equation (1) to ensure that pre-democracy risk is not related to pre-democracy HIV outcomes. We can not, however, control for all sources of endogeneity, like individuals' readiness to adopt preventive strategies.

3.3 Testing ethnic favoritism

We seek to estimate the relationship between the ethnicity of the political leader and the HIV infection. During period of non-democracy, the government promotes interests of the Kamatusa group (Kalenjin, Maasai, Turkana and Samburu ethnic groups). We hypothesized that individuals belonging to these ethnic groups received a higher attention in HIV cares relative to other ethnic groups during period of non-democracy. In other words, Kamatusa individuals should be favored during period of non-democracy resulting in lower probability to be HIV infected.

To do so, we augment equation (1) by interacting ($\text{HIV}_j \times \text{exposure}_i$) with an indicator, ($\text{Kamatusa}_i$), equals to 1 when an individual belongs to Kamatusa group. We control for all the subcomponents of the triple interaction term not already included in equation (1).

3.4 Testing gender disparities

There are four channels through which gender disparities may occur. First, male chauvinism norms encourage men to have competing sexual relationships. Thereby, many women are contaminated for each infected man (Malowany (2008)). Second, female may have lower access to health care, relative to male, leading women with higher numbers of other untreated sexually transmitted infection. This in turn increases the probability to get infected with HIV/AIDS. Third, transactional sex can be a way for poor women to avoid falling into extreme poverty. Fourth, unsafe blood transfusion due to high level of blood shortage and

[20]The later the date of birth, the higher the probability that the person was exposed to democracy during his/her entire life.

low quality of health infrastructures. Women are the main group of patient receiving blood transfusion (due to childbirth).

These above effects are assumed to be relatively lower in period of democracy for two reasons. First, democracies produce more income redistribution, especially for low-income and middle-income groups (Anyanwu and Augustine (2013); Huber and Stephens (2014)) and second, because more public attentions are dedicated to health (Svensson and Reinikka (2004); Wigley and Akkoyunlu-Wigley (2011)); Ben-Bassat and Dahan (2012)).

To test the assumption of gender disparities, we augment equation (1) by a triple interaction tem: ($\text{HIV}_j \times \text{exposure}_i \times \text{gender}_i$). The gender variable takes the value one if the individual i is a woman, zero for men. We control for all the sub-components of the triple interaction term not already included in equation (1).

3.5 Data

To implement the empirical strategy we use the 2003 and 2008 Kenya DHS. Kenya has a heterogeneous dispersion of HIV infection throughout the country. Results from the 2003 KDHS estimate that 6.7 percent of adults age 15-49 were HIV-infected, with a higher proportion of women (8.7 percent) than men (4.6 percent). In 2007-08, KDHS reported that 6.3 percent of adults were infected with the disease. This declines in the national HIV prevalence rate does not take into account regional variations in HIV infection. For example, in Nairobi the regional rate goes from 10% in 2003 to 7% in 2008, and Nyanza from 15% in 2003 to 13.9% in 2008. These sharp declines are not observed in lower HIV regions such as Central where the decreasing in the HIV rate was 0.4 percentage points, and Eastern was 0.5 percentage points. The prevalence rate is lower in rural areas, in which about 80% of the total population lives, compared to the rate in urban areas. Further, urban respondents are one and a half times more likely to have heard of a Voluntary Counseling and Testing Center (VCTC) compared to rural inhabitants. Please see the annex for additional statistics (from table 10 to 13.b).

4 Results

This section presents the main results, and performs some robustness checks.

4.1 Main results

Table 1 presents initial evidence of the effect of democracy on the HIV infection. Regions with higher levels of HIV prior to democratization had the largest decrease in HIV infection. Further, the longer the time spent under democracy, the lower the probability of being infected. It reports an expected negatif effect: living under democracy decrease the probability of having an infection, even more in highly infected regions.

We present our main results in table 2 where the dependent variable is the individual HIV infection. Controls are added sequentially into equation (1): the baseline equation appears in column 1; the interaction term between regional fixed effect and exposure in column 2; the interaction term between regional fixed effects and individuals' date of birth in column 3. We find that a person living under the democracy is less likely to be infected, even more if he or she lives in initial high HIV intensity regions. Table 3 specifies the decomposition of the above effect. The more time spent under democracy, the less likely to be infected. In other words, the more a person lives under the democratic regime, the lower his or her probability to be contaminated.

Table 4 reports the effect of ethnic favoritism in non-democracy period. Kamatusa groups are less likely to be infected than any other ethnic groups. Further, during period of democracy, this result does not hold anymore. It suggests that sharing the same ethnic group of the political leader leads to lower the probability of being infected. This is consistent with other studies highlighting the effect of ethnic favoritism on health (Jones et al. (2003); Franck and Rainer (2012)).

Table 5 explains in greater detail the effect of democracy on gender. It shows that female has a higher probability of getting a HIV infection than their male counterpart. When we interact women with the exposure to democracy, this result does not hold anymore. In other words, being a woman during democracy reduced the probability of getting a HIV infection. This gives support to the assumption that democracy reduces gender inequalities. This is in line with a set of recent papers (Djeneba et al. (1998); Sikkema et al. (2000); Gunduza (2002); Thornton (2008)).

4.2 Robustness checks

To validate the identifying assumption, a combination of robustness checks is estimated.

Table 6 shows the robustness of our results to the increasing return of democracy. The more time spent under the democratic regime, the bigger the decrease. This is robust to an exclusion of all the control variables (column (2)), to individuals who remains in their village or city of birth (column (3)), to two restricted samples: limited to those living out of Nairobi (column (4)) and those living out of Nairobi and Rift-Valley (column (5)). Finaly, column (6) represents the last robustness checks, keeping only younger cohorts. All ranges of specification checks for this equation show robust coefficients.

