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HIV/AIDS and Conflict: Micro Evidence from Burundi

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This paper studies the relationship between civil war and HIV/AIDS in Burundi. It contributes to the empirical literature by providing micro level evidence using an identification strategy based on original data on the dynamics of rebel movements. The presence of exit and entry points from and to rebel safe havens is used to generate exogenous variation in conflict intensity. These points are plausibly assumed to serve as starting or end points for rebel attack, but are not directly related to HIV/AIDS or correlated with unobservables. The case of Burundi provides fruitful grounds of analysis, as seroprevalence rates are heterogeneous across the country, the serological and conflict data for Burundi is of good quality and conclusions are likely to serve as valuable insights in Burundi and other fragile countries with similar HIV/AIDS policy agendas. OLS, instrumental variable and binary response model results indicate that within provinces in Burundi there is no clear-cut relationship between local conflict intensity and seroprevalence, condom knowledge and use, knowledge of test opportunities and actual test taking, or rape. Findings suggest that although HIV/AIDS is a general development priority, it is not as urgent a post-conflict priority as commonly assumed.

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Keywords: HIV, AIDS, Civil War, Instrumental Variables, Burundi

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1 Introduction

This paper studies the empirical relationship between the prevalence of HIV/AIDS and civil war at the micro-level. HIV/AIDS figures prominently on post-conflict policy agendas and it has been a common assumption among donors and policy makers that civil war leads to increases in sexually-transmitted diseases such as HIV/AIDS.[1] During World War I sexually transmitted diseases were said to be substantially higher among soldiers, which probably resulted in spill-overs to civilian populations. In Rwanda, violence and subsequent mass displacements seem to have brought the HIV epidemic from cities such as Kigali to rural areas. In Angola HIV patterns appear to have shifted considerably during the last two decades of civil war. The disease is said to have spread from the north to the center and south of the country, trailing frontlines and mass displacements. In the case of Sierra Leone, sexual intercourse between foreign soldiers from HIV infeasted countries with locals are likely to have contributed to a spike in HIV prevalence (see Hankins, Friedman, Zafard, and Strathdee, 2002).

A series of indirect and direct channels between AIDS and conflict are commonly cited. War is accompanied by sexual abuse and rape is known to be systematically used as a psychological weapon. Women may be forced into "survival sex" in return for staying alive or receiving food. War may lead to an increase of high-risk prostitution. Furthermore sexual networks are reshuffled due to mass displacement, impoverishment and war trauma. More generally, people are likely to change fundamental behavior and risk taking. Finally, people in crisis regions may be less exposed to information about the dangers of unprotected sex or have no access to health facilities (see Hankins, Friedman, Zafard, and Strathdee, 2002).

However the correlation is not necessarily clear-cut and positive as Spiegel (2007) points out. Indeed conflict may even dampen the spread of diseases due to restricted mobility or access as well as due to fewer social interactions. Thus this topic is an empirical one and while the literature on HIV/AIDS and civil war has provided valuable descriptive analysis, correlations and cross-country studies, little attention has been paid to estimating causal effects and providing finely-grained micro evidence.[2]

This paper makes two main contributions. First, it provides micro level evidence at the individual level using serological and local conflict data from Burundi. The focus on the micro level is an important complement to existing macro evidence, since conflict and

[1] See Spiegel (2007) for a critical review.

[2] See, for instance, Smallman-Raynor and Cliff, 1991; Spiegel, Bennedsen, Rygaard, Claass, Bruns, Patterson, Yiweza, and Schilperoord, 2007; Strand, Fernandes Dias, Bergstrom, and Andersson, 2007; Supervie, Halima, and Blower, 2010.

risk behavior or seroprevalence rates may vary substantially within a country. Hence this relationship should not only be studied at an aggregate level. More generally, this paper adds to the growing literature on the impact and dynamics of civil war at the micro-level.[3] Second, I use a novel identification strategy based on the dynamics of rebel movements. The importance of a sound identification strategy to estimate causal effects has been forcefully underlined in the recent civil war literature.[4] In particular, omitted variables are a likely source of endogeneity. For example, the decision of rebels or government forces to engage in military operations in an area are probably correlated with commune characteristics that also affect HIV/AIDS outcome variables of interest that are not adequately captured by the household- and commune-level observables that are included in the empirical model. Also reverse causality cannot be ruled out. Using Ugandan data from the 1990s, Weinstein (2006) finds that districts with the highest levels of HIV prevalence also tend to exhibit high levels of crime.

