Health Policies for Women Empowerment:

Evidences from Malawi's Antiretroviral Therapy for HIV campaign

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Abstract

Can major health interventions promote women empowerment? Focusing on rural Malawi, I study the effect of Antiretroviral Therapy (ART) to combat the HIV/AIDS epidemic on women empowerment. To identify the effect, I use the ART roll-out campaign launched by the Malawian government starting in 2004. Based on the scope and accessibility of treatment, I calculate an index to measure the benefit of ART to a community. Women in communities that have benefited the most from the treatment, both in terms of the number of beneficiaries and access, experienced an increase in decision-making and a decrease in experiencing physical violence. The rise in women empowerment can be explained by the positive effect of health improvement on economic empowerment and human capital formation. This paper calls for a central role of health interventions in future women empowerment campaigns.

Keywords: HIV, Women Empowerment, Health Interventions, ART expansion, Africa, Malawi

JEL Codes: I15, I18, I38, J16, O10

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1 Introduction

Promoting women empowerment is crucial for sustainable development (UN (2000); UN Assembly (2015); Page and Pande (2018); Duflo (2012)). All over the world, cultural norms, stereotypes, and gender-based violence still prevent women from accessing proper education, economic resource, and health. Recently COVID-19 pandemic has dramatically shown that some health shocks may affect women more than men in terms of their impact on well-being (Etheridge and Spantig (2020)), occupation (Adams-Prassl et al. (2020)), and workload in the household (Farré et al. (2020)). Similar negative effects of a health shock on women empowerment have been observed in the context of the HIV/AIDS epidemic in Sub-Saharan Africa (SSA). Over 25 million people still live with HIV in SSA, and the deaths from HIV/AIDS are still 600 thousand per year. Cultural and biological factors make women in the African continent more exposed to HIV, and today a young woman is twice as likely to become HIV positive than a young man (Anderson (2018)).[1] International organizations have argued that there is a relationship between HIV/AIDS and women empowerment. Gender-based violence, lack of education, and poverty may make women more exposed to the virus, while the spread of the HIV/AIDS epidemic negatively affected women economic empowerment, reducing women work productivity, and women human capital, especially through a negative effect on women education. This negative relationship seems to go beyond the direct effect of being ill on empowerment, but it extends to the general population. Previous literature, as Conroy et al. (2013); Baranov et al. (2015), has shown how in HIV-endemic areas this virus has shaped beliefs and incentives affecting people's decision-making process regardless of their illness. At the same time, while being more exposed to the virus, the female population has also a higher chance to receive proper care for HIV. Since the early 2000s, the UN has implemented policies to reduce the Mother-to-Child transmission of HIV. As a result of these programs, women are more likely than men to know about their

[1] `https://www.unaids.org/en/resources/documents/2018/women_girls_hiv`

HIV status and being on treatment.[2] Both the COVID-19 and HIV/AIDS epidemics suggest an important and strong relationship between health and women empowerment. However, whether major health interventions may play a role in empowering women still remains unexplored.

The HIV pandemic and its management in Malawi provide a unique natural experiment to answer this question. HIV virus started spreading in Africa during the 70s, and, by 2000, over 36 million in the world were living with the virus (UNAIDS (2000)). Although the first antiretroviral therapy (ART) was approved in the US in 1987, ART was not available in the African continent until 2001 because of its prohibitive cost. In 2001, thanks to international organizations and public opinion campaigns, generic drugs for HIV were introduced in the market, leading to a massive drop in the price and cost of ART. The drop in drug prices allowed countries, often with the support of international organizations, to start ART rollout campaigns. In 2004, the Malawian government, with the support of the Global Fund, started a program aiming to provide free ART in the health facilities of the country. In the early 2000s Malawi was one of the poorest countries in the world and one of the most plagued by the HIV epidemic, with a prevalence of 14.9% among the adult population (World Bank, 2000). The impact of this campaign on health in the country has been massive, because of the HIV pandemic life expectancy dropped to 45 years in 2000, and started increasing toward the end of the decade of the millennium reaching 55 years in 2010 and over 64 years by 2019 (World Bank). Beyond the direct effect of ART on life expectancy, we observe a positive impact on work productivity and supply, mental health, saving and investment in human capital on both HIV-positive and negative people (Baranov et al. (2015); Baranov and Kohler (2018); Dickerson et al. (2020)). Recent literature has shown how ART rollout has promoted economic growth (Tompsett (2020)) and reduced social violence in the African continent (Berlanda et al. (2022)). Despite evidence of spillover effects of major health policies, there is still no evidence of an effect of them on women empowerment.

[2] https://www.unaids.org/sites/default/files/media_asset/live-life-positively-know-your-hiv-status_en.pdf

In this paper, I will show how major health intervention, such as ART rollout, has a positive impact on women empowerment, defined as *power to achieve goals and ends*.[3] I perform my analysis using a repeated cross-section of rural clusters of Demographic Health Surveys (DHS), from 4 waves conducted in Malawi between 2000 and 2016[4]. Since information on the number of people receiving ART is not available at the sub-national level, I rely on a proxy to identify the communities that benefited the most from ART availability. To do so, I exploit the geographical variation of the scope of the treatment and the access to it. I measure the scope of treatment using HIV prevalence in 2000 for each cluster. In this way, I capture the number of potential beneficiaries of the treatment in each community at the peak of the HIV pandemic. The second source of information I use is effective access to the treatment. Using data on health facilities' location, road network, and first geography, I construct a measure of access to health for each cluster in my sample. Proximity to facilities is a crucial determinant of access to health services in rural SSA. I then construct a measure of benefit from ART using the interaction of these two terms.

In this work, I perform a pre-post analysis resembling a non-staggered difference-in-difference approach. Because of data availability, I do not have information about the timing of treatment provision for each clinic, so I assume that each health facility started providing ART in 2004. This approach can be viewed as a conservative one, since considering all clinics treated at the same time would eventually imply an attenuation bias. In my baseline analysis, I include all the health facilities of the country in 2013, but results are robust if I restrict the clinics only to the ones actually providing ART in 2013 or to the public ones. I find that higher exposure to treatment, both in terms of the number of beneficiaries and access, has led to an increase in women empowerment after 2004. In particular, higher exposure to ART is associated with more decision-making by women, and a lower likelihood of experiencing physical violence. Despite the set of fixed effects included in the analysis, there is the possibility that, with my analysis,

[3]Following Demographic Health Surveys guidelines (`https://dhsprogram.com/pubs/pdf/CR20/CR20.pdf`), I define empowerment as *power to achieve goals and ends* and not as power *over* others.

[4]DHS collected 4 waves in Malawi over the period 2000-2016: 2000, 2004, 2010, 2015-16

I am capturing some variation due to other policies or cultural factors that may have affected women empowerment after 2004 and access to treatment. These concerns are relaxed, since possible confounders, such as education campaigns, cultural norms, and measures to sustain women occupation, are ruled out as drivers of the results. The main channels, through which ART expansion affected women empowerment, are economic empowerment, through a positive effect on women participation in the labor market, and a human capital channel, through a positive effect on young women education.

This paper contributes to the literature in several ways. The first contribution concerns the understanding of the relationship between HIV/AIDS epidemic and women empowerment. Previous literature has studied how lack of empowerment and poverty expose women to HIV/AIDS epidemic in Africa (Türmen (2003); Mufune (2015); Ramjee and Daniels (2013)), showing a relationship between lack of empowerment and poor health (Bashemera et al. (2013)). This work first provides an example of how health interventions are viable instruments for policymakers to promote women empowerment. A second contribution is providing new insight into the spillover effects of major health interventions in the context of HIV/AIDS epidemic. This paper complements previous literature on the effect of ART availability. Previous works have provided evidence of the impact of ART on fostering productivity and time devoted to work (Baranov et al. (2015)), on investment choices (Baranov and Kohler (2018)), on economic growth (Tompsett (2020)), and on social stability (Berlanda et al. (2022)). This paper complements this literature by providing evidence about the effect of ART on the extensive margin of female labor supply and investment in education. Finally, this work contributes to the literature studying the relationship between health and human capital. Becker (2007) provides a theoretical framework explicitly introducing health in a human capital model. The following literature showed that, according to Becker's prediction, improving health has a positive effect on productivity (Hokayem and Ziliak (2014)), and promotes investment and human capital accumulation (Goodman-Bacon (2021); Papageorge et al. (2021)).

The remainder of the paper is organized as follows. Section 2 provides background

on Malawi and its ART roll-out campaign. Section 3 describes the data used for the analysis. Section 4 describes the empirical approach used in the paper, and Section 5 discusses the main findings. Section 6 investigates the channels through which health policies affect women empowerment. Section 7 discusses the results and concludes.

2 Background

Management of the HIV pandemic in Malawi provides a unique setting to study the effect of the introduction of ART on women empowerment. Malawi is a land-locked low-income country in Eastern Africa, with an estimated population of 18.6 million people in 2019 (World Bank, 2019). With a GDP per capita of 583$, Malawi is one of the poorest countries in the world and over 80% of the population lives in rural areas, and the country's economy heavily relies on agriculture. The HIV/AIDS pandemic is the main public health issue in Malawi, where 10.6% of the adult population (15-64) was living with HIV in 2016.[5] This epidemic disproportionately affects women: in the adult population HIV prevalence among women is 12.8%, compared with 8.2% among men. Women and girls in Malawi experience worse living conditions and opportunities than their male counterparts, as shown by socio-economic indicators about education and labor outcomes (WEF (2021); Bank (2021)). In 2021, the secondary education gender parity ratio in the country was still 84%, with a proportion of over 60 men for 40 women in universities. Due to a lack of resources, women-managed plots in the agricultural sector, the most important for the economy, are 25% less productive than the ones managed by men. The major obstacle to gender equality and women empowerment in the country is often identified in the lack of access to economic resources.[6] The combination of these factors, lack of access to education and resources, make women more exposed to poverty and then increases their exposure to HIV (Mufune (2015); Anderson (2018)). At the same time, as shown by Baranov et al. (2015), exposure to HIV in Malawi has reduced people's labor provision, and it is true especially for women, because of their traditional

[5]Malawi Population-Based HIV Impact Assessment (MPHIA), 2015-16

[6]`https://www.usaid.gov/gender-equality-and-womens-empowerment`

caregiver role in the household. The HIV pandemic creates a vicious circle in which the disease creates poverty and, at the same time, poor people are more exposed to the disease, because of their behavior and deteriorating health conditions. This loop affects women more than men, and it results in even lower access to economic resources, with a detrimental effect on women empowerment.

ART rollout campaign. Despite the first Antiretroviral Therapy (ART) being discovered in the US in 1987, the treatment was not available in the African continent because of its prohibitive price. Only in the early 2000s, thanks to public opinion and international institutions' support, the price dropped dramatically and the treatment became available worldwide.[7] Before 2004 ART in Malawi was de facto not available, and only 3000 people out of approximately 930000 HIV-positive people were on ART. In 2003 Malawian government announced that it would have provided free ART to all HIV people in the country eligible for treatment.[8] One important feature of the ART rollout in Malawi was that it happened mainly through already existing clinics and hospitals. Because of very rigorous requirements for clinics, the expansion of the program was slow and by the end of 2005, only 60 health facilities were providing ART. Starting in 2006, in order to maximize ART coverage in the country, the Malawian government relaxed the standards for health facilities to access the program, making eligible all clinics with at least one data clerk (Baranov and Kohler (2018)) As a result of this change in the policy, by end of 2010, the number of clinics providing ART was over 300, reaching a total of 716 ART clinics in the country by 2015 (Jahn et al. (2016)).

Geographical coverage has been crucial for the success of the program since enrollment and adherence to the program are very costly for patients. ART recipients are required to visit a health facility every two weeks in the first month after the treatment began.

[7] In 2001 ART drugs price dropped from over 10000 $ to less than 1000$ per person/year (Tompsett (2020)).

[8] Eligibility for ART depended, according to WHO guidelines of the time, on the lymphocyte count of a patient. In 2004 were eligible all the patients in clinical stages 3 and 4 disease or patients with lymphocyte counts below 200 cells/μL

They should then visit once per month in the following semester and after that once every 3 months. For this reason distance from a health facility has been crucial for access and adherence to treatment in Malawi (Koole et al. (2014)).

3 Data

To study the effect of ART availability on women empowerment in Malawi, I use survey data collected by the Demographic and Health Surveys Program (DHS). The surveys are conducted in the years 2000, 2004, 2010, and 2015. As units of observation for the analysis, I use clusters, groupings of households that participated in the surveys, located in rural areas of the country. For each cluster DHS reports the GPS coordinates, however, in order to ensure respondent confidentiality, latitude and longitude are randomly displaced by a few kilometers.[9] The resulting dataset is a repeated cross-section containing a total of 2210 rural clusters over the 4 waves of the DHS survey.[10] I match each DHS cluster with the respective administrative unit, assigning each to the respective Region, Province, and Traditional Authority Area.[11] In the analysis, I exploit variation across DHS clusters within waves and Traditional Authority Areas. For each unit of observation, I compute then indicators of women empowerment according to DHS guidelines and I create a measure of exposure to ART in the country. Table A1 reports summary statistics of the variables described in Section 3.

Women Empowerment Indicators: Decision Making. Following DHS guidelines[12], I define empowerment as *power to achieve goals and ends* and not as power *over*

[9]Clusters are divided between urban clusters, which contain an error ranging between 0 and 2 km, and rural clusters, which contain an error ranging between 0 and 5 km. There is moreover a 1% of rural clusters displaced between 0 and 10 kilometers. The displacement is anyway restricted so that the points stay within the country and within the DHS survey region.

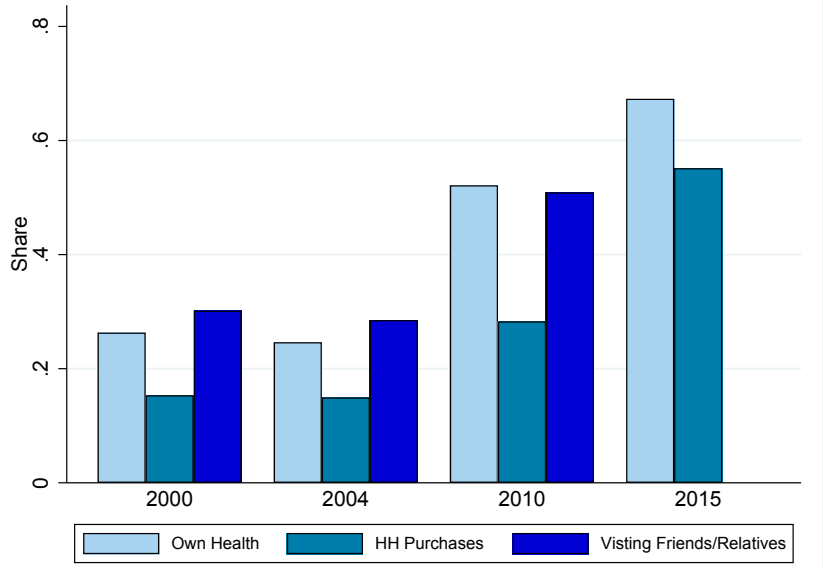
[10]More specifically, I have 435 rural clusters for the 2000 wave, 445 for the 2004 wave, 669 for the 2010 wave, and 661 for the 2015 wave.

[11]To do so, I construct a 5 km buffer around each rural cluster, then I assigned it to the most likely administrative unit

[12]`https://dhsprogram.com/pubs/pdf/CR20/CR20.pdf`

others. DHS measures women empowerment in terms of control over various aspects of life and the surrounding environment. The main indicator of women empowerment in the Malawi surveys is participation in decision-making. The relevant questions about women's decision-making are contained in Individual Recode (IR), the DHS dataset containing one record for every eligible woman as defined by the household schedule. DHS questionnaires aim to investigate decisional power in different spheres of a woman's life: the personal sphere, asking about decisions on respondents' own health, the family sphere, asking about big purchases decisions in the household, and the public sphere, asking about decisions on visiting friends or relatives. For each cluster and wave, I compute the share of married women participating in decision-making, according to DHS guidelines[13], data are shown in Figure 1. Figure 1 displays an increase in women partic-

Figure 1: Women Empowerment Indicators: Decision Making



Notes: The figure shows the time evolution of decision-making indicators over time. Light blue bars (*Own Health*) show the time evolution of the share of currently married women participating in decision-making about their own health. Bright blue bars (*HH Purchases*) show the time evolution of the share of currently married women participating in decision-making about big purchases in the household. Blue bars (*Visitng Friends/Relatives*) shows the time evolution of the share of currently married women participating in decision-making about visits to friends and relatives. Data are from DHS collected in Malawi over the period 2000-2016.

[13] `https://dhsprogram.com/data/Guide-to-DHS-Statistics/Participation_in_Decision_Making.htm`

ipating in each of the decisions over time, with a dramatic increase after the year 2004. Following DHS guidelines, I define as *empowered* the women participating in all the decisions discussed above. I create two outcome variables that capture the decision-making process. The first variable, labeled as *All Decisions*, is the share of women participating in all the decisions available in each specific year. The second variable, labeled as *Own Health & HH Purchases*, restricts the analysis only to the two decisions, the health and household ones, for which I have information in all 4 waves.

Women Empowerment Indicators: Domestic Violence. As an alternative proxy for women empowerment, following UN directive (Walby (2007)), I use data on women experiencing physical violence. DHS surveys from 2004 ask women if they have experienced physical violence in the 12 months before the interview. I use then this information to compute the share of women in my sample who experienced physical violence in the 12 months before the interview at the cluster-wave level.