Table 7 reports some robust evidence for the stability of our coefficients for the effect of ethnic favoritism. It has the following columns. Column (2) excludes individual controls. In column (3), we limited the sample to younger cohorts, eliminating the older individual aged from 45 to 54. In column (4) we control for the circumcised males[21]. Circumcision is intertwined with ethnicity, place of residence, and other factors that are indirectly associated with HIV prevalence (Auvert (2005); Bailey et al. (2007)). Finally, column (5) limits the sample to usual residents. This controls for potential migration. In other words, selective migration of high education individuals to previously low HIV intensity regions would bias the results. Controlling for the household's wealth in equation (1) helps us to proxy for parental education and mitigates concerns about this selection bias. There is no guarantee, however, that this place of residence coincides with the respondent's place of birth (this information is absent from the DHS surveys, as is the respondent's migrant status). We thus replicate equation (1) by restricting our analysis to persons who report that their place of resident was the same during both survey rounds. This has also an importance because urban residents have considerably higher (10%) infection level than rural (6%)[22].

Table 8 gives the robustness of gender coefficients. They are all the same as for the table 7, except for columns (3) and (4). These columns exclude individuals living in Nairobi (column (3)), and those living both in Nairobi and Rift-Valley (column (4)). Controlling for this factor may ensure that democracy has an affect even in lower HIV regions.

[21] Data shows that 13% of uncircumcised men are HIV affected, compared with 3% of those who are circumcised.

[22] Central Bureau of Statistics (CBS) [Kenya], Ministery of Health (MOH) [Kenya], and ORC Macro. 2004. Kenya Demographic and Health Survey 2003. Calverton, Maryland: CBS, MOH, and ORC Macro.

Overall, our results are robust to several specification checks. This gives support to our empirical strategy.

4.3 Pathways

The DHS rounds provide some information about media utilization. This allows us to see whether more information inputs are used after democratization. We use three measures of media: whether individuals watch television, listen to radio, and read newspaper[23]. The above variables are available for both women and men, for 2003 and 2008. We found that individuals watching television or reading newspaper during period of democracy are less likely to be infected. The effect of radio, however, seems to have no impact on the HIV infection. This finding brings some insights on how information could be implemented: individuals appear to be sensitive to prevention messages announced on television or in newspapers. Table 9 provides in greater details these results.

This is in line with other results on television HIV/AIDS campaigns (Keating, Meekers and Adewuyi (2006); Sood and Nambiar (2006)). Further, the effectiveness of interventions is not only influence by the type of channel but also by the level of exposure to media messages. In Kenya, HIV/AIDS mass media campaign revealed a dose-response relationship. A higher intensity of exposure to campaign media led to more favorable outcomes such as safer sex, and higher perceived self-efficacy in condom use and efficacy (Agha (2003)).

The decline for gender disparities in period of democracy could be explain by the increase in access and provision to family planning. The contraceptive prevalence rate remained the same between 1998 and 2003, but increased between 2003 and 2008-09. This increase in the overall contraceptive prevalence rate is fuelled by increased use of modern methods. Between 2003 and 2008-09, use of modern methods increased from 32 to 39 percent for married women, while the use of traditional methods over the same time period decreased from 8 to 6 percent. Similarly, changes in fertility levels over time can be used to proxy the utilisation of contraceptive methods. Fertility rises after 1998 reaching a total fertility rate of 4.9 children per woman during the 2000-02 period, then it declines, reaching a low of 4.6 children per woman during the 2006-08 period[24].

[23]Originally, these variables are the frequency of watching television, listenning to radio, and of reading newspaper or magazine. We transformed them into dummy variables.

[24]Kenya National Bureau of Statistics (KNBS) and ICF Macro. 2010. Kenya Demographic and Health

5 Conclusion

This study has provided support for the hypothesis that democracy tends to perform better than non-democracy in response to HIV/AIDS epidemic in Kenya. This does not mean, however, that democracy leads to a sharp decline of the HIV/AIDS infection, but appears to be better at managing the disease. We find that a person living under democracy is less likely to have a HIV infection. Further, we present some evidence of ethnic favoritism and gender disparities during periods of non-democracy. These results are consistent with a growing literature of the effect of political regimes on public health.

Nonetheless, our results do face some limitations. First, data could suffer from selective mortality: members of the older cohorts who survived to the time of the survey are a selected sample. Second, because data do not allow for sub-regional assignment of a local HIV rate, the disease is assumed to be uniform across regions.

Further research could analyse in greater details the effect of electoral systems to access HIV/AIDS preventions or treatments. In other words, proportional system and plurality voting could differ in the way government implements policy regarding minority interests.

Although, the empirical results do not necessarily establish causality, and should therefore be interpreted with caution, the finding nevertheless suggests that responses to HIV/AIDS have governmental roots.

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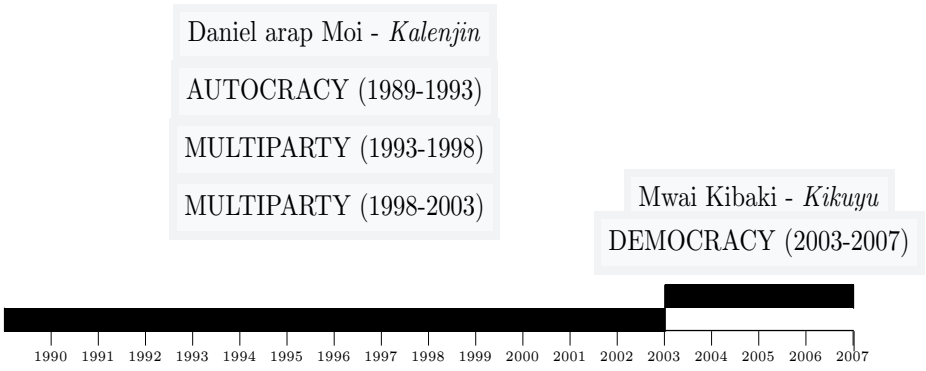
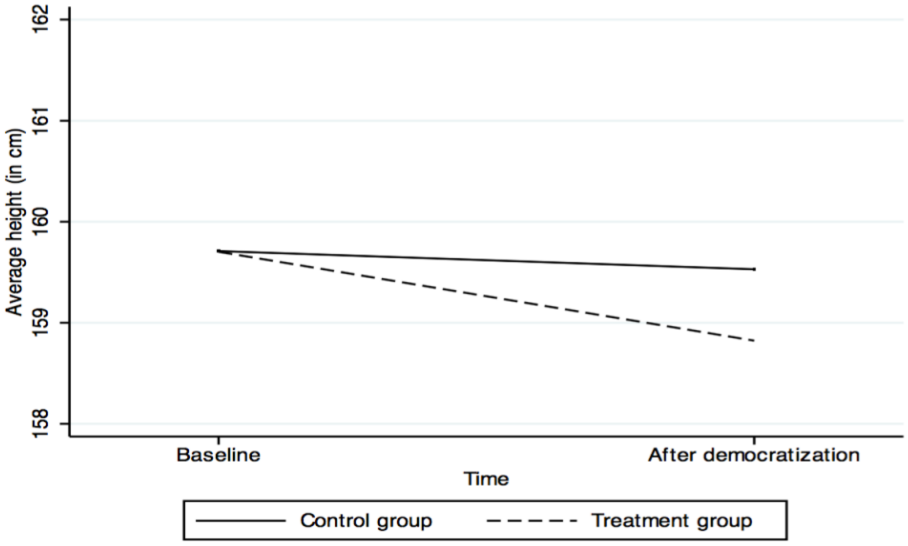
6 Figures & Tables