The impact of conflict on households and communities in Burundi has been extensively studied.[5] Despite the widespread belief that conflict has contributed to the spread of the disease in Burundi (see for instance Seckinelgin, Bigirumwami, and Morris, 2008), there is little empirical evidence. The case of Burundi provides fruitful grounds of analysis, as seroprevalence rates are heterogeneous across the country as can be seen in figure 1. In addition, the serological and conflict data is of good quality and conclusions are likely to serve as valuable insights for Burundi and other post-conflict countries with similar HIV/AIDS policy agendas. OLS, instrumental variables and binary response model estimates indicate that civil war has had no lasting effect on snapshot HIV/AIDS seroprevalence, condom knowledge and use, knowledge of test opportunities and actual test taking, or rape in post-conflict Burundi of 2007. This confirms the previously mixed evidence at the macro level and rejects the common hypothesis among policy makers that conflict leads to higher seroprevalence rates.

The rest of this paper is organized as follows. Section 2 reviews the previous literature

[3]Verwimp, Justino, and Brueck (2009) argue for a micro level rather than country level approach to study conflict and the behaviour and welfare of individuals, households, groups or communities. See also Blattman (2010) for an overview of the socio-economic literature on civil war at the micro and macro level.

[4]Most notably see Miguel and Roland (2011) who use the plausibly exogeneous distance to the 17^{th} parallel as exclusion restriction to study the long run economic effects of the US bombing on districts in Vietnam. This distance is assumed to have an exogeneous effect on bombing intensity at the district level, but is not directly related to socio-economic variables. The identification story is based on the idea that the border was set by the 1954 Geneva Accords at the end of the French colonial era. As a result the 17^{th} parallel became an area of heavy fighting, while the choice of the 17 degrees, rather than 16 or 18 degrees, amounts to a natural experiment. Miguel, Satyanath, and Sergenti (2004) use rainfall shocks to study the impact of GDP on Civil War.

[5]In terms of conflict and health, Bundervoet, Verwimp, and Akresh (2009) find important impacts of Burundian civil war exposure on children's health status.

and details some channels through which civil war may impact HIV/AIDS. Section 3 outlines the basic research questions and outcome variables. Section 4 presents the basic empirical specification, and shows why relying solely on OLS-based estimates of the impact of violence on prevalence may be misleading. Section 5 spells out the identification strategy. Section 6 details the data. Section 7 discusses reduced form estimates. Section 8 presents OLS, instrumental variable and binary choice model estimates of the impact of conflict on various outcomes related to HIV/AIDS. Section 9 concludes.

2 Previous Literature and Channels

Four main factors may increase the spread of HIV/AIDS: (i) the incidences of gender violences such as rape and transactional sex are likely to pick up during wars. Alison (2007) argues that sexual violence is the most frequent human rights violation during wars. Unlike indiscriminate rape during peacetime, wartime rape is often targeted. It serves as a weapon directed at enemy women. Also wartime sexual violence is often done in groups to promote bonding, social cohesion and loyalty. Consequently, targeted rape in conflict zones can lead to increases of prevalence rates in certain groups compared to others. In this context it is worth mentioning that children, women, humanitarian workers and military are considered key carriers of the disease. In particular, it is widely accepted that prevalence rates among soldiers are substantially higher. However Whiteside, de Waal, and Gebre-Tensae (2006) show that soldiers do not necessarily have a higher prevalence of HIV than civilians. In fact, prevalence is endogeneous to demographics of the army, patterns of deployment, local prevalence, and military health policies. (ii) Violent conflict can have a profound impact on behavioral change such as sexual risk-taking. In recent behavioral experiments Voorst, Nillesen, Verwimp, Bulte, Lensink, and van Soest (2010) find that individuals that have been exposed to relatively more conflict in Burundi seek more risk and have higher discount rates. In similar behavioral games in Nepal, Gilligan, Pasquale, and Sami (2010) find that individuals exhibit significantly greater levels of social capital if they experienced relatively higher levels of violence. The paper also detects some weaker evidence that people in conflict-affected communities are more trusting than those in communities unaffected by violence.[6] (iii) Resources for detecting, fighting and educating about HIV/AIDS may dwindle during conflict. For instance, HIV/AIDS is feared to increase in some of Uganda's conflict zones according to some reports of disruption of health services.[7] (iv) Displacement and forced migration may contribute to a geographical spread of the disease.