Additional Women Empowerment Indicator: Attitude Towards Intimate Partner Violence (IPV). As a measure of women empowerment, I use data on women's and men's attitudes toward Intimate Partner Violence. DHS surveys from 2000 ask women and men under which circumstances they find justifiable if a husband exerts physical violence on his spouse. The questionnaire contemplates abroad series of answers regarding aspects of women's life in the household, in the community, or in their sexual life. This variable takes value one for individuals who never justify violence. I use then this information to compute the share of women and men who never justify IPV in each cluster.

Benefit from ART provision program. As discussed in Section 2, in 2004, the Malawian government started a program to provide free ART to HIV-infected people in 9 hospitals situated in urban areas of the country. In the following years, the program expanded to other clinics in the country, both in urban and rural areas. Since I don't have detailed data on the program provision, to evaluate the effect of this policy, I use

two time-invariant measures to evaluate the beneficial effect of ART availability at the cluster level. The first one is the share of the adult population (15-49) living with HIV in 2000. This variable is meant to capture the share of the population benefiting from ART in a cluster. Considering the random displacement of the clusters, I assigned to each cluster the average HIV prevalence in 2000 within a radius of 5 km from the GPS coordinates in the survey. Panel (a) of Figure 2, shows the spatial distribution of HIV prevalence in the country. In the sample HIV prevalence in 2000 ranges between around 9% and 32% with an average value of around 17%.

The second measure is an interaction between the number of beneficiaries, given by the number of HIV-positive people in 2000, and the effective access to treatment, given by proximity to the closest health facility. In the baseline analysis, I construct two different measures of proximity to a health facility. The first one is the walking distance of each cluster from the closest health facility (panel (b) of Figure 2). Using the software AccessMod (Ray and Ebener (2008)) I constructed a Friction Surface Raster combining raster images of roads (Google Street View), rivers, land cover (Figure A1), and data on topography (Figure A2). Following Palk et al. (2020), I defined the walking speed for each cell of the Friction Surface Raster, and I computed the distance in minutes from the closest health facility for each cell of the grid (Table A4). The final result is a map of access to health by walking at a resolution of 30 meters $\times$30 meters. I assigned then to each cluster the average value within a 5 km radius from it, taking into account the coordinates randomization made by DHS to grant anonymity of the respondents. In the rural clusters sample, the average walking time of each cluster from the closest health facility is 98 minutes, ranging between 28.9 and over 470 minutes. The second, and simpler, measure of proximity is given by the inverse geodesic distance from the closest facility measured in kilometers.[14] As robustness, I then construct other two measures of proximity based on the linear and logarithmic transformation of distance.

[14]More specifically $Proximity_{c,h} = \frac{1}{1+distance_{c,h}}$, where c represent the cluster and h the closest health facility.

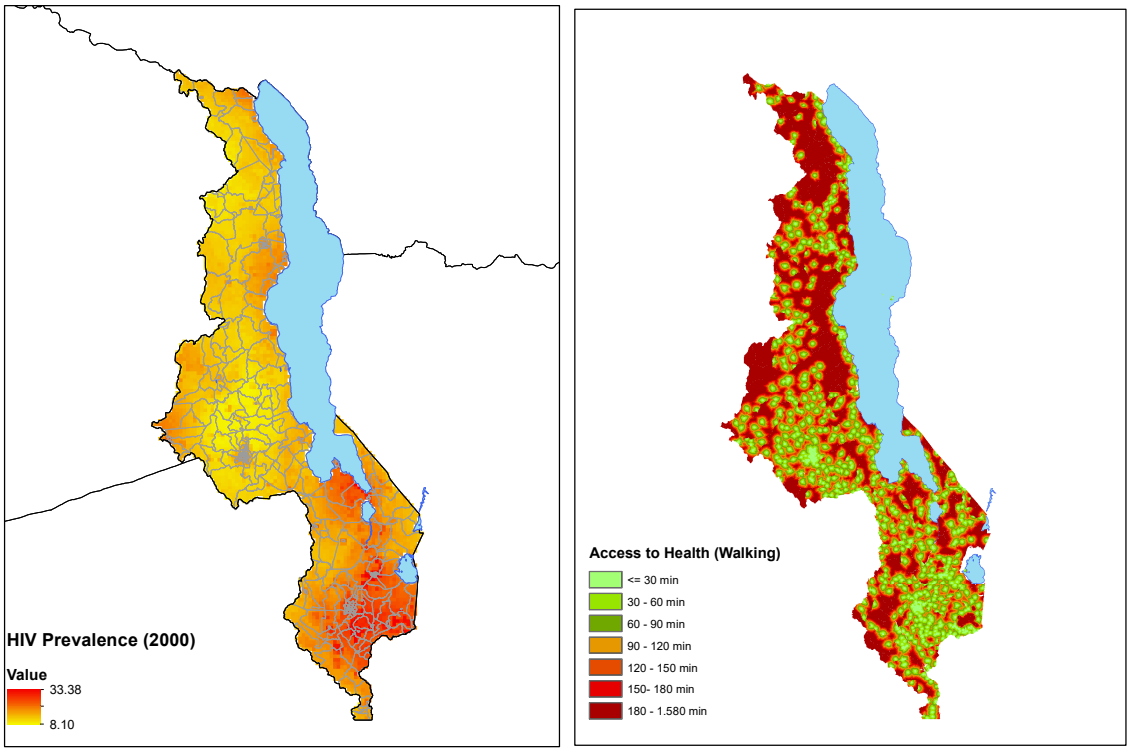
[15] In my sample the average distance of each cluster from the closest health facility is 4.4 km, ranging between clusters located within 1 km from the closest health facility to clusters that are more than 24 km far from the closest structure. To allow comparability between the measures I have converted the walking time in 15 minutes units, which represent the average speed to cover 1 km walking. Distance from health structures is a reliable proxy for access to health care in Africa (Guenther et al. (2012)), and in particular, is a significant predictor for access and adherence to ART in rural areas (Koole et al. (2014)). The combination of these two elements, HIV prevalence, and proximity, captures the potential benefit in a DHS cluster from ART provision after 2004: the greater the number of recipients, the greater the benefit of ART availability and, at the same time, the closer a health facility is, the higher is the probability of actually receiving the treatment.

Data on HIV prevalence are from Institute for Health Metrics and Evaluation (IHME)(Sartorius et al. (2021)). Using data on HIV and geographical location from surveys and sentinel surveillance of antenatal care clinics, IHME produced estimates for HIV prevalence among the adult population. The estimates are produced at 5×5 km grid level and cover 47 countries in Africa for a period between 2000 and 2017. In the analysis, I use HIV prevalence in 2000 in Malawi, in order to capture the HIV epidemic in the country right before ART became available in the African continent.

Data on health facilities come from Malawi DHS Service Provision Assessment (SPA) 2013-2014. This survey contains data on health facilities active in Malawi between 2013 and 2014, providing information about location, type of facility, and the services provided for 997 health facilities. In the analysis, I exploit as robustness information about the owner of the clinic, namely if it's public or private, and if in 2013 the clinic was part of the ART program provision. Figure A3, shows the spatial distribution of health facilities in Malawi, and it reports information about who manages each facility.

[15] More specifically, define the maximum distance of a cluster from a clinic in the sample as $dist_{max}$. Then: $LinearProximity_{c,h} = 1 + (dist_{max} - distance_{c,h})$ and $LnProximity_{c,h} = ln(1 + (dist_{max} - distance_{c,h}))$, where c represent the cluster and h the closest health facility.

Figure 2: Exposure to Treatment



(a) HIV Prevalence (b) Health Facilities

Notes: Panel (a) shows the spatial distribution of HIV prevalence in Malawi in 2000; data source: IHME, Sartorius et al. (2021). Panel (b) shows the distance in minutes of each location in Malawi from the closes health facility; data source: author's computations.

Additional Data. In my analysis, I use the information on women's employment status, educational attainment, and living in a polygynous household[16]. All those variables are constructed using DHS surveys over the period 2000 and 2015-16. The women employment indicator measures the share of married women who have been employed in the 12 months before the interview.[17] As educational attainment measure I use the share of women who completed primary education, and I compute this measure both for the married women in my baseline analysis and for all the young women (15-24) in DHS

[16]Polygyny is defined as the marriage of a man with several women

[17]`https://dhsprogram.com/data/Guide-to-DHS-Statistics/Employment_and_Occupation.htm`

surveys.[18] Finally, I use the information on the number of co-wives that a woman has to determine the share of married women living in polygynous households.[19]

4 Empirical Strategy

4.1 A Graphical Illustration

As discussed in section 2, the HIV pandemic disproportionately affects women in the African continent. Lack of women empowerment, cultural norms, and biology are crucial factors in explaining why women in Africa are more affected by HIV (Anderson (2018); Türmen (2003); Kim et al. (2008); Ramjee and Daniels (2013)). Figure 3 shows the time evolution of the raw mean of the main outcome variables discussed in Section 3. The summary statistics show a large improvement in women empowerment after 2004, which coincided with the ART rollout campaign to combat the HIV epidemic. Despite it being a simple correlation, these first pieces of graphical evidence suggest a potential relationship between ART provision and an improvement in women empowerment in the country.

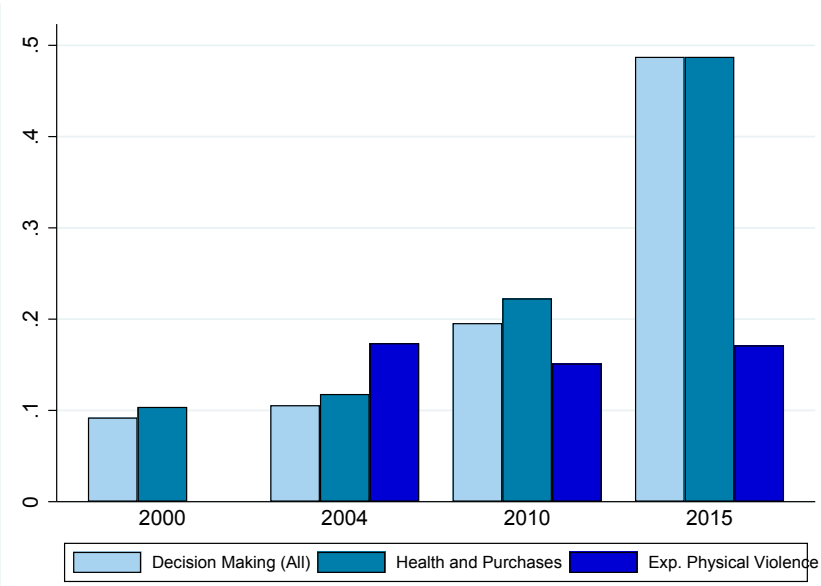
4.2 Baseline Analysis

I study the impact of ART availability on women empowerment indicators in Malawi using a repeated cross-section of (2210) DHS clusters, from four DHS rounds conducted between 2000 and 2016. I exploit the Malawian government's campaign started in 2004 to provide ART free of charge in health facilities described in Section 2. The implementation of this policy has been staggered over time across the country. It is then crucial that the timing of the policy has been exogenous to women's condition in the country. According to the literature, Baranov and Kohler (2018), the Malawian government's aim has been

[18] https://dhsprogram.com/data/Guide-to-DHS-Statistics/Educational_Attainment_of_Women_and_Men.htm

[19] https://dhsprogram.com/data/Guide-to-DHS-Statistics/Number_of_Co-Wives_and_Number_of_Wives.htm

Figure 3: Outcome variables



Notes: The figure shows the time evolution of women empowerment indicators over time. Light blue bars (*Decision Making (All)*) show the time evolution of the share of currently married women participating in all the decisions available in each specific year. Bright blue bars (*Own Health & HH Purchases*) show the time evolution of the share of currently married women participating in decision-making about their own health and big purchases in the household. Blue bars (*Physical Violence*) shows the time evolution of the share of currently married women who have experienced physical violence in the 12 months before the interview. Data are from DHS collected in Malawi over the period 2000-2016.

reaching the maximum geographical coverage for ART provision, so the timing of policy implementation should be a concern. In this work, because of data limitation, I adopt a more conservative approach and I assume that every clinic in the country started to provide the treatment after the year 2004. This approach allows me to rule out any potential endogeneity due to the timing of the campaign.

I run a pre-post treatment analysis resembling a Difference in Difference approach (DID). The first difference with a standard DID is that my sample is composed of a repeated cross-section and then it is not possible to include the unit of observation fixed effects. The second difference is that my treatment is continuous and that I consider as treated every unit after 2004. This determines the fact I do not have a not-treated control group after 2004 as in standard DID. The main analysis equation takes the following

form:

$$WomEmp_{c,t,a} = \beta \cdot Post_{2004} \cdot Exposure_c + \gamma \cdot Exposure_c + \theta_{r,t} + \eta_a + \epsilon_{c,t,a} \quad (1)$$

$WomEmp_{c,t}$ represents different women empowerment indicators, measured as the share of women in a cluster participating in decision-making about their life and the share of women who experienced domestic violence in the 12 months preceding the surveys t. $Exposure_c$ is a time-invariant measure of exposure to treatment once it becomes available, I compute this measure at the cluster level exploiting, as discussed in Section 3, geographical variation in the access and scope of the treatment. The first, and simplest, measure relies on the geographical variation in the scope of the treatment, so the number of people benefiting from it, and it is proxied by the HIV prevalence in the year 2000. This measure ($HIV_{2000,c}$) allows a simple interpretation of results, but it doesn't take into account effective access to the treatment. I build then a variable capturing the effective exposure to the treatment, which is a crucial factor to explain access to health in rural areas of SSA. The second measure of $Exposure_c$ relies on the interaction between the scope of treatment and effective access to health measured as proximity to the closest health facility ($\cdot HIV_{2000,c} \cdot Proximity_c$). The rationale for this measure is as follows. First, HIV prevalence in 2000 in a cluster captures the share of the adult population that will benefit from ART once it becomes available. Second, following Koole et al. (2014), distance from health facilities captures how easy, and then likely, it is to access and adhere to the treatment once it's available. The proximity-based exposure indicator increases with the number of beneficiaries and access to treatment. I use as a measure of proximity to health facilities the inverse of the walking distance from the closest health facility and the inverse geodesic distance as discussed in Section 3. I interact then the $Exposure_c$ variable with a binary indicator, $Post_{2004}$, taking value 1 for DHS conducted after 2004: coefficient β captures the potential benefit from access to ART. I expect the relevant coefficient, β_1, to be positive since the higher the number of people who can benefit from the treatment the higher will be the impact of ART once it becomes available.

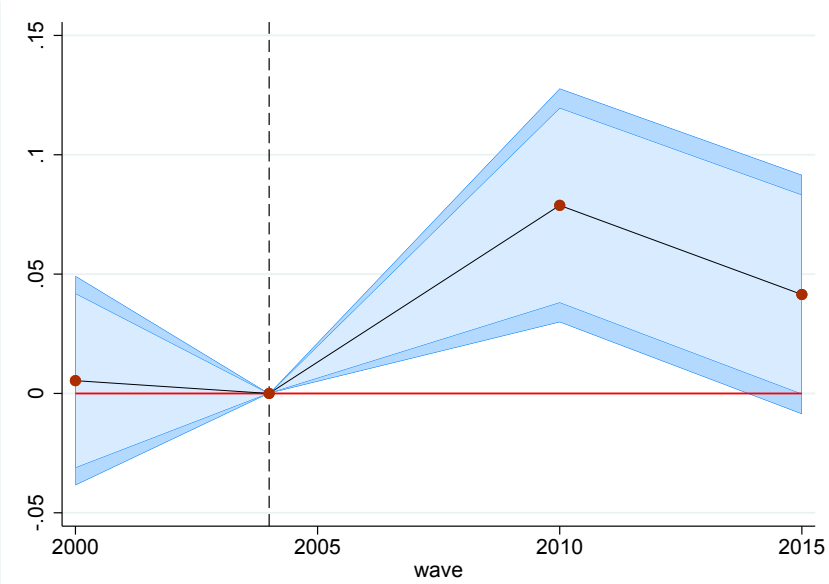
I include then an exhaustive set of fixed effects: $\theta_{r,t}$ captures fixed effects at region-

year[20] level, while η_a captures fixed effects at Traditional Authority area level. In my analysis, I include 204 admin3 areas, allowing me to relax the concerns about the cross-sectional structure of my data, and exploit variation within each admin 3 unit. Standard errors are clustered at the Traditional Authority area level.

DID exercise. Since my identification strategy resembles a DID, I decide to test if the parallel trends assumption holds. In this way, I can be reassured that the policy has been designed without targeting areas in which women empowerment was more lacking. To do so, I define a binary treatment based on HIV prevalence, where I consider as treated only the clusters in which HIV prevalence in 2000 is above the median. In this way, I am not bound by continuous treatment and, more importantly, I am able to identify a control group in my analysis. Considering the relationship between HIV and women empowerment, the biggest concern for identification strategy is that areas with higher HIV prevalence exhibited different trends in women empowerment before 2004. If that was the case, it would be possible that the policy was implemented to empower women in high-prevalence HIV-affected areas as well. Table A2 shows the summary statistics for the two groups before and after 2004. In the period before treatment, we do not observe systematic differences between the two groups in terms of women empowerment indicators, educational outcomes, and participation in the labor force. However, areas with lower HIV prevalence are likely to be located further (half s.e. difference) from health facilities. I then regress the HIV binary indicator with dummy variables for each wave of DHS surveys using as a reference wave the one performed in 2004. Figure 4 plots the marginal effect of a high HIV prevalence in the country and shows how there isn't any trend in HIV prevalence before ART became available, while there is a largely positive effect in the period right after treatment provision started. Because of data limitations, this event study is not exhaustive in removing all the concerns about possible pre-trends in the results. However, combined with the evidence provided in Section 4.1, this exercise suggests that my results are not driven by trends in the pre-treatment period.