Figure 1: Political and leardership transition in Kenya, 1989-2013.



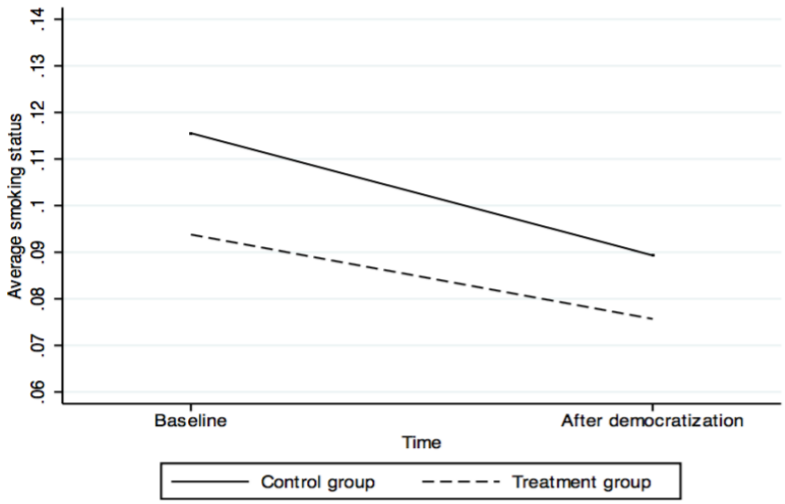
Note: this timeline illustrates the history of political and ethnic transitions in Kenya. Political transition proceeds as follows: 2003 is the transition from multiparty regime to democracy. Ethnic transitions: from Moi (Kalenjin) to Kibaki (Kikuyu). Daniel arap Moi headed the country from 1979 to 2003, and Mwai Kibaki from 2003-2007.

Figure 2a: Testing the parallel trend assumption, evidence from height.



Note: This figure shows the parallel trend assumption for a variable that should not be infected by the democratization. Adult women height should not be impacted by the democracy. This seems to be the case: the average height of the control and treatment groups is very similar before the democracy (159,7027 cm and 159,7098 cm, respectively), and stays close after the democracy (158.823 cm and 159.5296 cm, respectively).

Figure 2b: Testing the parallel trend assumption, evidence from smoking status.



Note: This figure shows the parallel trend assumption for a variable that should not be infected by the democratization. Smoking status should not be impacted by the democracy. This seems to be the case: the average smoking status in the control group and in the treatment group is different before and after democracy but this difference stays similar among these groups.

Table 1: Evidence of democracy on HIV infection

		First difference: across cohorts		
		Cohorts living before democracy (B)	**Cohorts living after democracy (A)**	**Difference A-B**
HIV infection				
Second difference: across regions				
	Low HIV regions (L)	0.045	0.047	0.002
		(0.003)	(0.003)	(0.005)
	High HIV regions (H)	0.102	0.097	-0.005
		(0.006)	(0.005)	(0.008)
	Difference H-L	0.057***	0.050***	
		(0.006)	(0.006)	

Notes: difference-in-difference expected effect: [0.050 - (0.057)] = [-0.005 - (0.002)] = -0.007. Lecture: a person living under democracy is less likely to be infected, even more if he or she lives in highly infection regions. Data collected from the 2003 and 2008 DHS rounds. Standard errors (in parentheses). * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ indicate significance at the 5, 1 and 0.1% level.

Table 2: Linear Probability Model:
Effect of democracy on HIV infection (high versus low initial regional HIV intensity)

	(1)	(2)	(3)	(4)
Dependant variable: HIV infection				
Exposure to democracy (D) x Pre-democracy HIV levels per region	-0.000	0.000	-0.003**	-0.004**
	(0.001)	(0.001)	(0.001)	(0.001)
Exposure to democracy (D)	0.001	0.007	0.025	0.068
	(0.005)	(0.013)	(0.015)	(0.037)
Pre-democracy HIV levels per region	-0.000	0.000	-0.000	0.000
	(0.002)	(0.001)	(0.002)	(0.002)
Pre-democratization HIV levels per region x Age	Yes	Yes	Yes	Yes
Age	Yes	Yes	Yes	Yes
Individual covariates	Yes	Yes	Yes	Yes
Region FE	No	No	Yes	Yes
Year of interview FE	No	No	Yes	Yes
Year of birth FE	No	Yes	Yes	Yes
Year of interview FE x Region FE	No	No	Yes	Yes
Region x Year of birth FE	No	Yes	Yes	Yes
Year of birth FE x Year of interview FE	No	No	No	Yes
Observations	11919	11919	11919	11919
R^2	0.055	0.059	0.061	0.064

Notes: This table reports results from equation (1). Estimates in all columns include individual covariates (age^2, education, wealth, religion, ethinc group and gender). Standard errors (in parentheses) are clustered at the DHS regional level. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ indicate significance at the 5, 1 and 0.1% level. Democracy is measured as a dummy variable equals to 1 for individuals living under democracy, 0 otherwise. Lecture: the more time spent under demorcracy in highly infected areas, the less likely to have a HIV infection.