[6]This paper uses an identification strategy based on exogenous isolation of communities due to Nepal's terrain ruggedness.

[7]See for instance "System Disruption & HIV AIDS", Albon, C., June 16, 2008, available at: www.conflicthealth.com/system-disruption-hiv-aid, acessed on: Novemver 10th, 2010

Spiegel (2007) points out two neglected factors induced by conflict that may dampen the spread of HIV prevalence: (i) conflict may reduce mobility and accessability. For example, infrastructure is often severely damaged during war, which renders access to remote communities difficult and decreases travel. (ii) Displaced people may have better access to humanitarian assistance, medical services and infrastructure in refugee camps or in neighboring countries. Clearly, the relevance of these channels depends on the intensity, scope and length of conflict; as well as initial prevalence rates of conflict-afflicted populations and neighboring communities.

However, as Spiegel (2007) points out forcefully, the relationship between HIV/AIDS and civil war is inherently complex and not clear-cut. And to this date empirical evidence is mixed. For instance, Strand, Fernandes Dias, Bergstrom, and Andersson (2007) study simple spearman rank correlations between HIV prevalence and conflict events[8] across 14 sub-saharan countries. The study finds a strong and significant correlation of -41%. Discussing these results in the context of post-conflict Angola, the authors argue that low prevalence in the country compared to other countries can be attributed to civil war. The paper warns that the return of soldiers and refugees may however lead to a rebound in prevalence rates. In this light preventive measures should be taken. A limitation of the study is that the authors make use of simple correlation measures at a very aggregated level. The lack of control variables or causal methods sheds some doubt on the magnitude of correlation and causality. Clearly, a series of omitted variables such as foreign aid, infrastructure, GDP, education, etc. are correlated with both conflict and HIV/AIDS, which may result in misleading implications. However, the paper rightly points out that one has to distinguish between conflict and post-conflict impacts on prevalence rates.

In a statistically more refined study, Smallman-Raynor and Cliff (1991) use data on ethnic recruitment patterns into the Ugandan National Liberation Army after the overthrow of Idi Amin to demonstrate that the observed geographical distribution between clinical AIDS cases in Uganda can be explained by civil war. The authors find a significant and positive relationship between indicators of the ethnic base of the Ugandan National Liberation Army and clinical AIDS reports across Uganda. Again, these findings underline that military personnel can be an important transmission vector during and after war. The authors are careful not to claim any causality and point out the limitations of the administrative AIDS and recruitment data.

Spiegel, Bennedsen, Rygaard, Claass, Bruns, Patterson, Yiweza, and Schilperoord (2007)

[8]The authors use the well known country level conflict data from the Department of Peace and Conflict Research (PCR), Uppsala University, Sweden

review HIV prevalence surveys and studies within communities that have been directly and indirectly affected by conflict across seven sub-Saharan African countries.[9] In 65 datasets there is no evidence of increases in HIV infection during conflict periods, irrespective of prevalence prior to conflict. In particular, infection rates in urban areas remain stable. Of 12 refugee camps, nine had a lower prevalence than their immediate environment. Finally, displacement and wide-scale rape seem not to have contributed to a raise in HIV prevalence. Although the study reviewed a wide array of studies and datasets, it does not move beyond descriptive statistics, correlations and event studies.

Recent simulations by Supervie, Halima, and Blower (2010) predict HIV/AIDS prevalence as a function of the potential use of mass rape as weapon of war in seven conflict-affected countries.[10] Using uncertainty analysis and risk models, the authors predict that mass rape could lead to about five HIV infections per 100 000 women per year in the Democratic Republic of the Congo, Sudan, Somalia and Sierra Leone, about 10 infections in Burundi and Rwanda, and 40 in Uganda. Despite these relatively low rates, the paper urges to offer help and treatment to victims of rape to reduce HIV incidences. It should be noted that these simulations are based on assumptions about, for instance, transmission rates, viral loads, and prevalence among violent and non-violent males.