[20]With region I refer to the three Administrative 1 units of Malawi: Northern Region, Central Region, and Southern Region

Figure 4: Event Study: Decision Making



Notes: The figure plots the event study graph for the coefficient of interest β from Equation 1. In this analysis, $Exposure_c$ is a binary indicator if the share of HIV in 2000 for the cluster is above the median level. The outcome variable is the share of women participating in all the decisions available (*Decision Making (All)*). The darker blue area shows the 95% confidence interval, the lighter blue area shows the 90% one.

Identification The identification of the effect of exposure to ART on women empowerment in equation 1, β, relies on the assumption that the measure of exposure to treatment is uncorrelated with unobserved or omitted factors in the error term $\epsilon_{c,t}$. Conditional to the set of controls and fixed effects included in the main analysis, the two elements of the measures of exposure to treatment, HIV prevalence and proximity to the closest health facility, are exogenous to women empowerment indicators. Before 2001, ART was not available in the African continent so policymakers didn't have any valid instrument to contrast effectively the epidemic. For this reason, it is safe to assume HIV prevalence in a cluster is related to specific historical, cultural, and social factors. Those factors are taken into account by the vast set of fixed effects included in the regression. In particular, Traditional Authority Areas[21] fixed effects take into account differences in cultural, social, and gender norms that have played a role in the spread of HIV. A

[21] According to UN, Traditional Authorities act as custodians of the cultural and traditional values of community link [Accessed: 09/12/2021]

second crucial aspect is that the clinics' location, and then their distance, is not related to policies affecting women empowerment or ART provision. This could be the case if the government has built new health facilities trying to boost the provision of ART or if health facilities have been used for other policies that could have an impact on women empowerment. Baranov et al. (2015); Baranov and Kohler (2018); Dickerson et al. (2020), have shown how the Malawian government did not target specific areas for the ART roll-out and that it used health facilities already existing in 2004 for policy implementation. The inclusion of Traditional Authority area fixed effects helps again in taking into account any systematic difference in clinic availability due to ethnic and cultural factors. Finally, the inclusion of region-wave fixed effects takes into account any shock change in policy at the national and regional level that may have had an impact on both access to treatment and women empowerment.

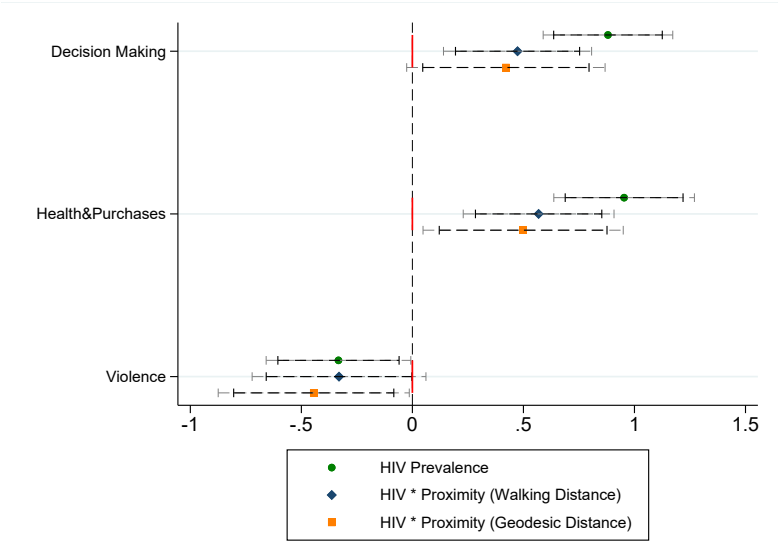
5 Results

Baseline Analysis. Figure 5 and Table A5 report the results for the impact of exposure to ART on women empowerment using the estimation strategies discussed in Section 4. The figure shows results on the share of women taking decisions about their life and women experiencing physical violence.

The first panel shows the results of ART availability on the share of women who report participating in decision-making about different aspects of their own life. The second panel shows results for the decision-making indicator constructed using the sub-sample of decisions, on women's own health and major purchases in the household, covered over the entire period by DHS surveys. Estimates show a positive and statistically significant relationship between both the decision-making variables and the measures of exposure to treatment after the year 2004.

The final panel of the figure reports the effect of ART availability on the share of women experiencing physical violence in the 12 months before the interview. Estimates show a negative and statistically significant correlation between experiencing physical

Figure 5: Baseline Analysis



Notes: OLS Estimates for effect of ART availability on women empowerment, using specification described in equation **??**. I use three proxies to measure exposure to ART. HIV prevalence in 2000 (HIV) meant to capture the number of potential recipients of the treatment (green dots). An interaction between HIV prevalence and access to the clinic ($HIVxProximity$ (Walking Distance)) that combines the prevalence of HIV with access to ART measured as the inverse walking distance from the closest clinic (blue diamonds). An interaction between HIV prevalence and access to the clinic ($HIVxProximity$ (Geodesic Distance)) that combines the prevalence of HIV with access to ART measured as the inverse geodesic distance from the closest clinic. This variable is meant to capture the exposure to ART combining the number of recipients and effective access to the treatment.
Dependent variables: first panel (*Decision Making (All)*), the share of currently married women participating in all the decisions available in each specific year; second panel (*Health & HH Purchases*), the share of currently married women participating in decision making about their own health and big purchases in the household; third panel (*Physical Violence*), the share of currently married women who have experienced physical violence in the 12 months before the interview. More details on the outcomes variables are provided in Section 3. Black lines show the 95% confidence interval, grey lines show the 90% one.

violence and ART exposure proxies after the year 2004. As an alternative outcome variable, I explore if ART introduction has had an impact on the attitude toward Intimate Partner Violence (IPV). DHS surveys contain information on when a person finds it justifiable that a husband exerts physical violence on his spouse. Table A6 reports the results for this analysis, showing how ART expansion is associated with a higher share of women never justifying IPV. This variable is interesting because it allows us to measure men's attitudes toward it. Surprisingly, more men than women never justify IPV, however, we do not observe any change in their attitude because of ART.

While the OLS analysis shows a strong significant effect of ART on promoting women empowerment, it is not straightforward how to quantify the effect of exposure to ART. To provide an example of that, we can interpret the results for the analysis using only HIV prevalence as a proxy for the benefit of ART. The total effect of a 1 p.p. increase in HIV prevalence in the post period, summing up the effect before and after 2004, is an increase of around 0.74 p.p. on all decision-making variables, and a decrease of 0.18 p.p. on the share of women experiencing physical violence. This means that for the average cluster in terms of HIV prevalence, the introduction of ART implied an increase in decision-making indicators of over 12 p.p. and a decrease in physical violence of around 3 p.p. Concerning decision-making, this effect explains around 30% of the total increase in decision-making indicators observed in the data.

Table A7 reports results for the baseline analysis using different methods to compute geodesic distance. More specifically, rather than using the inverse distance, I use the linear and logarithmic distance from the closest health facility described in Section 3. Results are robust across all different specifications, showing how greater exposure to treatment has led to more women empowerment.

Table A8 reports results for baseline analysis analyzing the effect of ART expansion on the single components of the decision-making indicators. Column (1) presents the results of the baseline analysis. Column (2) shows results for the share of women participating in decision-making about their own health. Column (3) presents results for the share of women taking part in decision-making on big purchases for the household. Finally, column (4) show results for the share of women who participate in decision-making about visiting friends or relatives. Both ART availability proxies show a positive and robust correlation with all the components of the women empowerment indicators.

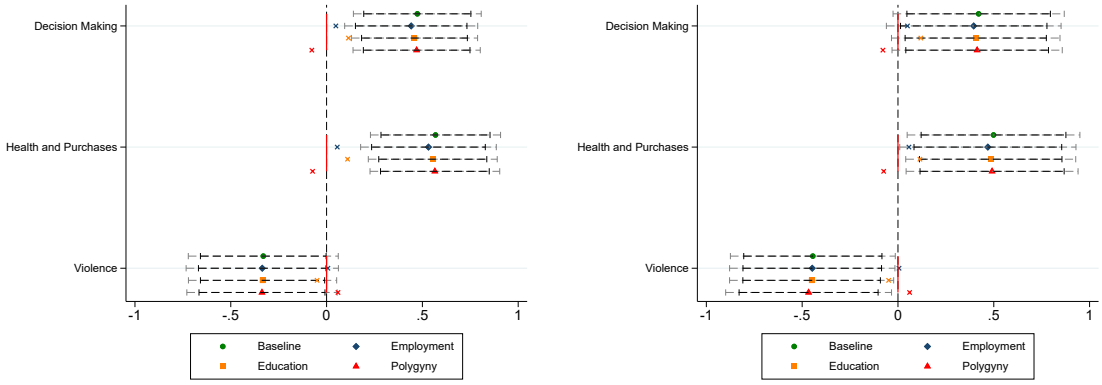
Robustness. Despite the broad set of fixed effects included in the regression, there could still be some concerns about the validity of the results. The main one is that with my analysis I am capturing some variation due to other policies, such as the implementation of Millennium Development Goals, or cultural factors that may affect women

empowerment after 2004. To address this concern I include in my baseline analysis extra controls that, despite they could suffer from endogeneity issues, allow me to control for that. Firstly, I control if the results are driven by improvement in women's education. More educated women are more empowered ones, and over the period of interest of my analysis, the share of women completing primary school grew from 11% in 2000 to over 25% in 2015. Secondly, I control if results are driven by an increase in women's occupation in the country. Women's economic conditions are a key determinant for women empowerment, and over the period of interest economic conditions in the country improved dramatically, with GDP per capita growing from 156$ in 2000 to 380 $ in 2015. Finally, I control if results are driven by changes in cultural norms that limit women empowerment as polygyny[22]. Despite polygyny is not legal in Malawi, in the year 2000 over 18% of women in my sample were living in a polygynous household, and, regardless of government efforts to fight it, in 2015 still almost 15% of the women in the sample were living in this condition. Tables A9, A10 and A11 show the results for baseline analysis once I include each of the controls discussed above. Results from the previous tables are summarized by Figure 6, where I plot the main coefficient for each of the regressions and the single coefficient for the added control variable. The inclusion of each of the controls does not affect baseline results either in terms of the magnitude of the effect or the significance. However, it is interesting to notice how each of these controls has an effect on women empowerment indicators. As expected, both higher education and employment lead to an increase in women empowerment, increasing decision-making. To what concerns physical violence, education is related to a reduction in it while employment does not seem to have any effect on violence. On the other side, living in polygynous household lead to a reduction in women empowerment: polygyny is associated with lower decision-making and a higher chance of experiencing physical violence. In Table A12 I include all three exogenous controls at the same time, and results are still robust both in terms of significance and magnitude. As a further robustness in this direction, I control if my results are driven by a general improvement in men's condition. I control then

[22]Polygyny is defined as the marriage of a man with several women

for men's education (Table A13) and for men's employment (Table A14). Results of the coefficient of interest are qualitatively and quantitatively unaffected, however, while male education seems to be associated with more empowerment their employment rate seems to be uncorrelated to it.

Figure 6: Robustness: control for confounds



(a) Walking Distance (b) Geodesic Distance

Notes: OLS Estimates for effect of ART availability on women empowerment, controlling for potential confounds. I calculate exposure to ART based on the interaction between HIV prevalence and access to the clinic ($HIV \times Proximity$). *Proximity* is measured as: the inverse walking distance from the closest clinic, measured in 20 minutes units (Subfig. a); the inverse geodesic distance from the closest clinic, measured in km (Subfig. b). These variables are meant to capture the exposure to ART combining the number of recipients and effective access to the treatment. Potential confounds: women employment (diamonds), women education (squares), and share of women living in polygynous households (triangles). The marker "X" represents the point estimates for the extra control variable.
Dependent variables: first panel (*Decision Making (All)*), the share of currently married women participating in all the decisions available in each specific year; second panel (*Health & HH Purchases*), the share of currently married women participating in decision making about their own health and big purchases in the household; third panel (*Physical Violence*), the share of currently married women who have experienced physical violence in the 12 months before the interview. More details on the outcomes variables are provided in Section 3. Black lines show the 95% confidence interval, grey lines show the 90% one.

A second potential threat to my analysis is the fact that areas with high or low HIV prevalence present some systematic characteristics affecting my main findings. To test it I construct balance tables for cluster characteristics (Table A2) and for Traditional Authority Areas characteristics (Table A3. Concerning the clusters, I observe that clusters with a higher prevalence of HIV are more likely to show a higher population density and access to health facilities. Then, it could be the case that I am identifying more

developed areas of the country and this could lead to my results. Table A15 shows the results once I include the unbalanced characteristic at the cluster level. Results are qualitatively and quantitatively unaffected. As a further robustness test, I include in my analysis the unbalanced characteristic at cluster and TA as flexible controls. The variables considered for this analysis are population density and access to health at the cluster level, and employment rate and primary education at the TAs level. I interact then each of these variables with specific year fixed effects. Results are shown in Table A16. From this analysis, we can notice how baseline results are qualitatively unaffected, and the set of fixed effects included in the regression is never statistically different from zero. However, the introduction of a such number of non-statistically significant controls leads to extra noise in my regression determining less precision in the point estimates for some specifications.

Another possible concern for my identification strategy is that I am capturing a general improvement in health conditions in the country and that my findings are unrelated to the ART roll-out. To test that I perform the same analysis using malaria instead of HIV. The choice of malaria is due to the fact that Malawi is one of the countries with the highest prevalence of this disease in the world, and malaria is one of the most serious issues in the country. I computed malaria prevalence[23] in each cluster in the year 2000, and I construct my exposure measure interacting malaria prevalence with proximity to the closest health facility. Table A17 reports results of the baseline analysis showing no effect of malaria on women empowerment indicators, besides a small effect, in terms of magnitude, on the combination of the three indicators in the walking-time specification. My results are then not due to a general improvement in health conditions in the country but to improvements in the living conditions of HIV-positive people.

Finally, I conduct the baseline analysis using alternative measures of proximity to health facilities. More specifically, using information contained in DHS SPA (2013) on clinics characteristic in the country. I compute then the proximity of each cluster from

[23]Using data from Malaria Atlas Project, I define malaria prevalence as parasite rate for Plasmodium falciparum malaria for children two to ten years of age for the year 2000.

the closest public health facility or from the closest facility providing ART in 2013, and I use then these measures to replace the measures in the baseline. Tables A18 and A19 report the results of this analysis, showing that baseline results are robust to different specifications of proximity.

6 Channels

Promoting women empowerment and gender equality around the world has been one of the main objectives of international policymakers since the start of the millennium. In 2000, United Nations included the promotion of empowerment and gender equality among the 8 Millennium Development Goals (MDGs)(UN (2000)). More specifically, UN's aim was to reduce the gender gap in education, to increase the number of women working in the non-agricultural sector, and women's political representation. Despite the progress made between 2000 and 2015, women empowerment and gender equality have been included too as a cross-cutting issue among the 17 Sustainable Development Goals (SDGs) set up in 2015 by the UN and intended to be achieved by 2030 (UN Assembly (2015)). SDGs don't refer explicitly to women's issues, since the promotion of women empowerment is considered as the *conditio sine qua non* to achieve all the other goals (OECD (2013)). International organizations' strategy to promote women empowerment relies on two main channels: promotion of women's economic empowerment[24] and promotion of education[25]. Through economic empowerment women can gain more power in terms of decision making, both in personal and public life and more independence. Through education, especially of younger cohorts, women can acquire more human capital that can allow them to improve their economic conditions, improve their health, and give them more instruments to increase their decision-making.

How can health policies affect economic empowerment and education outcomes? Concerning labor market outcomes, previous literature has shown that the HIV pandemic

[24] https://africa.unwomen.org/en/what-we-do/economic-empowerment_africa

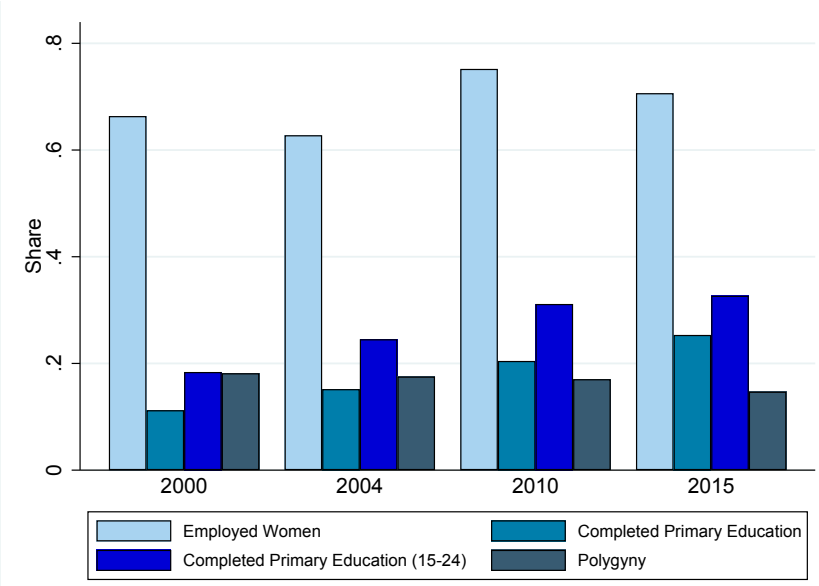
[25] https://www.un.org/en/chronicle/article/importance-educating-girls-and-women-fight-against-poverty-african-rural-communities

reduced workers' productivity and labor provision. This is true especially for women since the burden of taking care of ill members of the family has traditionally been on them. Availability of ART led to a recovery of labor productivity in the continent (Habyarimana et al. (2010); Bor et al. (2012)). Baranov et al. (2015) work shows that ART availability in Malawi led to an increase in labor market outcomes and that this effect is more pronounced for women, because of their traditional role of caregiver. Concerning education, the main references are Chicoine et al. (2021), for empirical evidence, and Becker (2007), for the theoretical framework. Chicoine et al. (2021) shows how the HIV pandemic had a detrimental effect on human capital accumulation, and in particular on education outcomes. Becker (2007) introduces explicitly health as a component of the human capital model, predicting that better health improves educational outcomes. Another prediction of Becker's model is a reduction in the individual discount rate. In the context of the HIV epidemic, this comes through a dramatic increase in HIV-positive people's life expectancy. This improvement in health conditions makes viable both investment in education and gives the incentive to break social norms and personal situations harming women empowerment (Papageorge et al. (2021)).