Table 3: Linear Probability Model:
Time effect of democracy on HIV infection

	(1)	(2)	(3)	(4)	(5)
Dependant variable: HIV infection					
Exposure to democracy (C): from 10% to 20% of an individual lifetime x Pre-democracy HIV levels per region	0.001	-0.016	-0.016	-0.016	-0.020*
	(0.001)	(0.007)	(0.007)	(0.007)	(0.008)
Exposure to democracy (C): from 21% to 30% of an individual lifetime x Pre-democracy HIV levels per region	-0.000	-0.018	-0.018	-0.018	-0.026*
	(0.001)	(0.008)	(0.008)	(0.008)	(0.009)
Exposure to democracy (C): from 31% to 40% of an individual lifetime x Pre-democracy HIV levels per region	-0.002*	-0.021*	-0.021*	-0.022*	-0.034**
	(0.001)	(0.008)	(0.008)	(0.008)	(0.010)
Exposure to democracy (C): from 10% to 20% of an individual lifetime	-0.092*	0.024	-0.040	-0.058	-0.027
	(0.038)	(0.031)	(0.050)	(0.053)	(0.049)
Exposure to democracy (C): from 21% to 30% of an individual lifetime	-0.100	0.021	-0.051	-0.065	-0.012
	(0.043)	(0.038)	(0.063)	(0.070)	(0.064)
Exposure to democracy (C): from 31% to 40% of an individual lifetime	-0.086	0.043	-0.024	-0.042	0.029
	(0.043)	(0.038)	(0.064)	(0.068)	(0.065)
Pre-democracy HIV levels per region	0.002	-6.682*	-6.756*	-6.743*	-4.541
	(0.001)	(2.811)	(2.795)	(2.738)	(2.178)
Pre-democratization HIV levels per region x Age	Yes	Yes	Yes	Yes	Yes
Age	Yes	Yes	Yes	Yes	Yes
Individual covariates	Yes	Yes	Yes	Yes	Yes
Region FE	No	Yes	Yes	Yes	Yes
Year of survey FE	No	No	Yes	Yes	Yes
Year of birth FE	No	No	No	Yes	Yes
Year of survey x Region FE	No	Yes	Yes	Yes	Yes
Year of birth x Year of survey FE	No	No	Yes	Yes	Yes
Region x Year of birth FE	No	No	No	Yes	Yes
Exposure x Region FE	No	No	No	No	Yes
Observations	11909	11909	11909	11909	11909
R^2	0.059	0.061	0.062	0.062	0.063

Notes: This table reports results from equation (1). Estimates in all columns include individual covariates (age^2, education, wealth, religion, ethinc groups and gender). Standard errors (in parentheses) are clustered at the DHS regional level. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ indicate significance at the 5, 1 and 0.1% level. Democracy is measured as a continuous variable equals to a percentage for individuals living under democracy, 0 otherwise. Lecture: the longer the lifetime in democracy, the less likely to be HIV positif.

Table 4: Linear Probability Model:
Evidence of ethnic favoritism during period of non-democracy

	(1)	(2)	(3)	(4)
Dependant variable: HIV infection				
Exposure to democracy (C) x Pre-democracy HIV levels per region x Kamatusa	-0.086***	-0.053**	-0.041**	-0.041**
	(0.004)	(0.012)	(0.010)	(0.010)
Pre-democracy HIV levels per region x Kamatusa	0.005	0.007	0.007*	0.007*
	(0.002)	(0.003)	(0.003)	(0.003)
Exposure to democracy (C) x Pre-democracy HIV levels per region	0.001	-0.011	0.043**	0.015
	(0.003)	(0.010)	(0.010)	(0.007)
Exposure to democracy (C) x Kamatusa	0.427***	0.225*	0.159	0.156*
	(0.038)	(0.082)	(0.068)	(0.064)
Kamatusa	-0.041*	-0.064*	-0.062**	-0.063**
	(0.016)	(0.019)	(0.017)	(0.017)
Exposure to democracy (C)	-0.007	0.019	-0.319	-0.082
	(0.023)	(0.112)	(0.204)	(0.187)
Pre-democracy HIV levels per region	-0.001	-0.004	0.038*	0.038*
	(0.001)	(0.002)	(0.015)	(0.015)
Pre-democratization HIV levels per region x Age	Yes	Yes	Yes	Yes
Age	Yes	Yes	Yes	Yes
Individual covariates	Yes	Yes	Yes	Yes
Region FE	No	Yes	Yes	Yes
Year of survey FE	No	Yes	Yes	Yes
Year of birth FE	No	No	Yes	Yes
Year of survey FE x Region FE	No	Yes	Yes	Yes
Year of birth FE x Region FE	No	No	Yes	Yes
Exposure x Region FE	No	No	No	Yes
Observations	11919	11919	11919	11919
R^2	0.056	0.061	0.067	0.067

Notes: Estimates in all columns include individual covariates (age, age^2 education, wealth, religion and ethinc group) except for column (3). Standard errors (in parentheses) are clustered at the DHS regional level. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ indicate significance at the 5, 1 and 0.1% level. Democracy is measured as a continuous variable equals to a percentage for individuals living under democracy, 0 otherwise. Lecture: Kamatusa individuals are less likely to be infected than other ethnic groups during period of non-democracy. This result, however, does not hold in democratic period.