3 Basic Research Questions

The paper seeks to answer a series of questions on the relationship between HIV/AIDS and civil war. Most importantly, it investigates the impact of different measures of civil war on individual HIV/AIDS seroprevalence. Yet as noted there are many potential channels of how civil war can affect the individual likelihood of an infection. To investigate some of these, I ask the following empirical questions, using the individual data from the 2007 Burundian national prevalence survey: (i) How does local conflict intensity affect the availability and knowledge of HIV/AIDS test centers? This is a binary variable that takes on a value of one, if the individual knows where he can get an HIV/AIDS test in his community and zero if he does not. (ii) Does conflict impact self-reported testing behavior? This is a binary variable that takes on a value of one, if the individual reports to have done a HIV/AIDS test and zero if he does not. People in war zones might have been exposed to less information on the importance of testing or do not consider long-term health a priority. (iii) Is individual risk behavior changed by local conflict? The dependent variable takes on the value of one, if people used a condom during their first sexual intercourse. (v) I also employ a binary variable, if an individual knows that

[9] Democratic Republic of the Congo, Southern Sudan, Rwanda, Uganda, Sierra Leone, Somalia, and Burundi.

[10] Burundi, Democratic Republic of the Congo, Rwanda, Sierra Leone, Somalia, Sudan and Uganda.

condoms protect against HIV/AIDS. (v) Finally, I investigate if local conflict increases self-reported incidences of sexual violence such as rape.

4 Empirical Specification

This paper aims to quantify the impact of civil war as proxied by communal level conflict intensity on the probability that an individual is HIV positive and other individual measures of HIV/AIDS. Let i denote individuals, h households, c communes, and N the sample size. The basic structural equation that is estimated is given by:

$$Y_{ihc} = x_{ihc}\alpha + w_c\beta + \varepsilon_{ic} \tag{1}$$

where Y_{ihc} is the $Nx1$ vector associated with the outcome variable (e.g., serological status, condom use, etc.), x_{ihc} is a matrix of individual, household and commune control variables, w_c is a measure of conflict intensity in the commune in which the individual resides, and ε_{ihc} is the disturbance term. The purpose is to consistently estimate the impact of civil war intensity on the outcome variable.

I decompose the disturbance term into two components:

$$\varepsilon_{ihc} = \lambda_c + \eta_{ihc} \tag{2}$$

where λ_c represents commune-level unobservables that affect the outcome, while η_{ihc} are individual- or household-level unobservables.

The OLS model is the baseline specification. However we cannot rule out that OLS estimates of (1) will lead to an inconsistent estimate of β, since conflict intensity is likely to be correlated with commune-level unobservables λ_c. For example, the decision of rebels or government forces to engage in military operations in an area are probably correlated with commune characteristics that are not adequately captured by the household- and commune-level observables that are included in x_{ihc}. Estimating (1) with commune-specific fixed effects solves this problem, but variables such as w_c can then no longer be identified. As a result, I decide to include fixed effects at the hierarchically higher province level and thus estimate within provinces. In particular, the provincial dummies should explain a sizeable bulk of the variance of seroprevalence (see figure 1) and mob up province-level endogeneity. Commune-specific random effects are not feasible either, because the likely endogeneity of conflict implies that it will be correlated with the random effects. Consequently, we investigate if OLS results are robust to instrumental variable results. I base my identification strategy on the history of the conflict.

All dependent variables are binary with varying degrees of zeros. In discrete choice models with endogeneous regressors, it is easier to work with the linear probability model, since then standard linear model methods can be applied provided standard errors adjust for heteroskedasticity. Another estimation issue is that positive seroprevalence tests are relatively rare in the dataset. For the baseline results I use a linear model. However, I provide a series robustness checks using endogenous probit models and rare events logit models although results turn out to be qualitatively similar.

5 Identification Strategy

An innovation of the study compared to existing studies on HIV and civil war is its causal identification strategy. A series of unobservable or omitted factors are both correlated with conflict intensity over the long civil war period and individual HIV status in 2007. Ignoring these confounding factors may bias estimates. The source of the bias are regional, household and individual unobservables. These variables can be time-varying (for instance specific to the war period) or constant.