To investigate potential channels through which ART provision in Malawi has improved women empowerment, I focus on changes in three main outcomes from DHS surveys: women labor outcomes, women education, and social norms. As a measure of labor market outcome, I use the share of women employed in the 12 months before the interview. As a measure of educational attainment, I use the share of women who completed primary school[26], among all women in my sample and among young women (15-24 yo). As a proxy for change in social norms, I use the share of women living in polygynous households. Figure 7 summarize the time evolution of the potential channels over time. Women employment rate follow a pattern similar to the one of women indicator variable used in the main analysis. The average share of employed women in the country is relatively constant until 2004 and, after that, shows a consistent increase. The

[26]Malawian educational system defines as primary education the first 8th grade of schooling and, according to the 1994 Constitution, primary education is mandatory in the country.

Figure 7: Channels

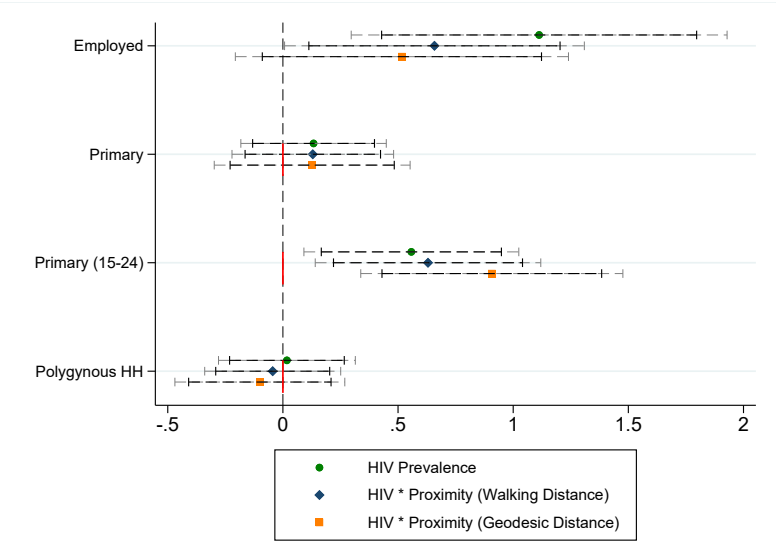


Notes: The figure shows the time evolution of the variables used in the channel analysis. Light blue bars (*Employed Women*) shows the time evolution of the share of currently married women who worked in the 12 months before the interview. Bright blue bars (*Completed Primary Education*) show the time evolution of the share of currently married women who have completed primary education (8 years of schooling). Blue bars (*Completed Primary Education (15-24)*) shows the time evolution of the share of young women (15-24) who have completed primary education (8 years of schooling). Dark grey bars (*Polygyny*) show the time evolution of the share of currently married women who are currently living in polygynous households. Data are from DHS collected in Malawi over the period 2000-2016.

share of women and young women who completed primary school is very low, especially considering that primary education in the country is mandatory since 1994, but it shows an increase over time ranging from around 18% in 2000 to over 32% in the year 2015. The share of women living in polygynous households is relatively constant over time, with an average always higher than 15% of women in my sample.

Figure 8 and Table A20 show the results for the analysis of the channel using the same specification described in section 4. All the specifications of the exposures measures have a positive effect on women employment, even if for the one using geodesic distance the effect is slightly not statistically different from zero (p-value = .16). The effect on education works only through the education of young women, where it's positive and statistically different from zero for all the specifications. The social norms channel, proxied by the share of women living in polygynous households, shows zero effect on health

Figure 8: Channels Analysis



Notes: OLS Estimates for effect of ART availability on women empowerment, using specification descrived in equation **??**. I use three proxies to measure exposure to ART. HIV prevalence in 2000 (HIV) meant to capture the number of potential recipients of the treatment (green dots). An interaction between HIV prevalence and access to the clinic ($HIVxProximity$ (Walking Distance)) that combines the prevalence of HIV with access to ART measured as the inverse walking distance from the closest clinic (blue diamonds). An interaction between HIV prevalence and access to the clinic ($HIVxProximity$ (Geodesic Distance)) that combines the prevalence of HIV with access to ART measured as the inverse geodesic distance from the closest clinic. This variable is meant to capture the exposure to ART combining the number of recipients and effective access to the treatment.
Dependent variables: first panel (*Employed*) share of currently married women who worked in the 12 months before the interview; second panel (*Primary*) share of currently married women who have completed primary education (8 years of schooling); third panel (*Primary (15-24)*) share of young women (15-24) who have completed primary education (8 years of schooling); fourth panel (*Polygynous HH*) share of currently married women who are currently living in polygynous households. More details on the outcomes variables are provided in Section 3. Black lines show the 95% confidence interval, grey lines show the 90% one.

policies. Table A21 reports the results of the previous analysis using different methods to compute geodesic distance. More specifically, rather than using the inverse distance, I use the linear and logarithmic distance from the closest health facility described in Section 3. These results confirm that employment and education are the main channels through which ART availability has had an effect on women empowerment.

ART availability has an impact on women empowerment in Malawi through its effect on economic employment, as suggested by results for women employment and previous literature. Another channel through which health reforms can affect women empow-

erment is through human capital, in particular by increasing the education of younger generations. I try to investigate then if ART expansion had a similar effect on men as on women. Figure A4 shows the time evolution for employment and education among the male population in my sample. Table A22 reports the results of the previous analysis on male outcomes. ART expansion appears to not have any effect on men's outcomes. Concerning employment outcomes, this could be explained by the fact that the male employment rate in rural areas of the country has been constant and over 90% throughout the sample. Concerning primary education, the small increase observed in the data is likely to be explained by other education campaigns and then captured by the region-year fixed effects.

7 Conclusions

Showing the positive relationship between ART roll-out in Malawi and women empowerment, this paper provides a first example of how major health interventions are viable instruments to promote women empowerment.

The connection between the HIV/AIDS epidemic spread in Africa and women empowerment is very strong. On the one side, cultural norms, and gender-based violence limit women empowerment and make women more exposed to the virus. On the other side, the spread of HIV negatively has a negative effect on women empowerment, especially on economic empowerment and education, because of the caregiver role of women in most African societies. This creates a vicious circle in which the lower the empowerment the bigger the spread of the virus, and the bigger the spread of HIV and the lower the empowerment.

The introduction of ART has provided an instrument to break this loop. Treatment availability has had a huge impact on reducing new infections and improving the health conditions of people living with HIV. This determined a lower burden on women both in terms of exposure to the virus and caregiving duties. In the context of the HIV/AIDS epidemic in Malawi, the ART roll-out campaign has had a positive impact

women empowerment, in particular in terms of decision-making outcomes and violence. This impact is due to the positive effect of ART on women economic empowerment and human capital formation.

The validity of these results extends beyond the HIV/AIDS epidemic in Malawi in Africa. The recent COVID-19 epidemic showed a similar negative effect of epidemics on women empowerment. My results suggest that policymakers should take into account health interventions as instruments to promote empowerment.

References

Adams-Prassl, Abi, Teodora Boneva, Marta Golin, and Christopher Rauh, "Inequality in the impact of the coronavirus shock: Evidence from real time surveys," *Journal of Public economics*, 2020, *189*, 104245.

Anderson, Siwan, "Legal origins and female HIV," *American Economic Review*, 2018, *108* (6), 1407–39.

Assembly, General UN, "Sustainable development goals," *SDGs Transform Our World*, 2015, *2030*.

Bank, World, "Malawi Economic Monitor, December 2021: Addressing Macro and Gender Imbalances," 2021.

Baranov, Victoria and Hans-Peter Kohler, "The impact of AIDS treatment on savings and human capital investment in Malawi," *American Economic Journal: Applied Economics*, 2018, *10* (1), 266–306.

_ , Daniel Bennett, and Hans-Peter Kohler, "The indirect impact of antiretroviral therapy: mortality risk, mental health, and HIV-negative labor supply," *Journal of health economics*, 2015, *44*, 195–211.

Bashemera, Domitilla R, Martha J Nhembo, and Grace Benedict, *The role of women's empowerment in influencing HIV testing*, ICF International, 2013.

Becker, Gary S, "Health as human capital: synthesis and extensions," *Oxford economic papers*, 2007, *59* (3), 379–410.

Berlanda, Andrea, Matteo Cervellati, Elena Esposito, Dominic Rohner, and Uwe Sunde, "Medication Against Conflict," *medRxiv*, 2022.

Bor, Jacob, Frank Tanser, Marie-Louise Newell, and Till Bärnighausen, "In a study of a population cohort in South Africa, HIV patients on antiretrovirals had nearly full recovery of employment," *Health affairs*, 2012, *31* (7), 1459–1469.

Chicoine, Luke, Emily Lyons, and Alexia Sahue, "The impact of HIV/AIDS on human capital investment in Sub-Saharan Africa: New evidence," *Journal of Applied Econometrics*, 2021, *36* (6), 842–852.

Conroy, Amy, Sara Yeatman, and Kathryn Dovel, "The social construction of AIDS during a time of evolving access to antiretroviral therapy in rural Malawi," *Culture, health & sexuality*, 2013, *15* (8), 924–937.

Dickerson, Sarah, Victoria Baranov, Jacob Bor, and Jeremy Barofsky, "Treatment as insurance: HIV antiretroviral therapy offers financial risk protection in Malawi," *Health Policy and Planning*, 2020, *35* (6), 676–683.

Duflo, Esther, "Women empowerment and economic development," *Journal of Economic literature*, 2012, *50* (4), 1051–79.

Etheridge, Ben and Lisa Spantig, "The gender gap in mental well-being during the Covid-19 outbreak: evidence from the UK," Technical Report, ISER Working paper series 2020.

Farré, Lídia, Yarine Fawaz, Libertad González, and Jennifer Graves, "How the COVID-19 lockdown affected gender inequality in paid and unpaid work in Spain," 2020.

Goodman-Bacon, Andrew, "The Long-Run Effects of Childhood Insurance Coverage: Medicaid Implementation, Adult Health, and Labor Market Outcomes," *American Economic Review*, 2021, *111* (8), 2550–93.

Guenther, Tanya, Salim Sadruddin, Tiyese Chimuna, Bias Sichamba, Kojo Yeboah-Antwi, Bamody Diakite, Bamadio Modibo, Eric Swedberg, and David R Marsh, "Beyond distance: an approach to measure effective access to case management for sick children in Africa," *The American journal of tropical medicine and hygiene*, 2012, *87* (5 Suppl), 77.

Habyarimana, James, Bekezela Mbakile, and Cristian Pop-Eleches, "The impact of HIV/AIDS and ARV treatment on worker absenteeism implications for African firms," *Journal of Human Resources*, 2010, *45* (4), 809–839.

Hokayem, Charles and James P Ziliak, "Health, human capital, and life cycle labor supply," *American Economic Review*, 2014, *104* (5), 127–31.

Jahn, Andreas, Anthony D Harries, Erik J Schouten, Edwin Libamba, Nathan Ford, Dermot Maher, and Frank Chimbwandira, "Scaling-up antiretroviral therapy in Malawi," *Bulletin of the World Health Organization*, 2016, *94* (10), 772.

Kim, Julia, Paul Pronyk, Tony Barnett, and Charlotte Watts, "Exploring the role of economic empowerment in HIV prevention," *Aids*, 2008, *22*, S57–S71.

Koole, Olivier, Rein MGJ Houben, Themba Mzembe, Thomas P Van Boeckel, Michael Kayange, Andreas Jahn, Frank Chimbwandira, Judith R Glynn, and Amelia C Crampin, "Improved retention of patients starting antiretroviral treatment in Karonga District, northern Malawi, 2005-2012," *Journal of acquired immune deficiency syndromes (1999)*, 2014, *67* (1), e27.

Mufune, Pempelani, "Poverty and HIV/AIDS in Africa: Specifying the connections," *Social Theory & Health*, 2015, *13* (1), 1–29.

OECD, "Gender Equality and Women's Rights in the Post-2015 Agenda—A Foundation for Sustainable Development," 2013.

Page, Lucy and Rohini Pande, "Ending global poverty: Why money isn't enough," *Journal of Economic Perspectives*, 2018, *32* (4), 173–200.

Palk, Laurence, Justin T Okano, Luckson Dullie, and Sally Blower, "Travel time to health-care facilities, mode of transportation, and HIV elimination in Malawi: a geospatial modelling analysis," *The Lancet Global Health*, 2020, *8* (12), e1555–e1564.

Papageorge, Nicholas W, Gwyn C Pauley, Mardge Cohen, Tracey E Wilson, Barton H Hamilton, and Robert A Pollak, "Health, human capital, and domestic violence," *Journal of Human Resources*, 2021, *56* (4), 997–1030.

Ramjee, Gita and Brodie Daniels, "Women and HIV in sub-Saharan Africa," *AIDS research and therapy*, 2013, *10* (1), 1–9.

Ray, Nicolas and Steeve Ebener, "AccessMod 3.0: computing geographic coverage and accessibility to health care services using anisotropic movement of patients," *International journal of health geographics*, 2008, *7* (1), 1–17.

Sartorius, Benn, John D VanderHeide, Mingyou Yang, Erik A Goosmann, Julia Hon, Emily Haeuser, Michael A Cork, Samantha Perkins, Deepa Jahagirdar, Lauren E Schaeffer et al., "Subnational mapping of HIV incidence and mortality among individuals aged 15–49 years in sub-Saharan Africa, 2000–18: a modelling study," *The Lancet HIV*, 2021, *8* (6), e363–e375.

Tompsett, Anna, "The Lazarus drug: the impact of antiretroviral therapy on economic growth," *Journal of Development Economics*, 2020, *143*, 102409.

Türmen, Tomris, "Gender and HIV/aids," *International Journal of Gynecology & Obstetrics*, 2003, *82* (3), 411–418.

UN, United Nations, "Millennium development goals," 2000.

UNAIDS, WHO, "AIDS epidemic update: December 2000. Geneva: Joint United Nations Programme on HIV," *AIDS*, 2000.

Walby, Sylvia, "Indicators to measure violence against women," 2007.

WEF, "The global gender gap report 2021," in "in" World Economic Forum 2021.

A Appendix

The appendix section is organized as follows:

- Data:
  - Table A1 reports the summary statistics of the main variables used in the paper.
  - Table A2 reports the summary statistics of the main variables used in the paper splitting the sample between clusters with high and low HIV prevalence in 2000.
  - Table A3 reports the summary statistics of selected variables from the 1998 Census splitting the sample between Traditional Authority Areas with high and low HIV prevalence in 2000.
  - Figure A1 shows the Land Use Map of Malawi.
  - Figure A2 shows the Digital Elevation Model of Malawi.
  - Figure A3 shows health facility locations in the country, classifying them according to the type of facility.
  - Table A4 shows the travel speed by different landscape characteristics used to calculate access to health.
- Baseline analysis and robustness:
  - Table A5 reports the results of the baseline analysis.
  - Table A6 reports baseline results using as the main outcome variable attitude toward Intimate Partner Violence.
  - Table A7 reports the results of the baseline analysis using alternative measures to the *Proximity* measure used in the main specification (inverse distance).
  - Table A8 reports the results of the baseline analysis showing the effect of ART expansion on each component of the decision-making indicator.
  - Tables A9, A10, A11, A12, A13. and A14 report the results of the baseline analysis introducing potential (endogenous) confounders in the analysis.
  - Tables A15 and A16 report the results once controlling for clusters', or Traditional Authority Areas', characteristics which are unbalanced in the sample.

  - Table A17 reports the results of the placebo analysis where I replace HIV prevalence with Malaria prevalence.
  - Table A18 and A19 reports the results of the baseline analysis using a subsample of clinics in the country, namely clinics providing ART in 2013 and public clinics.

- Channels analysis and robustness:
  - Table A20 reports the results of the channels analysis.
  - Table A21 reports the results of the channels analysis using alternative measures to the *Proximity* measure used in the main specification (inverse distance).
  - Table A22 reports the results of the channels analysis on men's outcomes.

Table A1: Summary Statistics

	Full Sample				
Outcome Variable	N	Mean	SD	Min	Max
Own Health Decision	2210	0.460	0.248	0.000	1.000
HH Purchase Decision	2210	0.310	0.227	0.000	1.000
Visiting Relatives Decision	1549	0.385	0.201	0.000	0.917
All Decisions	2210	0.244	0.218	0.000	1.000
Health & HH Purchases Decisions	2210	0.257	0.215	0.000	1.000
Experiencing physical violence (12 months)	1775	0.164	0.138	0.000	0.833
Never justify wife-beating (Wom)	2210	0.775	0.183	0.125	1.000
Never justify wife-beating (Men)	2177	0.877	0.201	0.000	1.000
Cluster Characteristics	N	Mean	SD	Min	Max
Geodesic distance from health facility (km)	2210	4.411	2.676	0.056	23.979
Population Density (2000)	2210	171.653	125.959	0.695	1633.243
HIV prevalence (2000)	2210	0.174	0.054	0.090	0.326
Malaria (2000)	2210	0.406	0.105	0.155	0.694
Employment rate (Wom)	2210	0.696	0.219	0.000	1.000
Employment rate (Men)	2177	0.950	0.155	0.000	1.000
Completed primary (Wom)	2210	0.190	0.156	0.000	0.833
Completed primary (Men)	2177	0.320	0.277	0.000	1.000
Completed primary (Wom) 15-24	2210	0.277	0.212	0.000	1.000
Completed primary (Men) 15-24	2006	0.333	0.330	0.000	1.000
Polygyny	2210	0.166	0.124	0.000	0.750

Notes: Summary Statistics for the main variable included in the paper.