Table 5: Linear Probability Model:
Evidence of gender disparities during period of non-democracy

	(1)	(2)	(3)	(4)
Dependant variable: HIV infection				
Exposure to democracy (C) x Pre-democracy HIV levels per region x Female	0.011*	0.011*	0.014**	0.014**
	(0.004)	(0.004)	(0.003)	(0.003)
Pre-democracy HIV levels per region x Female	0.002	0.002	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Exposure to democracy (C) x Pre-democracy HIV levels per region	-0.005*	-0.015	0.033*	0.004
	(0.002)	(0.009)	(0.010)	(0.007)
Exposure to democracy (C) x Female	-0.085	-0.088	-0.110*	-0.108*
	(0.043)	(0.044)	(0.043)	(0.043)
Female	0.023	0.024*	0.030*	0.030*
	(0.011)	(0.010)	(0.010)	(0.010)
Exposure to democracy (C)	0.041	0.044	-0.258	-0.013
	(0.021)	(0.107)	(0.204)	(0.172)
Pre-democracy HIV levels per region	-0.001	-0.005	0.039*	0.039*
	(0.002)	(0.002)	(0.015)	(0.015)
Pre-democratization HIV levels per region x Age	Yes	Yes	Yes	Yes
Age	Yes	Yes	Yes	Yes
Individual covariates	Yes	Yes	Yes	Yes
Region FE	No	Yes	Yes	Yes
Year of survey FE	No	Yes	Yes	Yes
Year of birth FE	No	No	Yes	Yes
Year of survey FE x Region FE	No	Yes	Yes	Yes
Year of birth FE x Region FE	No	No	Yes	Yes
Exposure x Region FE	No	No	No	Yes
Observations	11919	11919	11919	11919
R^2	0.056	0.061	0.067	0.067

Notes: Estimates in all columns include individual covariates (age, age^2 education, wealth, religion and ethinc group) except for column (3). Standard errors (in parentheses) are clustered at the DHS regional level. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ indicate significance at the 5, 1 and 0.1% level. Democracy is measured as a continuous variable equals to a percentage for individuals living under democracy, 0 otherwise. Lecture: female are more likely to be infected than male in period of non-democracy. This result, however, does not hold in democratic period.

Table 6: Linear Probability Model:
Robustness check of the time effect of democracy on HIV infection

	(1) Baseline	(2) Exclude controls	(3) Non movers	(4) Without Nairobi	(5) Without Nairobi and Rift Valley	(6) Without the younger cohort: 15-19
Dependant variable: HIV infection						
Exposure to democracy: from 10% to 20% of an individual lifetime x Pre-democracy HIV levels per region	-0.020*	-0.021*	-0.014*	-0.015**	-0.017**	-0.024*
	(0.008)	(0.008)	(0.005)	(0.003)	(0.003)	(0.007)
Exposure to democracy: from 21% to 30% of an individual lifetime x Pre-democracy HIV levels per region	-0.027*	-0.028*	-0.024**	-0.021***	-0.023***	-0.035**
	(0.009)	(0.010)	(0.006)	(0.003)	(0.003)	(0.008)
Exposure to democracy: from 31% to 40% of an individual lifetime x Pre-democracy HIV levels per region	-0.034**	-0.034*	-0.031**	-0.028***	-0.030**	-0.054***
	(0.010)	(0.011)	(0.008)	(0.004)	(0.005)	(0.007)
Exposure to democracy: from 10% to 20% of an individual lifetime	-0.029	-0.012	0.002	-0.005	0.023	0.004
	(0.051)	(0.050)	(0.099)	(0.050)	(0.050)	(0.051)
Exposure to democracy: from 21% to 30% of an individual lifetime	-0.011	0.008	0.042	0.008	0.044	0.038
	(0.066)	(0.067)	(0.131)	(0.064)	(0.065)	(0.058)
Exposure to democracy: from 31% to 40% of an individual lifetime	0.025	0.030	0.058	0.041	0.080	0.195**
	(0.068)	(0.069)	(0.141)	(0.072)	(0.076)	(0.050)
Pre-democracy HIV levels per region	-4.961	-4.961	-2.048	-3.788***	-4.380***	-4.780*
	(2.105)	(2.105)	(1.664)	(0.609)	(0.463)	(1.913)
Pre-democratization HIV levels per region x Age	Yes	Yes	Yes	Yes	Yes	Yes
Age	Yes	Yes	Yes	Yes	Yes	Yes
Individual covariates	Yes	No	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes	Yes
Year of survey FE	Yes	Yes	Yes	Yes	Yes	Yes
Year of birth FE	Yes	Yes	Yes	Yes	Yes	Yes
Year of survey x Region FE	Yes	Yes	Yes	Yes	Yes	Yes
Year of birth x Year of survey FE	Yes	Yes	Yes	Yes	Yes	Yes
Region x Year of birth FE	Yes	Yes	Yes	Yes	Yes	No
Exposure x Region FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	11909	11909	4694	10595	8648	9164
R^2	0.061	0.049	0.069	0.062	0.067	0.057

Notes: Estimates in all columns include individual covariates (education, wealth, religion, ethinc group, and gender) except for column 2. Standard errors (in parentheses) are clustered at the DHS regional level. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ indicate significance at the 5, 1 and 0.1% level. Lecture: results of the time effect of democracy on HIV infection are robust.

Table 7: Linear Probability Model:
Robustness check of the ethnic favoritism effect

	(1) Baseline	(2) Exclude individual controls	(3) Without older cohorts: 45-54	(4) Being circumcised (male)	(5) Usual residents (non movers)
Dependant variable: HIV infection					
Exposure to democracy (C) x Pre-democracy HIV levels per region x Kamatusa	-0.041**	-0.036**	-0.046**	-0.108***	-0.053***
	(0.010)	(0.007)	(0.012)	(0.011)	(0.009)
Pre-democracy HIV levels per region x Kamatusa	0.007*	0.007**	0.007	0.020***	0.010**
	(0.003)	(0.002)	(0.003)	(0.003)	(0.002)
Exposure to democracy (C) x Pre-democracy HIV levels per region	0.015	0.014***	0.027	0.020*	0.004
	(0.007)	(0.000)	(0.012)	(0.007)	(0.008)
Exposure to democracy (C) x Kamatusa	0.156*	0.158**	0.172	0.647***	0.212**
	(0.064)	(0.038)	(0.077)	(0.066)	(0.059)
Kamatusa	-0.063**	-0.079***	-0.059*	-0.126***	-0.079**
	(0.017)	(0.010)	(0.021)	(0.015)	(0.016)
Exposure to democracy (C)	-0.082	0.117***	0.058	-0.152	-0.058
	(0.187)	(0.000)	(0.216)	(0.182)	(0.176)
Pre-democracy HIV levels per region	0.038*	0.013***	0.040*	0.040*	0.048*
	(0.015)	(0.000)	(0.017)	(0.012)	(0.017)
Being circumcised (male)				-0.088*	
				(0.033)	
Pre-democratization HIV levels per region x Age	Yes	Yes	Yes	Yes	Yes
Age	Yes	Yes	Yes	Yes	Yes
Individual covariates	Yes	No	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes
Year of survey FE	Yes	Yes	Yes	Yes	Yes
Year of birth FE	Yes	Yes	Yes	Yes	Yes
Year of survey FE x Region FE	Yes	Yes	Yes	Yes	Yes
Region FE x Year of birth FE	Yes	Yes	Yes	Yes	Yes
Region FE x exposure	Yes	Yes	Yes	Yes	Yes
Observations	11919	11919	10781	5533	11599
R^2	0.067	0.055	0.068	0.096	0.067

Notes: Estimates in all columns include individual covariates (age^2, education, wealth, religion, and ethinc group) except for column 5. Standard errors (in parentheses) are clustered at the DHS regional level. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ indicate significance at the 5, 1 and 0.1% level. Lecture: results for ethnic favoristim coefficients are robust.