The causal identification strategy in the light of such unobservables is based on the movement of rebels during the Burundian civil war by exploiting geographical variation in the intensity of violence experienced by different communities due to the presence of exit and entry points to and from rebel safe-havens in national parks and forests. Unlike Voorst, Nillesen, Verwimp, Bulte, Lensink, and van Soest (2010), I do not use the distance to Bujumbura as exclusion restriction, as it is well know that HIV/AIDS often originates or spreads more easily from urban centers and thus I cannot rule out a direct impact of the excluded instrument on my response variables.[11]

Exit and entry points include mountain passes, paths and trails. I will compare communes that have similar health and economic potentials, but differ in the presence of such strategic points. These points are plausibly assumed to serve as starting or end points for rebel attacks, but are not directly related to the response variables like seroprevalence of inviduals or correlated with omitted variables. I will generate exogenous variation in the intensity of conflict using a binary dummy variable that takes on a value of one if the commune features entry/exit points to safe-havens. The presence of entry and exit points should have no direct effect on HIV prevalence, but only indirectly through conflict

[11] Arcand, Rodella-Boitreaud, and Rieger (2011) generate exogenous variation in conflict (landmine) intensity using the distance between communes and rebel headquarters, as predicted by a theoretical model of rebel mining. Landmine intensity is found to be a decreasing function of the distance to a set of rebel headquarters.

intensity. Due to the presence of an exit point, communities are relatively more exposed to conflict. This exogeneous variation in conflict intensity can then be used to causally identify the resulting impact on HIV prevalence.

My instrument must satisfy two conditions. First, conditional on the individual-, household- and commune-level covariates included in x_{ihc}, the presence of key entry points to rebel safe havens must be a statistically significant determinant of the intensity of conflict facing commune c. Second, it must, conditional on x_{ihc}, be orthogonal with respect to λ_c.

Several potential confounding factors that are correlated with the outcome and instrumental variable are included in the empirical models. As previously mentioned, the location constituting the instrument is fairly remote. The distance of a given commune to the rebels might be inversely related to the commune's remoteness, which itself might well be correlated with individual, household and commune-level unobservables that affect the response variable(s). Therefore, I include, amongst the covariates, variables that will control for remoteness, such as terrain elevation, the distance of communes to Bujumbura and to their respective provincial capital (economic remoteness). Furthermore, I include population density estimates at the commune level.

Last but not least, individual and household-level control variables such as education level, gender, age, religion, employment, family composition, relationship status, ownership of television and radio receivers and marriage status. A rural dummy accounts for the localization of the household in a rural area. Unfortunately, we cannot control for the province of birth, displacement history or ethnicity.

To summarize the identification strategy: commune level conflict intensity is an increasing function of the dummy variable indicating rebel safe havens. Letting D_c denote this dummy, the identification story suggests that the underlying first-stage reduced form that corresponds to the structural equation specified in (2) should be given by:

$$w_c = x_{ihc}\gamma + D_c\pi + \nu_{ihc} \tag{3}$$

with $\pi > 0$. Whether or not D_c does provide any modicum of identification can be explicitly tested by examining the statistical significance of π.

6 Data

The Burundian civil war broke out in 1993 and ended in 2005.[12] This means that at the time of the 2007 National Serological Household Survey among the general population that is used in this study, the incubation time had been sufficiently long to assess the impact of the war period on the snapshot prevalence of HIV at the individual level.

I base my measure of conflict intensity on news-based casualty data provided by Cyrus Samii of Columbia University. The latter was in hand-written form and has been coded by the author. From the local news data, I use the total number of violent events per commune from 1993 to 2003. As an alternative conflict variable, I use information from the United Nations High Commissioner for Refugees(UNHCR) in Burundi about the total number of repatriations by commune up to 2010. This is an imperfect proxy, but it is a good indication of displacement and conflict during the war at the communal level. The communal conflict measures are merged into the 2007 National Serological Household Survey among the general population.