Table A2: Summary Statistics - High vs Low HIV prevalence

PANEL A	Balance Tables - Pre-2004							
	HIV 2000 ≥ Median			HIV 2000 < Median			Difference	
Outcome Variable	N	Mean	SD	N	Mean	SD	Diff.	p (2-tailed)
Own Health Decision	449	0.258	0.177	431	0.250	0.150	.008	.473
HH Purchase Decision	449	0.155	0.129	431	0.147	0.122	.009	.297
Visiting Relatives Decision	449	0.302	0.171	431	0.282	0.145	.02	.063
All Decisions	449	0.105	0.107	431	0.093	0.094	.012	.075
Health & HH Purchases Decisions	449	0.114	0.110	431	0.108	0.102	.006	.378
Experiencing physical violence (12 months)	223	0.172	0.106	222	0.176	0.110	-.004	.706
Never justify wife-beating (Wom)	449	0.691	0.184	431	0.620	0.187	.071	0
Never justify wife-beating (Men)	434	0.860	0.234	417	0.788	0.262	.073	0
Cluster Characteristics	N	Mean	SD	N	Mean	SD	Diff.	p (2-tailed)
Geodesic distance from health facility (km)	449	3.812	2.152	431	5.139	2.885	-1.327	0
Population Density (2000)	449	237.335	157.815	431	122.440	64.782	114.895	0
HIV prevalence (2000)	449	0.223	0.042	431	0.130	0.019	.092	0
Malaria (2000)	449	0.447	0.103	431	0.365	0.084	.082	0
Employment rate (Wom)	449	0.650	0.251	431	0.639	0.214	.011	.482
Employment rate (Men)	434	0.905	0.227	417	0.935	0.178	-.029	.035
Completed primary (Wom)	449	0.125	0.134	431	0.137	0.141	-.011	.229
Completed primary (Men)	434	0.257	0.281	417	0.263	0.290	-.006	.757
Completed primary (Wom) 15-24	449	0.210	0.205	431	0.218	0.213	-.008	.594
Completed primary (Men) 15-24	367	0.342	0.373	361	0.290	0.346	.052	.049
Polygyny	449	0.148	0.125	431	0.210	0.139	-.061	0
PANEL B	Balance Tables - Post-2004							
	HIV 2000 ≥ Median			HIV 2000 < Median			Difference	
Outcome Variable	N	Mean	SD	N	Mean	SD	Diff.	p (2-tailed)
Own Health Decision	656	0.631	0.192	674	0.563	0.188	.068	0
HH Purchase Decision	656	0.424	0.216	674	0.408	0.218	.016	.18
Visiting Relatives Decision	320	0.538	0.177	349	0.480	0.186	.059	0
All Decisions	656	0.351	0.219	674	0.330	0.223	.021	.086
Health & HH Purchases Decisions	656	0.364	0.212	674	0.344	0.215	.02	.095
Experiencing physical violence (12 months)	656	0.166	0.149	674	0.156	0.143	.01	.197
Never justify wife-beating (Wom)	656	0.888	0.111	674	0.821	0.135	.067	0
Never justify wife-beating (Men)	654	0.919	0.151	672	0.902	0.153	.017	.038
Cluster Characteristics	N	Mean	SD	N	Mean	SD	Diff.	p (2-tailed)
Geodesic distance from health facility (km)	656	3.750	2.203	674	4.988	3.008	-1.238	0
Population Density (2000)	656	217.171	140.439	674	115.065	62.961	102.106	0
HIV prevalence (2000)	656	0.214	0.040	674	0.130	0.020	.085	0
Malaria (2000)	656	0.442	0.110	674	0.369	0.091	.073	0
Employment rate (Wom)	656	0.722	0.198	674	0.737	0.205	-.015	.186
Employment rate (Men)	654	0.977	0.091	672	0.962	0.122	.015	.014
Completed primary (Wom)	656	0.221	0.147	674	0.236	0.162	-.015	.076
Completed primary (Men)	654	0.355	0.266	672	0.364	0.261	-.009	.527
Completed primary (Wom) 15-24	656	0.324	0.202	674	0.314	0.205	.01	.359
Completed primary (Men) 15-24	632	0.366	0.313	646	0.321	0.308	.045	.01
Polygyny	656	0.129	0.103	674	0.188	0.118	-.059	0

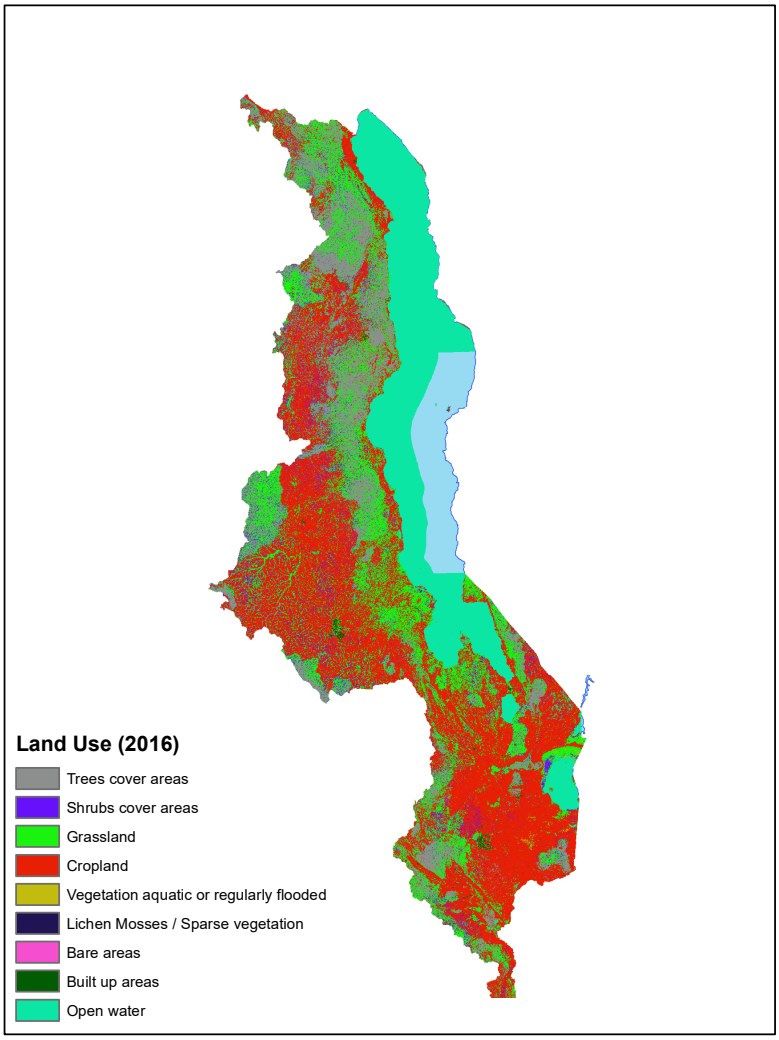
Notes: Summary Statistics for the main variable included in the paper, splitting the sample by clusters above or below the median HIV prevalence in 2000. Panel (a) reports the summary statistics for the clusters in the sample in the pre-treatment period; Panel (B) reports summary statistics for the clusters in sample after the year 2004.

Table A3: Summary Statistics - High vs Low HIV prevalence using 1998 Census data

PANEL A	Output Variables - Census 1998											
	HIV 2000 ≥ Median					HIV 2000 < Median					Difference	
Variable	N	Mean	SD	Min	Max	N	Mean	SD	Min	Max	Diff.	p (2-tailed)
Share of Women	94	0.494	0.106	0.000	0.551	93	0.508	0.016	0.467	0.541	-.014	.219
Employment	94	0.592	0.160	0.000	0.828	93	0.654	0.084	0.380	0.812	-.062	.001
Employment (Men)	94	0.589	0.139	0.000	0.795	93	0.644	0.078	0.419	0.792	-.055	.001
Employment (Wom)	94	0.592	0.198	0.000	0.858	93	0.663	0.106	0.240	0.831	-.071	.003
Prime Age Population	94	0.472	0.104	0.000	0.593	93	0.474	0.021	0.416	0.562	-.002	.862
Literacy	94	0.556	0.177	0.000	0.876	93	0.532	0.119	0.258	0.792	.023	.288
Literacy (Men)	94	0.626	0.171	0.000	0.896	93	0.597	0.102	0.352	0.811	.03	.153
Literacy (Wom)	94	0.491	0.187	0.000	0.857	93	0.470	0.136	0.178	0.794	.02	.4
Less than Primary	94	0.804	0.195	0.000	0.961	93	0.867	0.072	0.645	0.965	-.063	.004
Less than Primary (Men)	94	0.756	0.192	0.000	0.941	93	0.824	0.083	0.584	0.950	-.068	.002
Less than Primary (Wom)	94	0.849	0.199	0.000	0.978	93	0.909	0.063	0.702	0.987	-.06	.006
Years of Education	94	3.211	1.331	0.000	6.659	93	3.055	0.999	1.271	5.609	.156	.366
Years of Education (Men)	94	3.798	1.384	0.000	7.174	93	3.558	0.994	1.753	6.125	.24	.174
Years of Education (Wom)	94	2.664	1.290	0.000	6.118	93	2.571	1.005	0.803	5.042	.093	.581
HIV Prevalence	93	21.089	4.006	15.656	31.801	93	12.831	1.749	9.262	15.632	8.258	0
Population Density	94	317.169	425.598	3.966	2376.187	93	122.744	96.722	14.126	764.084	194.425	0

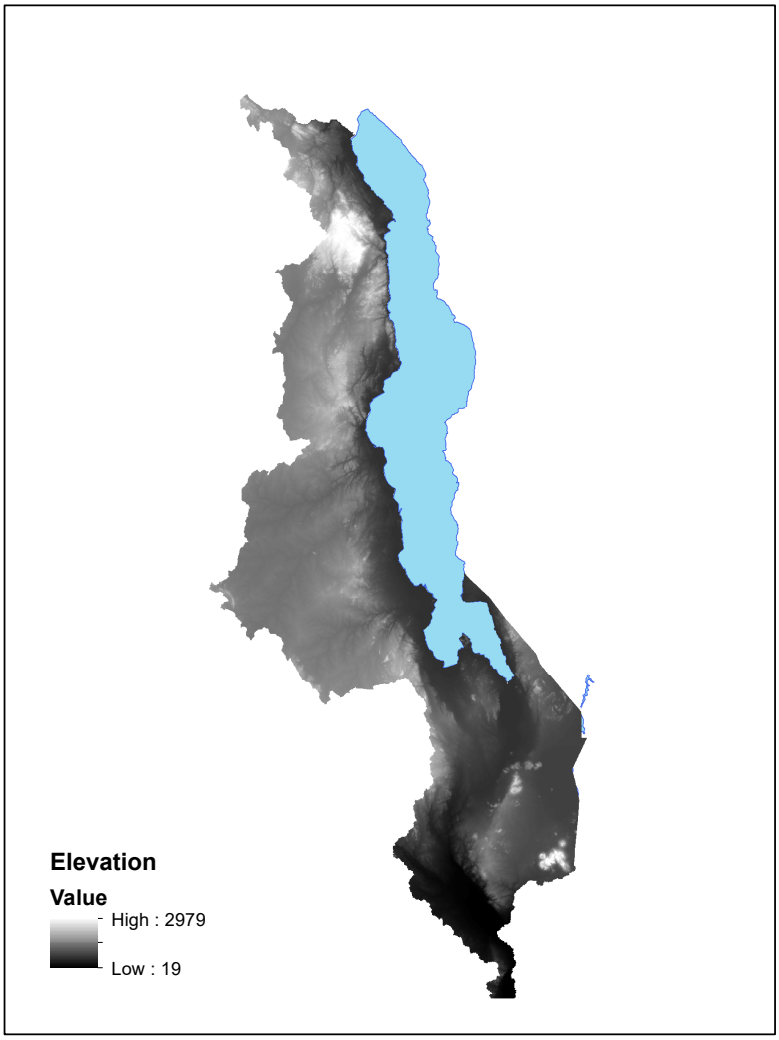
Notes: Summary Statistics for selected variables from the 1998 Census computed at Traditional Authority Area (admin 3), splitting the sample by TAs above or below the median HIV prevalence in 2000. Panel (a) reports the summary statistics for the clusters in the sample in the pre-treatment period; Panel (B) reports summary statistics for the clusters in the sample after the year 2004.

Figure A1: Land Use



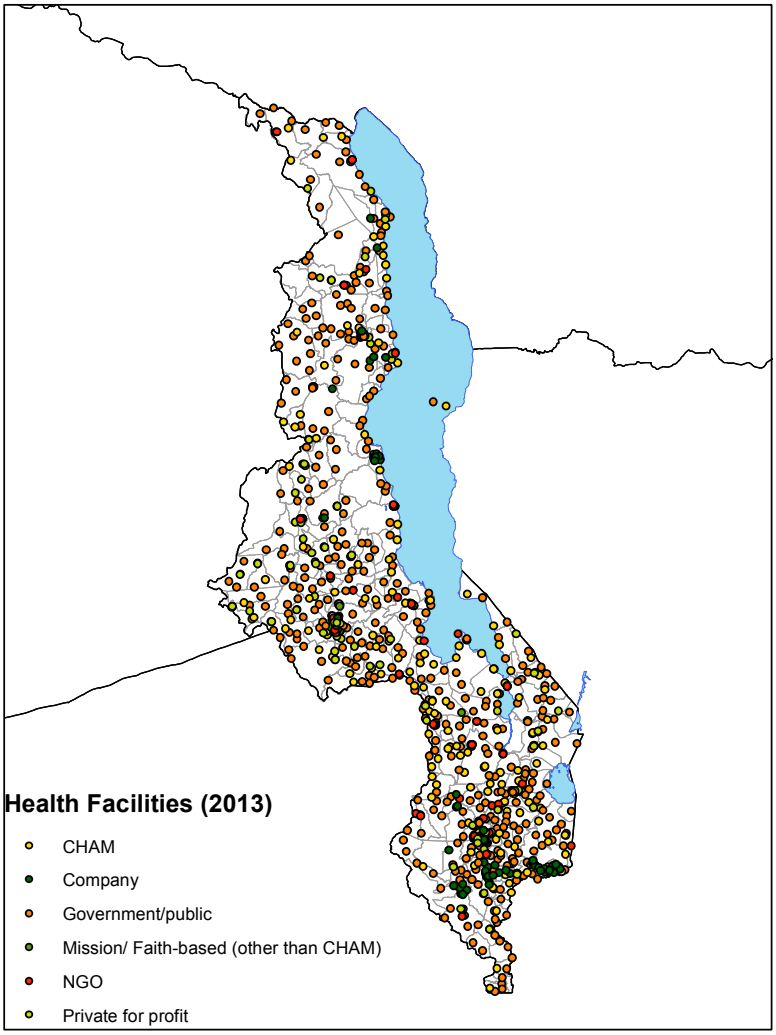
Notes: This figure shows the Land Use Map of Malawi; source: Sentinel-2 global land cover data

Figure A2: Topography



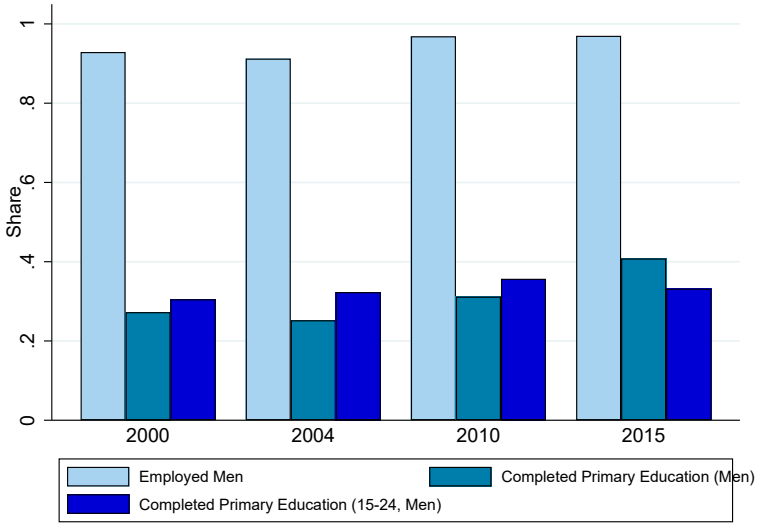
Notes: This figure shows the Digital Elevation Model of Malawi; source: Shuttle Radar Topography Mission (SRTM)

Figure A3: Health facilities



Notes: This figure shows health facility locations in the country, classifying them according to the type of facility; data source: Malawi DHS Service Provision Assessment (SPA) 2013-2014.

Figure A4: Men's Outcomes



Notes: The figure shows the time evolution of the variables used in the channel analysis but computed for the male population. Light blue bars (*Employed Men*) show the time evolution of the share of currently married men who worked in the 12 months before the interview. Bright blue bars (*Completed Primary Education*) show the time evolution of the share of currently married men who have completed primary education (8 years of schooling). Blue bars (*Completed Primary Education (15-24)*) shows the time evolution of the share of young men (15-24) who have completed primary education (8 years of schooling). Data are from DHS collected in Malawi over the period 2000-2016.