Table 8: Linear Probability Model:
Robustness check of the effect of HIV infection by gender

	(1) Baseline	(2) Exclude individual controls	(3) Without Nairobi	(4) Without Nairobi and Rift Valley	(5) Without older cohorts: 45-54
Dependant variable: HIV infection					
Exposure to democracy (C) x Pre-democracy HIV levels per region x Female	0.014**	0.014**	0.014**	0.015**	0.015**
	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)
Pre-democracy HIV levels per region x Female	0.001	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Exposure to democracy (C) x Pre-democracy HIV levels per region	0.004	0.008	0.052***	0.052***	0.018
	(0.007)	(0.005)	(0.005)	(0.005)	(0.013)
Exposure to democracy (C) x Female	-0.108*	-0.113*	-0.111*	-0.136*	-0.121*
	(0.043)	(0.045)	(0.044)	(0.043)	(0.045)
Female	0.030*	0.030*	0.031*	0.034*	0.033*
	(0.010)	(0.010)	(0.010)	(0.012)	(0.010)
Pre-democracy HIV levels per region	0.039*	0.005	0.046*	0.042*	0.040
	(0.015)	(0.014)	(0.016)	(0.015)	(0.018)
Exposure to democracy (C)	-0.013	0.156***	-0.451*	-0.485	0.109
	(0.172)	(0.021)	(0.154)	(0.191)	(0.206)
Pre-democratization HIV levels per region x Age	Yes	Yes	Yes	Yes	Yes
Age	Yes	Yes	Yes	Yes	Yes
Individual covariates	Yes	No	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes
Year of survey FE	Yes	Yes	Yes	Yes	Yes
Year of birth FE	Yes	Yes	Yes	Yes	Yes
Year of survey FE x Region FE	Yes	Yes	Yes	Yes	Yes
Year of birth FE x Region FE	Yes	Yes	Yes	Yes	Yes
Region FE x exposure	Yes	Yes	Yes	Yes	Yes
Observations	11919	11919	10605	8656	10781
R^2	0.067	0.059	0.069	0.075	0.068

Notes: Estimates in all columns include individual covariates (education, wealth, religion, and ethinc group) except for column 5. Standard errors (in parentheses) are clustered at the DHS regional level. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ indicate significance at the 5, 1 and 0.1% level. Lecture: results for gender coefficients are robust.

Table 9: Pathways: testing the media channel

	(1)	(2)	(3)
Dependant variable: HIV infection			
Watch television x Pre-democracy HIV levels per region x Exposure to democracy	-0.027*		
	(0.008)		
Watch television x Exposure to democracy	0.131		
	(0.068)		
Pre-democracy HIV levels per region x Exposure to democracy	-0.043**	-0.049***	-0.063***
	(0.010)	(0.008)	(0.005)
Watch television x Pre-democracy HIV levels per region	0.001		
	(0.002)		
Watch television	-0.006		
	(0.008)		
Exposure to democracy	0.351	0.388*	0.514***
	(0.152)	(0.144)	(0.076)
Pre-democracy HIV levels per region	-4.354**	-4.606***	-4.946***
	(0.843)	(0.768)	(0.659)
Read newspaper x Pre-democracy HIV levels per region x Exposure to democracy		-0.014***	
		(0.002)	
Read newspaper x Exposure to democracy		0.062*	
		(0.026)	
Read newspaper x Pre-democracy HIV levels per region		-0.000	
		(0.002)	
Read newspaper		0.009	
		(0.013)	
Listen to radio x Pre-democracy HIV levels per region x Exposure to democracy			0.007
			(0.013)
Listen to radio x Exposure to democracy			-0.105
			(0.094)
Listen to radio x Pre-democracy HIV levels per region			-0.002
			(0.001)
Listen to radio			0.022*
			(0.009)
Pre-democratization HIV levels per region x Age	Yes	Yes	Yes
Age	Yes	Yes	Yes
Individual covariates	Yes	Yes	Yes
Region FE	Yes	Yes	Yes
Year of survey FE	Yes	Yes	Yes
Year of birth FE	Yes	Yes	Yes
Year of survey x Region FE	Yes	Yes	Yes
Year of birth x Year of survey FE	Yes	Yes	Yes
Region x Year of birth FE	Yes	Yes	Yes
Observations	11915	11904	11894
R^2	0.057	0.057	0.056

Notes: Estimates in all columns include individual covariates (education, wealth, religion, ethinc group, and gender). Standard errors (in parentheses) are clustered at the DHS regional level. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ indicate significance at the 5, 1 and 0.1% level. Lecture: the less likely to be infected if individuals watch television or read newspaper. The effect of radio, however, seems to have no impact on the HIV infection.