Furthermore, the paper uses original data from interviews conducted with eyewitnesses, rebels and military in October 2010. These provide insights in the dynamics of various rebel movements during the civil war and inform the identification strategy. I could clearly identify 10 communes with main exit or entry points that were cross-checked across interviews. As the current political situation in Burundi is rather tense, most interviews were conducted off-record. However sources or notes can be shared on request.

Summary statistics are presented in table 1. When interpreting the results in this paper it is important to note that seroprevalence in the sample is relatively low with a mean of 3.2%. 6% of individuals in the sample that includes people aged between 15 and 49 years used condoms during their first sexual intercourse. 46% of individuals know that condoms protect against HIV/AIDS. 22% of individuals know about a test center nearby, while 18 % have taken a test. 3% of people have been victims of sexual violence.

There is considerable variance in violence across communes. Local news sources recorded on average four violent events per commune between 1991 and 2003. The distribution across communes is highly skewed as can be inferred from the median of two, a large maximum value of 36 and a standard deviation of 5.3. The proxy of displacement are UNHCR repatriations. An average commune has had 6159 UNHCR repatriations up to October 2010. Again the distribution is skewed across communes.

[12]For details on the history of the conflict see for instance Lemarchand (1996) and Chretien and Dupaquier (2007).

7 Reduced Form

Reduced form estimates are presented in table 2. I fail to reject the hypothesis that exit/entry points from and to rebel safe havens are a statistically significant determinant of conflict. Results for violent events recorded in local news sources are displayed in the first column. The presence of an exit point to a rebel safe-haven is a significant and sizeable predictor of violence at the commune level. The treatment effect amounts to roughly five events more compared to other communes without such points. Results for UNHCR repatriations are also striking. The treatment effect amounts to a sizeable 12,400 additional repatriations.

Table 2 also presents some selected control variables at the commune level. It is not suprising that total population at the commune level is positively and significantly associated with displacement, however there is no correlation with the number of violent events. Terrain elevation is negatively related to violence with a p-value of 12%, as well as to displacement with a p-value of 0%. This result underlines the crucial fact that altitude is an important co-founder in the case of Burundi. Distance to the provincial capital is significantly and negatively correlated with commune violence, however it does so positively with refugees. Finally, the number of refugees is significantly and positively affected by the distance to Bujumbura.

8 OLS and Instrumental Variable Results

Empirical results for the OLS and linear IV models are presented in tables 3,4 and 5. Each table includes OLS, instrumental variables and binary response estimates for the two measures of conflict at the commune level: conflict events from local news and UNHCR repatriations.

Consider the results for individual seroprevalence status in the first column of table 3. Both IV and OLS results in the first column suggest that there is no impact of conflict nor displacement on the likelihood of an individual being tested positive. This result is robust to employing the rare events logit specifications. In column 2 and 3 of the same table, I split the sample into two age groups to see if age cohorts are differently affected. In the age group of 31 to 49 year, the OLS estimates suggest that local conflict events is significantly correlated with lower seroprevalence. However this result is not robust to employing instrumental variables and the rare events specification.

If one believes the OLS and probit estimates in table 4, there is some statistical evidence that displacement as proxied by UNHCR repatriations is associated with a lower likeli-

hood of using condoms during the first sexual intercourse. However this result vanishes once one takes into account sources of endogeneity or one uses the measure of conflict based on local news events. There is also no indication that conflict is related to the knowledge that condoms protect against HIV/AIDS as presented in the second column of table 4. In the last column, I find that violence is not significantly correlated with self-reported incidence of sexual violence in the 2007 survey.

Table 5 presents results on the knowledge about the presence of HIV/AIDS test centers and if the individual has taken a test. Across all models and the two measures of conflict, I detect no impact of civil war on the knowledge about the presence of test centers. On the other hand the likelihood of the individual taking a test is significantly lower in conflict affected communes according to IV estimates. However if I take into account the binary nature of the response variables by employing probit models, the statistical significance vanishes.

9 Concluding Remarks

Results in this paper indicate that at least for the case of Burundi there is no empirical relationship between seroprevalence, condom use, test behavior, rape and knowledge about condoms and test centers with respect to measures of local conflict intensity within provinces. This evidence rejects the common hypothesis among policy makers and donors that civil war has an impact on HIV/AIDS, at least at a local level. Thus relatively more conflict affected areas do not need to be prioritized over others in terms of HIV/AIDS policies. Finding also suggest that although HIV/AIDS is a general development priority, it is not as urgent a post-conflict priority as commonly assumed.