Table A4: Travel Speed

Label	Speed	Mode
Trees cover areas	2	WALKING
Shrubs cover areas	2	WALKING
Grassland	3	WALKING
Cropland	3	WALKING
Vegetation aquatic or regularly flooded	2	WALKING
Lichen Mosses Sparse vegetation	3	WALKING
Bare areas	3	WALKING
Built up areas	5	WALKING
Open water	0	WALKING
Trunk roads	5	WALKING
Secondary roads	5	WALKING
Tertiary roads	5	WALKING
Track roads	5	WALKING

Notes: Travel speed by different landscape characteristics.

Table A5: Baseline Analysis

Dependent Variable	Women Empowerment Indicators		
	Decision Making		Physical Violence
Panel A	All Indicators	Own Health & HH Purchases	Exp. Physical Violence (12 m)
	(1)	(2)	(3)
Post × HIV	0.881***	0.953***	-0.333**
	(0.148)	(0.161)	(0.165)
Proximity Measure	NA	NA	NA
Type of Clinic	NA	NA	NA
Type of DHS Unit	Rural	Rural	Rural
Observations	2,210	2,210	1,771
Clusters	204	204	200
Adj-R2	0.65	0.62	0.09
Panel B	All Indicators	Own Health & HH Purchases	Exp. Physical Violence (12 m)
	(1)	(2)	(3)
Post × HIV × Proximity	0.474***	0.568***	-0.330*
	(0.169)	(0.172)	(0.198)
Proximity Measure	Walking Distance	Walking Distance	Walking Distance
Type of Clinic	Any	Any	Any
Type of DHS Unit	Rural	Rural	Rural
Observations	2,208	2,208	1,771
Clusters	203	203	200
Adj-R2	0.64	0.61	0.09
Panel C	All Indicators	Own Health & HH Purchases	Exp. Physical Violence (12 m)
	(1)	(2)	(3)
Post × HIV × Proximity	0.421*	0.499**	-0.444**
	(0.227)	(0.229)	(0.218)
Proximity Measure	Geodesic Distance	Geodesic Distance	Geodesic Distance
Type of Clinic	Any	Any	Any
Type of DHS Unit	Rural	Rural	Rural
Observations	2,210	2,210	1,771
Clusters	204	204	200
Adj-R2	0.64	0.61	0.09
Controls	√	√	√
Traditional Authorities f.e.	√	√	√
Region × Year f.e.	√	√	√

Notes: OLS Estimates for effect of ART availability on women empowerment. I use three proxies to measure exposure to ART. In Panel A is HIV prevalence in 2000 (HIV) meant to capture the number of potential recipients of the treatment. In Panel B and C I use the interaction between HIV prevalence and access to the clinic ($HIVxProximity$) that combines the prevalence of HIV with access to ART. $Proximity$ is measured as: the inverse walking distance from the closest clinic, measured in 20 minutes units (Panel B); the inverse geodesic distance from the closest clinic, measured in km (Panel C). *Post* is a binary variable taking value 1 after the year 2004.
Dependent variables: Column (1) share of currently married women participating in all the decisions available in each specific year; Column (2) share of currently married women participating in decision-making about their own health and big purchases in the household; Column (3) share of currently married women who have experienced physical violence in the 12 months before the interview. More details on the outcomes variables are provided in Section 3. */**/*** indicate significance at 10%/5%/1%, respectively; standard errors in parentheses clustered at the Traditional Authorities Areas level.

Table A6: Baseline Analysis: Attitude towards Intimate Partner Violence

Panel A	Share of Women Never Justifying Intimate Partner Violence		
	(1)	(2)	(3)
Post × Treatment	0.786***	0.409*	0.285
	(0.239)	(0.224)	(0.263)
Treatment	HIV	HIV × Walk Time	HIV × Geodesic
Type of Clinic	NA	Any	Any
Type of DHS Unit	Rural	Rural	Rural
Observations	2,210	2,208	2,210
Clusters	204	203	204
Adj-R2	0.51	0.51	0.51

Panel A	Share of Men Never Justifying Intimate Partner Violence		
	(1)	(2)	(3)
Post × Treatment	0.063	-0.189	0.125
	(0.230)	(0.219)	(0.286)
Treatment	HIV	HIV × Walk Time	HIV × Geodesic
Type of Clinic	NA	Any	Any
Type of DHS Unit	Rural	Rural	Rural
Observations	2,176	2,174	2,176
Clusters	203	202	203
Adj-R2	0.18	0.18	0.18

Notes: OLS Estimates for effect of ART availability on Attitude towards Intimate Partner Violence. The main outcome variable captures the share of women (Panel (A)) or men (Panel (B)) who never justify IPV. I use three proxies to measure exposure to ART. Column 1 shows results for HIV prevalence in 2000 (HIV) meant to capture the number of potential recipients of the treatment. In Columns 2 and 3 I use the interaction between HIV prevalence and access to the clinic ($HIVxProximity$) that combines the prevalence of HIV with access to ART. *Proximity* is measured as: the inverse walking distance from the closest clinic, measured in 20 minutes units (Column 2); the inverse geodesic distance from the closest clinic, measured in km (Column 3). *Post* is a binary variable taking value 1 after the year 2004. */**/*** indicate significance at 10%/5%/1%, respectively; standard errors in parentheses clustered at the Traditional Authorities Areas level.

Table A7: Baseline Analysis: Alternative Proximity Measures (Geodesic Distance)

Dependent Variable	Women Empowerment Indicators					
	Decision Making				Physical Violence	
	All Indicators		Own Health & HH Purchases		Exp. Physical Violence (12 m)	
	(1)	(2)	(3)	(4)	(5)	(6)
Post × HIV × Proximity	0.036***	0.044***	0.040***	0.048***	-0.019*	-0.016
	(0.008)	(0.008)	(0.008)	(0.009)	(0.010)	(0.011)
Proximity Measure	Linear	Log	Linear	Log	Linear	Log
Type of Clinic	Any	Any	Any	Any	Any	Any
Type of DHS Unit	Rural	Rural	Rural	Rural	Rural	Rural
Observations	2,210	2,210	2,210	2,210	1,771	1,771
Clusters	204	204	204	204	200	200
Adj-R2	0.64	0.65	0.61	0.62	0.12	0.12
Controls	√	√	√	√	√	√
Traditional Authorities f.e.	√	√	√	√	√	√
Region × Year f.e.	√	√	√	√	√	√

Notes: OLS Estimates for effect of ART availability on women empowerment. I use two proxies to measure exposure to ART. $HIVxProximity$ is the interaction between HIV prevalence and access to the clinic that combines the prevalence of HIV with access to ART. Columns (1), (3), and (5) use as proximity measure the distance from the closest clinic, measured as $Proximity_i = \max_i(dist) - dist_i$. Columns (2), (4), and (6) use as proximity measure the distance from the closest clinic, measured as $Proximity_i = \ln(1 + \max_i(dist) - dist_i)$. $Post$ is a binary variable taking value 1 after the year 2004. All coefficients are standardized to make them comparable.
Dependent variables: Columns (1) and (2) share of currently married women participating in all the decisions available in each specific year; Columns (3) and (4) share of currently married women participating in decision-making about their own health and big purchases in the household; Columns (5) and (6) share of currently married women who have experienced physical violence in the 12 months before the interview. More details on the outcomes variables are provided in Section 3. */**/*** indicate significance at 10%/5%/1%, respectively; standard errors in parentheses clustered at the Traditional Authorities Areas level.

Table A8: Baseline Analysis: Single Decisions

Dependent Variable	Share of Women Making Decisions on			
Panel A	All Indicators	Own Health	HH Purchases	Visit Friends/Relatives
	(1)	(2)	(3)	(4)
Post × HIV	0.881***	1.080***	0.926***	0.915***
	(0.148)	(0.224)	(0.172)	(0.267)
Proximity Measure	NA	NA	NA	NA
Type of Clinic	NA	NA	NA	NA
Type of DHS Unit	Rural	Rural	Rural	Rural
Observations	2,210	2,210	2,210	1,538
Clusters	204	204	204	193
Adj-R2	0.65	0.60	0.62	0.47
Panel B	All Indicators	Own Health	HH Purchases	Visit Friends/Relatives
	(1)	(2)	(3)	(4)
Post × HIV × Proximity	0.474***	0.619**	0.506***	0.519**
	(0.169)	(0.240)	(0.187)	(0.232)
Proximity Measure	Walking Distance	Walking Distance	Walking Distance	Walking Distance
Type of Clinic	Any	Any	Any	Any
Type of DHS Unit	Rural	Rural	Rural	Rural
Observations	2,208	2,208	2,208	1,538
Clusters	203	203	203	193
Adj-R2	0.64	0.60	0.62	0.47
Panel C	All Indicators	Own Health	HH Purchases	Visit Friends/Relatives
	(1)	(2)	(3)	(4)
Post × HIV × Proximity	0.421*	0.494*	0.484**	0.625*
	(0.227)	(0.292)	(0.229)	(0.329)
Proximity Measure	Geodesic Distance	Geodesic Distance	Geodesic Distance	Geodesic Distance
Type of Clinic	Any	Any	Any	Any
Type of DHS Unit	Rural	Rural	Rural	Rural
Observations	2,210	2,210	2,210	1,538
Clusters	204	204	204	193
Adj-R2	0.64	0.60	0.61	0.46
Controls	√	√	√	√
Traditional Authorities f.e.	√	√	√	√
Region × Year f.e.	√	√	√	√

Notes: OLS Estimates for effect of ART availability on women empowerment. I use three proxies to measure exposure to ART. In Panel A is HIV prevalence in 2000 (HIV) meant to capture the number of potential recipients of the treatment. In Panel B and C I use the interaction between HIV prevalence and access to the clinic ($HIVxProximity$) that combines the prevalence of HIV with access to ART. $Proximity$ is measured as: the inverse walking distance from the closest clinic, measured in 20 minutes units (Panel B); the inverse geodesic distance from the closest clinic, measured in km (Panel C). $Post$ is a binary variable taking value 1 after the year 2004.
Dependent variables: Column (1) share of currently married women participating in all the decisions available in each specific year; Column (2) share of currently married women participating in decision-making about their own health; Column (3) share of currently married women participating in decision making about big purchases in the household; Column (4) share of currently married women participating in decision making about visiting friends or relatives. More details on the outcomes variables are provided in Section 3. */**/*** indicate significance at 10%/5%/1%, respectively; standard errors in parentheses clustered at the Traditional Authorities Areas level.

Table A9: Robustness: Baseline controlling for Education

Dependent Variable	Women Empowerment Indicators		
	Decision Making		Physical Violence
Panel A	All Indicators	Own Health & HH Purchases	Exp. Physical Violence (12 m)
	(1)	(2)	(3)
Post × HIV	0.866***	0.939***	-0.330**
	(0.147)	(0.159)	(0.165)
Primary Education (Women)	0.111***	0.106***	-0.050*
	(0.022)	(0.023)	(0.026)
Proximity Measure	NA	NA	NA
Type of Clinic	NA	NA	NA
Type of DHS Unit	Rural	Rural	Rural
Observations	2,210	2,210	1,771
Clusters	204	204	200
Adj-R2	0.65	0.62	0.09
Panel B	All Indicators	Own Health & HH Purchases	Exp. Physical Violence (12 m)
	(1)	(2)	(3)
Post × HIV × Proximity	0.459***	0.554***	-0.334*
	(0.167)	(0.171)	(0.196)
Primary Education (Women)	0.114***	0.110***	-0.049*
	(0.022)	(0.023)	(0.027)
Proximity Measure	Walking Distance	Walking Distance	Walking Distance
Type of Clinic	Any	Any	Any
Type of DHS Unit	Rural	Rural	Rural
Observations	2,208	2,208	1,771
Clusters	203	203	200
Adj-R2	0.65	0.62	0.09
Panel C	All Indicators	Own Health & HH Purchases	Exp. Physical Violence (12 m)
	(1)	(2)	(3)
Post × HIV × Proximity	0.406*	0.484**	-0.451**
	(0.223)	(0.225)	(0.217)
Primary Education (Women)	0.119***	0.115***	-0.049*
	(0.021)	(0.022)	(0.027)
Proximity Measure	Geodesic Distance	Geodesic Distance	Geodesic Distance
Type of Clinic	Any	Any	Any
Type of DHS Unit	Rural	Rural	Rural
Observations	2,210	2,210	1,771
Clusters	204	204	200
Adj-R2	0.65	0.61	0.09
Controls	√	√	√
Traditional Authorities f.e.	√	√	√
Region × Year f.e.	√	√	√

Notes: OLS Estimates for effect of ART availability on women empowerment controlling for women education. *Primary Education* is the share of currently married women who have completed primary education (8 years of schooling). I use three proxies to measure exposure to ART. In Panel A is HIV prevalence in 2000 (HIV) meant to capture the number of potential recipients of the treatment. In Panel B and C I use the interaction between HIV prevalence and access to the clinic ($HIVxProximity$) that combines the prevalence of HIV with access to ART. *Proximity* is measured as: the inverse walking distance from the closest clinic, measured in 20 minutes units (Panel B); the inverse geodesic distance from the closest clinic, measured in km (Panel C). *Post* is a binary variable taking value 1 after the year 2004.
Dependent variables: Column (1) share of currently married women participating in all the decisions available in each specific year; Column (2) share of currently married women participating in decision-making about their own health and big purchases in the household; Columns (3) share of currently married women who have experienced physical violence in the 12 months before the interview. More details on the outcomes variables are provided in Section 3. */**/*** indicate significance at 10%/5%/1%, respectively; standard errors in parentheses clustered at the Traditional Authorities Areas level.

Table A10: Robustness: Baseline controlling for Employment

Dependent Variable	Women Empowerment Indicators		
	Decision Making		Physical Violence
Panel A	All Indicators	Own Health & HH Purchases	Exp. Physical Violence (12 m)
	(1)	(2)	(3)
Post × HIV	0.833***	0.897***	-0.344**
	(0.157)	(0.171)	(0.169)
Employment Rate (Women)	0.043**	0.050**	0.008
	(0.021)	(0.021)	(0.017)
Proximity Measure	NA	NA	NA
Type of Clinic	NA	NA	NA
Type of DHS Unit	Rural	Rural	Rural
Observations	2,210	2,210	1,771
Clusters	204	204	200
Adj-R2	0.65	0.62	0.09
Panel B	All Indicators	Own Health & HH Purchases	Exp. Physical Violence (12 m)
	(1)	(2)	(3)
Post × HIV × Proximity	0.442**	0.532***	-0.336*
	(0.176)	(0.180)	(0.202)
Employment Rate (Women)	0.049**	0.056***	0.007
	(0.021)	(0.021)	(0.018)
Proximity Measure	Walking Distance	Walking Distance	Walking Distance
Type of Clinic	Any	Any	Any
Type of DHS Unit	Rural	Rural	Rural
Observations	2,208	2,208	1,771
Clusters	203	203	200
Adj-R2	0.64	0.61	0.09
Panel C	All Indicators	Own Health & HH Purchases	Exp. Physical Violence (12 m)
	(1)	(2)	(3)
Post × HIV × Proximity	0.395*	0.469**	-0.447**
	(0.231)	(0.233)	(0.219)
Employment Rate (Women)	0.050**	0.057***	0.006
	(0.021)	(0.021)	(0.017)
Proximity Measure	Geodesic Distance	Geodesic Distance	Geodesic Distance
Type of Clinic	Any	Any	Any
Type of DHS Unit	Rural	Rural	Rural
Observations	2,210	2,210	1,771
Clusters	204	204	200
Adj-R2	0.64	0.61	0.09
Controls	√	√	√
Traditional Authorities f.e.	√	√	√
Region × Year f.e.	√	√	√

Notes: OLS Estimates for effect of ART availability on women empowerment controlling for women employment rate. Employment rate (Women) is the share of currently married women who worked in the 12 months before the interview. I use three proxies to measure exposure to ART. In Panel A is HIV prevalence in 2000 (HIV) meant to capture the number of potential recipients of the treatment. In Panel B and C I use the interaction between HIV prevalence and access to the clinic ($HIVxProximity$) that combines the prevalence of HIV with access to ART. $Proximity$ is measured as: the inverse walking distance from the closest clinic, measured in 20 minutes units (Panel B); the inverse geodesic distance from the closest clinic, measured in km (Panel C). *Post* is a binary variable taking value 1 after the year 2004. Dependent variables: Column (1) share of currently married women participating in all the decisions available in each specific year; Column (2) share of currently married women participating in decision-making about their own health and big purchases in the household; Column (3) share of currently married women who have experienced physical violence in the 12 months before the interview. More details on the outcomes variables are provided in Section 3. */**/*** indicate significance at 10%/5%/1%, respectively; standard errors in parentheses clustered at the Traditional Authorities Areas level.