Table 10: Descriptive statistics

2003		Obs.	Mean	SD.	Min	Max	**2008**	Obs.	Mean	SD.	Min	Max
		(1)	(2)	(3)	(4)	(5)		(6)	(7)	(8)	(9)	(10)
Highest education level	Primary	5905	0.55	0.50	0.00	1.00	Primary	6605	0.53	0.50	0.00	1.00
	Secondary	5905	0.25	0.43	0.00	1.00	Secondary	6605	0.28	0.45	0.00	1.00
	Higher	5905	0.08	0.27	0.00	1.00	Higher	6605	0.09	0.29	0.00	1.00
Region	Central	5905	0.16	0.37	0.00	1.00	Central	6605	0.11	0.32	0.00	1.00
	Coast	5905	0.11	0.31	0.00	1.00	Coast	6605	0.13	0.34	0.00	1.00
	Eastern	5905	0.12	0.33	0.00	1.00	Eastern	6605	0.14	0.34	0.00	1.00
	Nyanza	5905	0.14	0.35	0.00	1.00	Nyanza	6605	0.16	0.37	0.00	1.00
	Rift Valley	5905	0.17	0.38	0.00	1.00	Higher	6605	0.16	0.36	0.00	1.00
	Estern	5905	0.13	0.34	0.00	1.00	Estern	6605	0.13	0.34	0.00	1.00
	North Eastern	5905	0.05	0.21	0.00	1.00	North Eastern	6605	0.06	0.23	0.00	1.00
Age	20-24	5905	0.20	0.40	0.00	1.00	20-24	6605	0.20	0.40	0.00	1.00
	25-29	5905	0.15	0.36	0.00	1.00	25-29	6605	0.15	0.36	0.00	1.00
	30-34	5905	0.13	0.34	0.00	1.00	30-34	6605	0.14	0.34	0.00	1.00
	35-39	5905	0.10	0.31	0.00	1.00	35-39	6605	0.10	0.31	0.00	1.00
	40-44	5905	0.09	0.28	0.00	1.00	40-44	6605	0.09	0.28	0.00	1.00
	45-49	5905	0.06	0.24	0.00	1.00	45-49	6605	0.08	0.27	0.00	1.00
	50-54	5905	0.03	0.17	0.00	1.00	50-54	6605	0.03	0.16	0.00	1.00
Residence	Rural	5905	0.70	0.46	0.00	1.00	Rural	6605	0.71	0.45	0.00	1.00
Religion	Protestant	5905	0.61	0.49	0.00	1.00	Protestant	6605	0.61	0.49	0.00	1.00
	Muslim	5905	0.11	0.31	0.00	1.00	Muslim	6605	0.14	0.34	0.00	1.00
	No religion	5905	0.04	0.19	0.00	1.00	No religion	6605	0.03	0.17	0.00	1.00
	Other	5905	0.00	0.04	0.00	1.00	Other					
Ethnic group	Kalenjin	5905	0.09	0.29	0.00	1.00	Kalenjin	6605	0.09	0.29	0.00	1.00
	Kamba	5905	0.10	0.30	0.00	1.00	Kamba	6605	0.08	0.27	0.00	1.00
	Kikuyu	5905	0.22	0.42	0.00	1.00	Kikuyu	6605	0.17	0.38	0.00	1.00
	Kisii	5905	0.06	0.25	0.00	1.00	Kisii	6605	0.06	0.23	0.00	1.00
	Luhya	5905	0.16	0.37	0.00	1.00	Luhya	6605	0.16	0.37	0.00	1.00
	Luo	5905	0.11	0.31	0.00	1.00	Luo	6605	0.14	0.35	0.00	1.00
	Masai	5905	0.02	0.14	0.00	1.00	Masai	6605	0.01	0.10	0.00	1.00
	Meru	5905	0.05	0.21	0.00	1.00	Meru	6605	0.05	0.21	0.00	1.00
	Mijikenda/Swahili	5905	0.06	0.24	0.00	1.00	Mijikenda/Swahili	6605	0.08	0.27	0.00	1.00
	Somali	5905	0.06	0.24	0.00	1.00	Somali	6605	0.06	0.24	0.00	1.00
	Taita/Taveta	5905	0.02	0.13	0.00	1.00	Taita/Taveta	6605	0.02	0.13	0.00	1.00
	Turkana	5905	0.01	0.12	0.00	1.00	Turkana					
	Kuria	5905	0.01	0.09	0.00	1.00	Kuria					
	Other	5905	0.01	0.12	0.00	1.00	Other	6605	0.06	0.23	0.00	1.00

Table 11: Percentage of HIV positive and negative persons before and after the democracy

		Blood test result (%)				Blood test result (%)		
Before democratization		HIV negative	HIV positive	Total	**After democratization**	HIV negative	HIV positive	Total
		(1)	(2)	(3)		(4)	(5)	(6)
Region	Nairobi	90.84	9.16	100.00	Nairobi	92.28	7.72	100.00
	Central	95.14	4.86	100.00	Central	95.21	4.79	100.00
	Coast	94.41	5.59	100.00	Coast	95.45	4.55	100.00
	Eastern	95.74	4.26	100.00	Eastern	96.67	3.33	100.00
	Nyanza	85.22	14.78	100.00	Nyanza	83.65	16.35	100.00
	Rift Valley	94.93	5.07	100.00	Rift Valley	94.83	5.17	100.00
	Western	94.88	5.12	100.00	Western	93.07	6.93	100.00
Ethnic group	Embu	97.01	2.99	100.00	Embu	97.20	2.80	100.000
	Kalenjin	*96.77*	*3.23*	*100.00*	*Kalenjin*	*97.63*	*2.37*	*100.00*
	Kamba	94.22	5.78	100.00	Kamba	94.16	5.84	100.00
	Kikuyu	95.12	4.88	100.00	Kikuyu	95.15	4.85	100.00
	Kisii	96.06	3.94	100.00	Kisii	93.65	6.35	100.00
	Luhya	93.98	6.02	100.00	Luhya	93.46	6.54	100.00
	Luo	77.52	22.48	100.00	Luo	78.78	21.22	100.00
	Masai	*94.64*	*5.36*	*100.00*	*Masai*	*93.10*	*6.90*	*100.00*
	Meru	96.44	3.56	100.00	Meru	95.19	4.81	100.00
	Mijikenda /Swahili	96.47	3.53	100.00	Mijikenda /Swahili	97.01	2.99	100.00
	Somali	99.15	0.85	100.00	Somali	99.05	0.95	100.00
	Taita /Taveta	90.82	9.18	100.00	Taita /Taveta	94.59	5.41	100.00
	Turkana	*95.12*	*4.88*	*100.00*	*Turkana*	/	/	/
	Kuria	97.78	2.22	100.00	Kuria	/	/	/
	Other	92.05	7.95	100.00	Other	95.49	4.51	100.00
Religion	Roman Catholic	93.01	6.99	100.00	Roman Catholic	92.04	7.96	100.00
	Protestant /Other Christian	92.83	7.17	100.00	Protestant /Other Christian	92.58	7.42	100.00
	Muslim	97.41	2.59	100.00	Muslim	97.19	2.81	100.00
	No religion	94.12	5.88	100.00	No religion	94.18	5.82	100.00
	Other	100.00	0.00	100.00	Other	/	/	/
Place of residence	Urban	90.25	9.75	100.00	Urban	91.51	8.49	100.00
	Rural	94.75	5.25	100.00	Rural	93.82	6.18	100.00
Educational attainment	Primary	96.76	3.24	100.00	Primary	95.27	4.73	100.00
	Secondary	92.70	7.30	100.00	Secondary	94.58	5.42	100.00
	Higher	94.12	5.88	100.00	Higher	94.23	5.77	100.00
Gender	Female	91.55	8.45	100.00	Female	91.59	8.41	100.00
	Male	95.51	4.49	100.00	Male	95.05	4.95	100.00