Table A11: Robustness: Baseline controlling for Polygyny

Dependent Variable	Women Empowerment Indicators		
	Decision Making		Physical Violence
Panel A	All Indicators	Own Health & HH Purchases	Exp. Physical Violence (12 m)
	(1)	(2)	(3)
Post × HIV	0.882***	0.955***	-0.341**
	(0.147)	(0.160)	(0.165)
Polygyny	-0.075***	-0.071**	0.061*
	(0.026)	(0.028)	(0.033)
Proximity Measure	NA	NA	NA
Type of Clinic	NA	NA	NA
Type of DHS Unit	Rural	Rural	Rural
Observations	2,210	2,210	1,771
Clusters	204	204	200
Adj-R2	0.65	0.62	0.09
Panel B	All Indicators	Own Health & HH Purchases	Exp. Physical Violence (12 m)
	(1)	(2)	(3)
Post × HIV × Proximity	0.470***	0.565***	-0.337*
	(0.168)	(0.172)	(0.199)
Polygyny	-0.077***	-0.073**	0.060*
	(0.027)	(0.028)	(0.034)
Proximity Measure	Walking Distance	Walking Distance	Walking Distance
Type of Clinic	Any	Any	Any
Type of DHS Unit	Rural	Rural	Rural
Observations	2,208	2,208	1,771
Clusters	203	203	200
Adj-R2	0.64	0.61	0.09
Panel C	All Indicators	Own Health & HH Purchases	Exp. Physical Violence (12 m)
	(1)	(2)	(3)
Post × HIV × Proximity	0.413*	0.491**	-0.466**
	(0.225)	(0.228)	(0.219)
Polygyny	-0.079***	-0.074***	0.061*
	(0.027)	(0.028)	(0.033)
Proximity Measure	Geodesic Distance	Geodesic Distance	Geodesic Distance
Type of Clinic	Any	Any	Any
Type of DHS Unit	Rural	Rural	Rural
Observations	2,210	2,210	1,771
Clusters	204	204	200
Adj-R2	0.64	0.61	0.09
Controls	√	√	√
Traditional Authorities f.e.	√	√	√
Region × Year f.e.	√	√	√

Notes: OLS Estimates for effect of ART availability on women empowerment controlling for polygyny. *Polygyny* is the share of currently married women who are currently living in polygynous households. I use three proxies to measure exposure to ART. In Panel A is HIV prevalence in 2000 (HIV) meant to capture the number of potential recipients of the treatment. In Panel B and C I use the interaction between HIV prevalence and access to the clinic ($HIVxProximity$) that combines the prevalence of HIV with access to ART. *Proximity* is measured as: the inverse walking distance from the closest clinic, measured in 20 minutes units (Panel B); the inverse geodesic distance from the closest clinic, measured in km (Panel C). *Post* is a binary variable taking value 1 after the year 2004.
Dependent variables: Column (1) share of currently married women participating in all the decisions available in each specific year; Column (2) share of currently married women participating in decision-making about their own health and big purchases in the household; Column (3) share of currently married women who have experienced physical violence in the 12 months before the interview. More details on the outcomes variables are provided in Section 3. */**/*** indicate significance at 10%/5%/1%, respectively; standard errors in parentheses clustered at the Traditional Authorities Areas level.

Table A12: Robustness: Baseline controlling for Education, Employment, and Polygyny

Dependent Variable	Women Empowerment Indicators		
	Decision Making		Physical Violence
Panel A	All Indicators	Own Health & HH Purchases	Exp. Physical Violence (12 m)
	(1)	(2)	(3)
Post × HIV	0.820***	0.885***	-0.348**
	(0.154)	(0.168)	(0.169)
Employment Rate (Women)	0.043**	0.050**	0.008
	(0.021)	(0.021)	(0.017)
Primary Education (Women)	0.106***	0.101***	-0.044*
	(0.022)	(0.022)	(0.025)
Polygyny	-0.061**	-0.058**	0.054
	(0.026)	(0.028)	(0.033)
Proximity Measure	NA	NA	NA
Type of Clinic	NA	NA	NA
Type of DHS Unit	Rural	Rural	Rural
Observations	2,210	2,210	1,771
Clusters	204	204	200
Adj-R2	0.65	0.62	0.09
Panel B	All Indicators	Own Health & HH Purchases	Exp. Physical Violence (12 m)
	(1)	(2)	(3)
Post × HIV × Proximity	0.425**	0.516***	-0.345*
	(0.173)	(0.177)	(0.200)
Employment Rate (Women)	0.048**	0.055***	0.007
	(0.021)	(0.021)	(0.017)
Primary Education (Women)	0.109***	0.104***	-0.044
	(0.022)	(0.023)	(0.027)
Polygyny	-0.063**	-0.059**	0.053
	(0.027)	(0.028)	(0.033)
Proximity Measure	Walking Distance	Walking Distance	Walking Distance
Type of Clinic	Any	Any	Any
Type of DHS Unit	Rural	Rural	Rural
Observations	2,208	2,208	1,771
Clusters	203	203	200
Adj-R2	0.65	0.62	0.09
Panel C	All Indicators	Own Health & HH Purchases	Exp. Physical Violence (12 m)
	(1)	(2)	(3)
Post × HIV × Proximity	0.375*	0.450*	-0.472**
	(0.226)	(0.228)	(0.220)
Employment Rate (Women)	0.049**	0.057***	0.005
	(0.021)	(0.021)	(0.017)
Primary Education (Women)	0.114***	0.109***	-0.042
	(0.021)	(0.022)	(0.026)
Polygyny	-0.063**	-0.059**	0.053
	(0.027)	(0.028)	(0.033)
Proximity Measure	Geodesic Distance	Geodesic Distance	Geodesic Distance
Type of Clinic	Any	Any	Any
Type of DHS Unit	Rural	Rural	Rural
Observations	2,210	2,210	1,771
Clusters	204	204	200
Adj-R2	0.65	0.62	0.09
Controls	√	√	√
Traditional Authorities f.e.	√	√	√
Region × Year f.e.	√	√	√

Notes: OLS Estimates for effect of ART availability on women empowerment controlling for women education, employment rate, and polygyny. Employment rate (Women) is the share of currently married women who worked in the 12 months before the interview. *Primary Education* is the share of currently married women who have completed primary education (8 years of schooling). *Polygyny* is the share of currently married women who are currently living in polygynous households. I use three proxies to measure exposure to ART. In Panel A is HIV prevalence in 2000 (HIV) meant to capture the number of potential recipients of the treatment. In Panel B and C I use the interaction between HIV prevalence and access to the clinic ($HIVxProximity$) that combines the prevalence of HIV with access to ART. *Proximity* is measured as: the inverse walking distance from the closest clinic, measured in 20 minutes units (Panel B); the inverse geodesic distance from the closest clinic, measured in km (Panel C). *Post* is a binary variable taking value 1 after the year 2004.
Dependent variables: Column (1) share of currently married women participating in all the decisions available in each specific year; Column (2) share of currently married women participating in decision-making about their own health and big purchases in the household; Column (3) share of currently married women who have experienced physical violence in the 12 months before the interview. More details on the outcomes variables are provided in Section 3. */**/*** indicate significance at 10%/5%/1%, respectively; standard errors in parentheses clustered at the Traditional Authorities Areas level.

Table A13: Robustness: Baseline controlling for Male Education

Dependent Variable	Women Empowerment Indicators		
	Decision Making		Physical Violence
Panel A	All Indicators	Own Health & HH Purchases	Exp. Physical Violence (12 m)
	(1)	(2)	(3)
Post × HIV	0.897***	0.970***	-0.282*
	(0.147)	(0.160)	(0.170)
Primary Education (Men)	0.028**	0.031**	0.005
	(0.012)	(0.012)	(0.016)
Proximity Measure	NA	NA	NA
Type of Clinic	NA	NA	NA
Type of DHS Unit	Rural	Rural	Rural
Observations	2,176	2,176	1,756
Clusters	203	203	200
Adj-R2	0.64	0.62	0.09
Panel B	All Indicators	Own Health & HH Purchases	Exp. Physical Violence (12 m)
	(1)	(2)	(3)
Post × HIV	0.479***	0.576***	-0.301
	(0.167)	(0.170)	(0.200)
Primary Education (Men)	0.027**	0.030**	0.006
	(0.012)	(0.012)	(0.016)
Proximity Measure	Walking Distance	Walking Distance	Walking Distance
Type of Clinic	Any	Any	Any
Type of DHS Unit	Rural	Rural	Rural
Observations	2,174	2,174	1,756
Clusters	202	202	200
Adj-R2	0.64	0.61	0.09
Panel C	All Indicators	Own Health & HH Purchases	Exp. Physical Violence (12 m)
	(1)	(2)	(3)
Post × HIV	0.445*	0.524**	-0.452**
	(0.229)	(0.231)	(0.219)
Primary Education (Men)	0.029**	0.032***	0.006
	(0.012)	(0.012)	(0.016)
Proximity Measure	Geodesic Distance	Geodesic Distance	Geodesic Distance
Type of Clinic	Any	Any	Any
Type of DHS Unit	Rural	Rural	Rural
Observations	2,176	2,176	1,756
Clusters	203	203	200
Adj-R2	0.64	0.61	0.09
Controls	√	√	√
Traditional Authorities f.e.	√	√	√
Region × Year f.e.	√	√	√

Notes: OLS Estimates for effect of ART availability on women empowerment controlling for men education. *Primary Education* is the share of currently married men who have completed primary education (8 years of schooling). I use three proxies to measure exposure to ART. In Panel A is HIV prevalence in 2000 (HIV) meant to capture the number of potential recipients of the treatment. In Panel B and C I use the interaction between HIV prevalence and access to the clinic ($HIV x Proximity$) that combines the prevalence of HIV with access to ART. *Proximity* is measured as: the inverse walking distance from the closest clinic, measured in 20 minutes units (Panel B); the inverse geodesic distance from the closest clinic, measured in km (Panel C). *Post* is a binary variable taking value 1 after the year 2004.
Dependent variables: Column (1) share of currently married women participating in all the decisions available in each specific year; Column (2) share of currently married women participating in decision-making about their own health and big purchases in the household; Columns (3) share of currently married women who have experienced physical violence in the 12 months before the interview. More details on the outcomes variables are provided in Section 3. */**/*** indicate significance at 10%/5%/1%, respectively; standard errors in parentheses clustered at the Traditional Authorities Areas level.

Table A14: Robustness: Baseline controlling for Male Employment

Dependent Variable	Women Empowerment Indicators		
	Decision Making		Physical Violence
Panel A	All Indicators	Own Health & HH Purchases	Exp. Physical Violence (12 m)
	(1)	(2)	(3)
Post × HIV	0.899***	0.971***	-0.279
	(0.146)	(0.160)	(0.172)
Employment Rate (Men)	-0.021	-0.023	-0.005
	(0.023)	(0.023)	(0.025)
Proximity Measure	NA	NA	NA
Type of Clinic	NA	NA	NA
Type of DHS Unit	Rural	Rural	Rural
Observations	2,176	2,176	1,756
Clusters	203	203	200
Adj-R2	0.64	0.61	0.09
Panel B	All Indicators	Own Health & HH Purchases	Exp. Physical Violence (12 m)
	(1)	(2)	(3)
Post × HIV × Proximity	0.480***	0.577***	-0.301
	(0.169)	(0.172)	(0.201)
Employment Rate (Men)	-0.017	-0.019	-0.007
	(0.024)	(0.024)	(0.025)
Proximity Measure	Walking Distance	Walking Distance	Walking Distance
Type of Clinic	Any	Any	Any
Type of DHS Unit	Rural	Rural	Rural
Observations	2,174	2,174	1,756
Clusters	202	202	200
Adj-R2	0.64	0.61	0.09
Panel C	All Indicators	Own Health & HH Purchases	Exp. Physical Violence (12 m)
	(1)	(2)	(3)
Post × HIV × Proximity	0.446*	0.525**	-0.454**
	(0.230)	(0.232)	(0.219)
Employment Rate (Men)	-0.015	-0.017	-0.008
	(0.024)	(0.024)	(0.025)
Proximity Measure	Geodesic Distance	Geodesic Distance	Geodesic Distance
Type of Clinic	Any	Any	Any
Type of DHS Unit	Rural	Rural	Rural
Observations	2,176	2,176	1,756
Clusters	203	203	200
Adj-R2	0.64	0.61	0.09
Controls	√	√	√
Traditional Authorities f.e.	√	√	√
Region × Year f.e.	√	√	√

Notes: OLS Estimates for effect of ART availability on women empowerment controlling for men employment rate. Employment rate (Men) is the share of currently married women who worked in the 12 months before the interview. I use three proxies to measure exposure to ART. In Panel A is HIV prevalence in 2000 (HIV) meant to capture the number of potential recipients of the treatment. In Panel B and C I use the interaction between HIV prevalence and access to the clinic ($HIV x Proximity$) that combines the prevalence of HIV with access to ART. $Proximity$ is measured as: the inverse walking distance from the closest clinic, measured in 20 minutes units (Panel B); the inverse geodesic distance from the closest clinic, measured in km (Panel C). *Post* is a binary variable taking value 1 after the year 2004. Dependent variables: Column (1) share of currently married women participating in all the decisions available in each specific year; Column (2) share of currently married women participating in decision-making about their own health and big purchases in the household; Column (3) share of currently married women who have experienced physical violence in the 12 months before the interview. More details on the outcomes variables are provided in Section 3. */**/*** indicate significance at 10%/5%/1%, respectively; standard errors in parentheses clustered at the Traditional Authorities Areas level.

Table A15: Robustness: Baseline controlling for Population Density and Access to Health

	Decision Making		Physical Violence	
Panel A	All Indicators	Own Health & HH Purchases	Exp. Physical Violence (12 m)	Never Justify IPV
	(1)	(2)	(3)	(4)
Post × HIV	0.886***	0.960***	-0.334**	0.788***
	(0.149)	(0.162)	(0.164)	(0.238)
Proximity Measure	NA	NA	NA	NA
Type of Clinic	NA	NA	NA	NA
Type of DHS Unit	Rural	Rural	Rural	Rural
Additional Controls	√	√	√	√
Observations	2,210	2,210	1,771	2,210
Clusters	204	204	200	204
Adj-R2	0.65	0.62	0.09	0.51
Panel B	All Indicators	Own Health & HH Purchases	Exp. Physical Violence (12 m)	Never Justify IPV
	(1)	(2)	(3)	(4)
Post × HIV × Proximity	0.479***	0.573***	-0.322	0.402*
	(0.170)	(0.173)	(0.198)	(0.222)
Proximity Measure	NA	NA	NA	NA
Type of Clinic	NA	NA	NA	NA
Type of DHS Unit	Rural	Rural	Rural	Rural
Additional Controls	√	√	√	√
Observations	2,208	2,208	1,771	2,208
Clusters	203	203	200	203
Adj-R2	0.64	0.61	0.09	0.51
Panel C	All Indicators	Own Health & HH Purchases	Exp. Physical Violence (12 m)	Never Justify IPV
	(1)	(2)	(3)	(4)
Post × HIV × Proximity	0.438*	0.517**	-0.442**	0.284
	(0.229)	(0.232)	(0.219)	(0.259)
Proximity Measure	NA	NA	NA	NA
Type of Clinic	NA	NA	NA	NA
Type of DHS Unit	Rural	Rural	Rural	Rural
Additional Controls	√	√	√	√
Observations	2,210	2,210	1,771	2,210
Clusters	204	204	200	204
Adj-R2	0.64	0.61	0.09	0.51

Notes: OLS Estimates for effect of ART availability on women empowerment controlling for population density and access to health. I use three proxies to measure exposure to ART. In Panel A is HIV prevalence in 2000 (HIV) meant to capture the number of potential recipients of the treatment. In Panel B and C I use the interaction between HIV prevalence and access to the clinic ($HIVxProximity$) that combines the prevalence of HIV with access to ART. $Proximity$ is measured as: the inverse walking distance from the closest clinic, measured in 20 minutes units (Panel B); the inverse geodesic distance from the closest clinic, measured in km (Panel C). $Post$ is a binary variable taking value 1 after the year 2004.
Dependent variables: Column (1) share of currently married women participating in all the decisions available in each specific year; Column (2) share of currently married women participating in decision-making about their own health and big purchases in the household; Column (3) share of currently married women who have experienced physical violence in the 12 months before the interview; Column (4) share of women who never justify Intimate Partner Violence. More details on the outcomes variables are provided in Section 3. */**/*** indicate significance at 10%/5%/1%, respectively; standard errors in parentheses clustered at the Traditional Authorities Areas level.

Table A16: Robustness: Baseline introducing flexible controls

	Decision Making		Physical Violence	
Panel A	All Indicators	Own Health & HH Purchases	Exp. Physical Violence (12 m)	Never Justify IPV
	(1)	(2)	(3)	(4)
Post × HIV	0.960***	0.965***	-0.149	1.152***
	(0.202)	(0.221)	(0.212)	(0.272)
Proximity Measure	NA	NA	NA	NA
Type of Clinic	NA	NA	NA	NA
Type of DHS Unit	Rural	Rural	Rural	Rural
Additional Controls	√	√	√	√
Observations	2,210	2,210	1,771	2,210
Clusters	204	204	200	204
Adj-R2	0.65	0.62	0.09	0.52
Panel B	All Indicators	Own Health & HH Purchases	Exp. Physical Violence (12 m)	Never Justify IPV
	(1)	(2)	(3)	(4)
Post × HIV × Proximity	0.489*	0.506*	-0.168	1.134***
	(0.272)	(0.288)	(0.330)	(0.343)
Proximity Measure	NA	NA	NA	NA
Type of Clinic	NA	NA	NA	NA
Type of DHS Unit	Rural	Rural	Rural	Rural
Additional Controls	√	√	√	√
Observations	2,208	2,208	1,771	2,208
Clusters	203	203	200	203
Adj-R2	0.64	0.61	0.09	0.52
Panel C	All Indicators	Own Health & HH Purchases	Exp. Physical Violence (12 m)	Never Justify IPV
	(1)	(2)	(3)	(4)
Post × HIV × Proximity	0.536	0.521	-0.478	0.912**
	(0.346)	(0.355)	(0.321)	(0.356)
Proximity Measure	NA	NA	NA	NA
Type of Clinic	NA	NA	NA	NA
Type of DHS Unit	Rural	Rural	Rural	Rural
Additional Controls	√	√	√	√
Observations	2,210	2,210	1,771	2,210
Clusters	204	204	200	204
Adj-R2	0.64	0.61	0.09	0.52

Notes: OLS Estimates for effect of ART availability on women empowerment controlling in a flexible way for population density, access to health, employment rate, and primary education. I use three proxies to measure exposure to ART. In Panel A is HIV prevalence in 2000 (HIV) meant to capture the number of potential recipients of the treatment. In Panel B and C I use the interaction between HIV prevalence and access to the clinic ($HIVxProximity$) that combines the prevalence of HIV with access to ART. *Proximity* is measured as: the inverse walking distance from the closest clinic, measured in 20 minutes units (Panel B); the inverse geodesic distance from the closest clinic, measured in km (Panel C). *Post* is a binary variable taking value 1 after the year 2004.
Dependent variables: Column (1) share of currently married women participating in all the decisions available in each specific year; Column (2) share of currently married women participating in decision-making about their own health and big purchases in the household; Column (3) share of currently married women who have experienced physical violence in the 12 months before the interview; Column (4) share of women who never justify Intimate Partner Violence. More details on the outcomes variables are provided in Section 3. */**/*** indicate significance at 10%/5%/1%, respectively; standard errors in parentheses clustered at the Traditional Authorities Areas level.

Table A17: Falsification test: replace HIV with malaria

Dependent Variable	Share of Women Making Decisions on				Physical Violence
Panel A	All Indicators	Own Health	HH Purchases	Visit Friends/Relatives	Exp. Physical Violence (12 m)
	(1)	(2)	(3)	(4)	(5)
Post × Malaria × Proximity	0.170**	-0.008	0.135	-0.014	-0.010
	(0.078)	(0.113)	(0.087)	(0.144)	(0.124)
Proximity Measure	Geodesic Distance	Geodesic Distance	Geodesic Distance	Geodesic Distance	Geodesic Distance
Type of Clinic	Any	Any	Any	Any	Any
Type of DHS Unit	Rural	Rural	Rural	Rural	Rural
Observations	2,239	2,239	2,239	1,555	1,794
Clusters	204	204	204	195	201
Adj-R2	0.65	0.60	0.63	0.46	0.08
Panel B	All Indicators	Own Health	HH Purchases	Visit Friends/Relatives	Exp. Physical Violence (12 m)
	(1)	(2)	(3)	(4)	(5)
Post × HIV × Proximity	0.088	-0.147	0.062	0.045	-0.063
	(0.108)	(0.133)	(0.112)	(0.156)	(0.109)
Proximity Measure	Geodesic Distance	Geodesic Distance	Geodesic Distance	Geodesic Distance	Geodesic Distance
Type of Clinic	Any	Any	Any	Any	Any
Type of DHS Unit	Rural	Rural	Rural	Rural	Rural
Observations	2,241	2,241	2,241	1,555	1,794
Clusters	205	205	205	195	201
Adj-R2	0.65	0.60	0.62	0.46	0.08
Controls	√	√	√	√	√
Traditional Authorities f.e.	√	√	√	√	√
Region × Year f.e.	√	√	√	√	√

Notes: OLS Estimates for a falsification analysis to show that the effect of ART-rollout campaign works through HIV and not other diseases. $Malaria \times Proximity$ is the interaction between Malaria prevalence and access to the clinic that combines the prevalence of HIV with access to ART. *Proximity* is measured as: the inverse walking distance from the closest clinic, measured in 20 minutes units (A); the inverse geodesic distance from the closest clinic, measured in km (Panel B). *Post* is a binary variable taking value 1 after the year 2004.
Dependent variables: Column (1) share of currently married women participating in all the decisions available in each specific year; Column (2) share of currently married women participating in decision-making about their own health; Column (3) share of currently married women participating in decision making about big purchases in the household; Column (4) share of currently married women participating in decision making about visiting friends or relatives; Column (5) share of currently married women who have experienced physical violence in the 12 months before the interview.. More details on the outcomes variables are provided in Section 3. */**/*** indicate significance at 10%/5%/1%, respectively; standard errors in parentheses clustered at the Traditional Authorities Areas level.

Table A18: Baseline Analysis: Alternative Clinics (Walking Distance)

Dependent Variable	Women Empowerment Indicators		
	Decision Making		Physical Violence
Panel A	All Indicators	Own Health & HH Purchases	Exp. Physical Violence (12 m)
	(1)	(2)	(3)
Post × HIV × Proximity	0.474***	0.568***	-0.330*
	(0.169)	(0.172)	(0.198)
Proximity Measure	Walking Distance	Walking Distance	Walking Distance
Type of Clinic	Any	Any	Any
Type of DHS Unit	Rural	Rural	Rural
Observations	2,208	2,208	1,771
Clusters	203	203	200
Adj-R2	0.64	0.61	0.09
Panel B	All Indicators	Own Health & HH Purchases	Exp. Physical Violence (12 m)
	(1)	(2)	(3)
Post × HIV × Proximity	0.498***	0.604***	-0.413*
	(0.173)	(0.178)	(0.230)
Proximity Measure	Walking Distance	Walking Distance	Walking Distance
Type of Clinic	ART	ART	ART
Type of DHS Unit	Rural	Rural	Rural
Observations	2,208	2,208	1,771
Clusters	203	203	200
Adj-R2	0.64	0.61	0.09
Panel C	All Indicators	Own Health & HH Purchases	Exp. Physical Violence (12 m)
	(1)	(2)	(3)
Post × HIV × Proximity	0.565***	0.655***	-0.378*
	(0.212)	(0.218)	(0.203)
Proximity Measure	Walking Distance	Walking Distance	Walking Distance
Type of Clinic	Public	Public	Public
Type of DHS Unit	Rural	Rural	Rural
Observations	2,204	2,204	1,767
Clusters	202	202	199
Adj-R2	0.64	0.61	0.09
Controls	√	√	√
Traditional Authorities f.e.	√	√	√
Region × Year f.e.	√	√	√

Notes: OLS Estimates for effect of ART availability on women empowerment. As proxy for access to ART, I use the interaction between HIV prevalence and access to the clinic that combines the prevalence of HIV with access to ART ($HIVxProximity$). I use three different variations of my measure exposure to ART based on inverse walking distance, measured in 20 minutes units, from different typologies of clinics. In Panel A I replicate the baseline analysis including any clinic in the sample. In Panel B I restrict the analysis only to the clinics providing ART in 2013. In Panel C I restrict the analysis only to the public clinics. *Post* is a binary variable taking value 1 after the year 2004.
Dependent variables: Column (1) share of currently married women participating in all the decisions available in each specific year; Column (2) share of currently married women participating in decision-making about their own health; Column (3) share of currently married women participating in decision making about big purchases in the household; Column (4) share of currently married women participating in decision making about visiting friends or relatives. More details on the outcomes variables are provided in Section 3. */**/*** indicate significance at 10%/5%/1%, respectively; standard errors in parentheses clustered at the Traditional Authorities Areas level.

Table A19: Baseline Analysis: Alternative Clinics (Geodesic Distance)

Dependent Variable	Women Empowerment Indicators		
Panel A	Decision Making		Physical Violence
Panel A	All Indicators	Own Health & HH Purchases	Exp. Physical Violence (12 m)
	(1)	(2)	(3)
Post × HIV × Proximity	0.421*	0.499**	-0.444**
	(0.227)	(0.229)	(0.218)
Proximity Measure	Walking Distance	Walking Distance	Walking Distance
Type of Clinic	Any	Any	Any
Type of DHS Unit	Rural	Rural	Rural
Observations	2,210	2,210	1,771
Clusters	204	204	200
Adj-R2	0.64	0.61	0.09
Panel B	All Indicators	Own Health & HH Purchases	Exp. Physical Violence (12 m)
	(1)	(2)	(3)
Post × HIV × Proximity	0.415*	0.515**	-0.402*
	(0.240)	(0.242)	(0.236)
Proximity Measure	Walking Distance	Walking Distance	Walking Distance
Type of Clinic	ART	ART	ART
Type of DHS Unit	Rural	Rural	Rural
Observations	2,210	2,210	1,771
Clusters	204	204	200
Adj-R2	0.64	0.61	0.09
Panel C	All Indicators	Own Health & HH Purchases	Exp. Physical Violence (12 m)
	(1)	(2)	(3)
Post × HIV × Proximity	0.686**	0.752***	-0.394*
	(0.270)	(0.271)	(0.237)
Proximity Measure	Walking Distance	Walking Distance	Walking Distance
Type of Clinic	Public	Public	Public
Type of DHS Unit	Rural	Rural	Rural
Observations	2,210	2,210	1,771
Clusters	204	204	200
Adj-R2	0.64	0.61	0.09
Controls	√	√	√
Traditional Authorities f.e.	√	√	√
Region × Year f.e.	√	√	√

Notes: OLS Estimates for effect of ART availability on women empowerment. As proxy for access to ART, I use the interaction between HIV prevalence and access to the clinic that combines the prevalence of HIV with access to ART ($HIVxProximity$). I use three different variations of my measure exposure to ART based on inverse geodesic distance, measured in kilometers, from different typologies of clinics. In Panel A I replicate the baseline analysis including any clinic in the sample. In Panel B I restrict the analysis only to the clinics providing ART in 2013. In Panel C I restrict the analysis only to the public clinics. *Post* is a binary variable taking value 1 after the year 2004.
Dependent variables: Column (1) share of currently married women participating in all the decisions available in each specific year; Column (2) share of currently married women participating in decision-making about their own health; Column (3) share of currently married women participating in decision making about big purchases in the household; Column (4) share of currently married women participating in decision making about visiting friends or relatives. More details on the outcomes variables are provided in Section 3. */**/*** indicate significance at 10%/5%/1%, respectively; standard errors in parentheses clustered at the Traditional Authorities Areas level.

Table A20: Channels

Dependent Variable	Share of Women			
Panel A	Employed	Completed Primary	Completed Primary (15-24)	in Polygynous HH
	(1)	(2)	(3)	(4)
Post × HIV	1.113***	0.133	0.558**	0.017
	(0.414)	(0.160)	(0.237)	(0.151)
Proximity Measure	NA	NA	NA	NA
Type of Clinic	NA	NA	NA	NA
Type of DHS Unit	Rural	Rural	Rural	Rural
Observations	2,210	2,210	2,210	2,210
Clusters	204	204	204	204
Adj-R2	0.22	0.37	0.26	0.29
Panel B	Employed	Completed Primary	Completed Primary (15-24)	in Polygynous HH
	(1)	(2)	(3)	(4)
Post × HIV × Proximity	0.658**	0.130	0.630**	-0.044
	(0.330)	(0.178)	(0.248)	(0.150)
Proximity Measure	Walking Distance	Walking Distance	Walking Distance	Walking Distance
Type of Clinic	Any	Any	Any	Any
Type of DHS Unit	Rural	Rural	Rural	Rural
Observations	2,208	2,208	2,208	2,208
Clusters	203	203	203	203
Adj-R2	0.21	0.38	0.27	0.29
Panel C	Employed	Completed Primary	Completed Primary (15-24)	in Polygynous HH
	(1)	(2)	(3)	(4)
Post × HIV × Proximity	0.517	0.127	0.907***	-0.100
	(0.367)	(0.216)	(0.289)	(0.187)
Proximity Measure	Geodesic Distance	Geodesic Distance	Geodesic Distance	Geodesic Distance
Type of Clinic	Any	Any	Any	Any
Type of DHS Unit	Rural	Rural	Rural	Rural
Observations	2,210	2,210	2,210	2,210
Clusters	204	204	204	204
Adj-R2	0.21	0.36	0.26	0.29
Controls	√	√	√	√
Traditional Authorities f.e.	√	√	√	√
Region × Year f.e.	√	√	√	√

Notes: OLS Estimates for the channels through which ART availability affects women empowerment. I use three proxies to measure exposure to ART. In Panel A is HIV prevalence in 2000 (HIV) meant to capture the number of potential recipients of the treatment. In Panel B and C I use the interaction between HIV prevalence and access to the clinic ($HIVxProximity$) that combines the prevalence of HIV with access to ART. $Proximity$ is measured as: the inverse walking distance from the closest clinic, measured in 20 minutes units (Panel B); the inverse geodesic distance from the closest clinic, measured in km (Panel C). $Post$ is a binary variable taking value 1 after the year 2004.
Dependent variables: Column (1) share of currently married women who worked in the 12 months before the interview; Column (2) share of currently married women who have completed primary education (8 years of schooling); Column (3) share of young women (15-24) who have completed primary education (8 years of schooling); Column (4) share of currently married women who are currently living in polygynous households. More details on the outcomes variables are provided in Section 3. */**/*** indicate significance at 10%/5%/1%, respectively; standard errors in parentheses clustered at the Traditional Authorities Areas level.

Table A21: Channels: Alternative Proximity Measures (Geodesic Distance)

Dependent Variable	Share of Women							
	Employed		Completed Primary		Completed Primary (15-24)		in polygynous HH	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post × HIV × Proximity	0.044**	0.055**	0.007	0.008	0.036***	0.034***	-0.005	-0.003
	(0.018)	(0.021)	(0.008)	(0.008)	(0.012)	(0.012)	(0.008)	(0.009)
Proximity Measure	Linear	Log	Linear	Log	Linear	Log	Linear	Log
Type of Clinic	NA	Any	NA	Any	NA	Any	NA	Any
Type of DHS Unit	Rural	Rural	Rural	Rural	Rural	Rural	Rural	Rural
Observations	2,210	2,210	2,210	2,210	2,210	2,210	2,210	2,210
Clusters	204	204	204	204	204	204	204	204
Adj-R2	0.22	0.22	0.37	0.37	0.27	0.27	0.29	0.29
Controls	√	√	√	√	√	√	√	√
Traditional Authorities f.e.	√	√	√	√	√	√	√	√
Region × Year f.e.	√	√	√	√	√	√	√	√

Notes: OLS Estimates for effect of ART availability on women empowerment. I use two proxies to measure exposure to ART. $HIVxProximity$ is the interaction between HIV prevalence and access to the clinic that combines the prevalence of HIV with access to ART. Columns (1), (3), (5), and (7) use as proximity measure the distance from the closest clinic, measured as $Proximity_i = \max(dist) - dist_i$. Columns (2), (4), (6), and (8) use as proximity measure the distance from the closest clinic, measured as $Proximity_i = \log(1 + \max(dist) - dist_i)$. $Post$ is a binary variable taking value 1 after the year 2004. All coefficients are standardized to make them comparable.
Dependent variables: Columns (1) and (2) share of currently married women who worked in the 12 months before the interview; Columns (3) and (4) share of currently married women who have completed primary education (8 years of schooling); Columns (5) and (6) share of young women (15-24) who have completed primary education (8 years of schooling); Columns (7) and (8) share of currently married women who are currently living in polygynous households. More details on the outcomes variables are provided in Section 3. */**/*** indicate significance at 10%/5%/1%, respectively; standard errors in parentheses clustered at the Traditional Authorities Areas level.

Table A22: Channels: Men's Outcomes

Dependent Variable	Share of Men		
Panel A	Employed	Completed Primary	Completed Primary (15-24)
	(1)	(2)	(3)
Post × HIV	0.258	-0.142	0.161
	(0.280)	(0.289)	(0.423)
Proximity Measure	NA	NA	NA
Type of Clinic	NA	NA	NA
Type of DHS Unit	Rural	Rural	Rural
Observations	2,176	2,176	2,006
Clusters	203	203	204
Adj-R2	0.12	0.17	0.07
Panel B	Employed	Completed Primary	Completed Primary (15-24)
	(1)	(2)	(3)
Post × HIV	-0.126	0.119	0.389
	(0.211)	(0.341)	(0.409)
Proximity Measure	Walking Distance	Walking Distance	Walking Distance
Type of Clinic	Any	Any	Any
Type of DHS Unit	Rural	Rural	Rural
Observations	2,174	2,174	2,004
Clusters	202	202	203
Adj-R2	0.12	0.18	0.08
Panel C	Employed	Completed Primary	Completed Primary (15-24)
	(1)	(2)	(3)
Post × HIV	-0.456*	0.258	0.291
	(0.271)	(0.444)	(0.528)
Proximity Measure	Geodesic Distance	Geodesic Distance	Geodesic Distance
Type of Clinic	Any	Any	Any
Type of DHS Unit	Rural	Rural	Rural
Observations	2,176	2,176	2,006
Clusters	203	203	204
Adj-R2	0.12	0.18	0.07
Controls	√	√	√
Traditional Authorities f.e.	√	√	√
Region × Year f.e.	√	√	√

Notes: OLS Estimates for the channels through which ART availability affects men's outcomes. I use three proxies to measure exposure to ART. In Panel A is HIV prevalence in 2000 (HIV) meant to capture the number of potential recipients of the treatment. In Panel B and C I use the interaction between HIV prevalence and access to the clinic ($HIVxProximity$) that combines the prevalence of HIV with access to ART. *Proximity* is measured as: the inverse walking distance from the closest clinic, measured in 20 minutes units (Panel B); the inverse geodesic distance from the closest clinic, measured in km (Panel C). *Post* is a binary variable taking value 1 after the year 2004.
Dependent variables: Column (1) share of currently married men who worked in the 12 months before the interview; Column (2) share of currently married men who have completed primary education (8 years of schooling); Column (3) share of young men (15-24) who have completed primary education (8 years of schooling). More details on the outcomes variables are provided in Section 3. */**/*** indicate significance at 10%/5%/1%, respectively; standard errors in parentheses clustered at the Traditional Authorities Areas level.