Table 12: Percentage of HIV positive and negative persons for the whole time period

		Blood test result (%)		
Whole time period		HIV negative	HIV positive	Total
Region	Nairobi	91.60	8.40	100.00
	Central	95.17	4.83	100.00
	Coast	95.01	4.99	100.00
	Eastern	96.25	3.75	100.00
	Nyanza	84.34	15.66	100.00
	Rift Valley	94.89	5.11	100.00
	Western	93.94	6.06	100.00
	North Eastern	99.40	0.60	100.00
Ethnic group	Embu	97.01	2.99	100.00
	Kalenjin	*97.23*	*2.77*	*100.00*
	Kamba	94.19	5.81	100.00
	Kikuyu	95.13	4.87	100.00
	Kisii	94.86	5.14	100.00
	Luhya	93.71	6.29	100.00
	Luo	78.26	21.74	100.00
	Masai	*94.12*	*5.88*	*100.00*
	Meru	95.78	4.22	100.00
	Mijikenda/Swahili	96.79	3.21	100.00
	Somali	99.09	0.91	100.00
	Taita/Taveta	92.82	7.18	100.00
	Turkana	*95.12*	*4.88*	*100.00*
	Kuria	97.78	2.22	100.00
	Other	94.84	5.16	100.00
Religion	Roman Catholic	92.52	7.48	100.00
	Protestant/Other Christian	92.70	7.30	100.00
	Muslim	97.28	2.72	100.00
	No religion	94.15	5.85	100.00
Place of residence	Urban	90.90	9.10	100.00
	Rural	94.26	5.74	100.00
Educational attainment	Primary	92.23	7.77	100.00
	Secondary	93.95	6.05	100.00
	Higher	94.18	5.82	100.00
Gender	Female	91.57	8.43	100.00
	Male	95.27	4.73	100.00
Total		93.27	6.73	100.00

Table 13.a: Verifying balance between groups in terms of individual characteristics

		Individual characteristics		
		Comparison group (C)	Treatment group (T)	Difference T - C
Percentage religion	Protestant	61.05	60.78	-0.26
				(0.008)
	Catholic	24.87	22.70	-2.17***
				(0.008)
	Muslim	10.25	13.54	3.29***
				(0.006)
	No religion	3.63	2.98	-0.65**
				(0.003)
Percentage wealth	Poorest	15.88	18.49	2.61***
				(0.007)
	Poorer	17.53	16.76	-0.77
				(0.007)
	Middle	18.42	16.93	-1.49**
				(0.007)
	Richer	20.37	20.37	0.004
				(0.007)
	Richest	27.80	27.45	-0.35
				(0.008)
Percentage group age	15-19	23.79	22.51	-1.28
				(0.007)
	20-24	19.87	19.82	-0.06
				(0.007)
	25-29	15.36	15.12	-0.45
				(0.007)
	30-34	13.05	13.38	0.33
				(0.006)
	35-39	10.46	10.35	-0.10
				(0.005)
	40-44	8.60	8.49	-0.11
				(0.005)
	45-49	5.67	7.77	2.10***
				(0.004)
	50-54	3.00	2.56	-0.43
				(0.004)
Percentage gender	Female	52.46	54.59	2.13**
				(0.009)

Notes: different individual characteristics or outcomes for control and treatment groups. Data collected from the 2003 and 2008 DHS rounds. Standard errors (in parentheses). * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ indicate significance at the 5, 1 and 0.1% level.

Table 13.b: Verifying balance between groups in terms of individual characteristics

		Individual characteristics		
		Comparison group (C)	Treatment group (T)	Difference T - C
Percentage education attainment	No education	11.52	9.60	-1.98***
				(0.005)
	Incomplete primary	32.18	28.61	-3.57***
				(0.008)
	Complete primary	23.17	24.42	1.25
				(0.007)
	Incomplete secondary	11.31	12.57	1.26**
				(0.005)
	Complete secondary	13.79	15.66	1.86***
				(0.006)
	Higher	8.03	9.14	1.11**
				(0.005)
Percentage ethnic group	Kikuyu	22.44	17.31	-5.13***
				(0.007)
	Luhya	16.04	16.55	0.51
				(0.006)
	Luo	11.24	13.71	2.48***
				(0.006)
	Kamba	9.56	7.93	-1.62**
				(0.005)
	Kalenjin	9.45	9.48	0.03
				(0.005)
	Kisii	6.58	5.88	-0.70
				(0.004)
	Mijikenda/Swahili	6.36	8.28	1.92***
				(0.004)
	Somali	5.71	5.89	0.18
				(0.004)
Percentage marital status	Married	52.15	51.94	-0.21
				(0.009)
	Never married	37.24	37.28	0.04
				(0.008)
	Other status	10.60	10.76	0.17
				(0.005)
Percentage place of residence	Rural	70.28	70.89	0.61
				(0.008)

Notes: different individual characteristics or outcomes for control and treatment groups. Data collected from the 2003 and 2008 DHS rounds. Standard errors (in parentheses). * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ indicate significance at the 5, 1 and 0.1% level.