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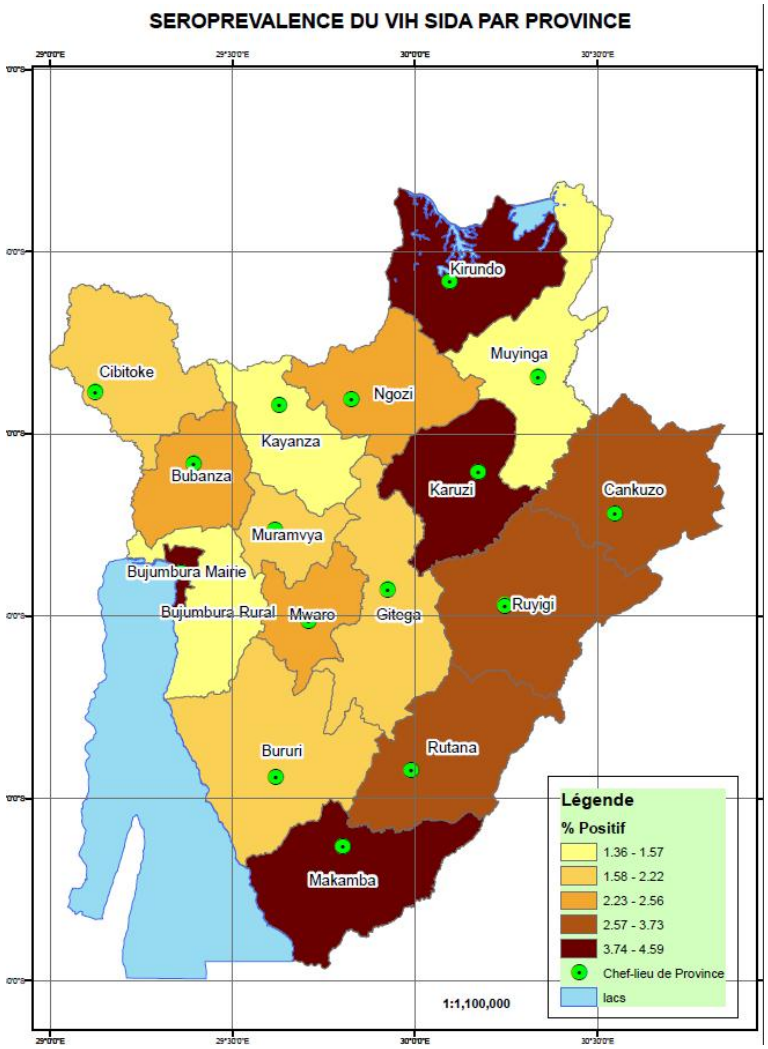

Figure 1: Seroprevalence of HIV/AIDS Across Provinces in Burundi. Source: SEP-CNLS, 2007

	mean	median	sd	min	max
Conflict Variables					
Violent Events in Local News	4.07	2.00	5.25	0	36
UNHCR Repatriations	6159	1337	12380	0	65670
Response Variables					
Seroprevalence	0.03	0	0.18	0	1
Knows Where to get HIV Test	0.22	0	0.41	0	1
Has Taken HIV Test	0.18	0	0.38	0	1
Used Condom(First Intercourse)	0.06	0	0.24	0	1
Thinks Condoms Protect	0.46	0	0.50	0	1
Victim of Sexual Violence	0.03	0	0.16	0	1
Commune Variables					
Exit/Entry Points	0.07	0	0.26	0	1
Population	55810	53720	20770	25.72	113300
Terrain Elevation	1523	1579	383	773	2382
Latitude	-3.35	-3.31	0.40	-4.33	-2.52
Dist. to Provincial Capital	14.23	13.65	10.39	0	38.80
Dist. to Bujumbura	72.06	68.39	42.07	0.68	165.90
Household and Indiv. Variables					
Gender	0.56	1	0.50	0	1
Age	29.12	28.00	10.23	15	49
Rural Household	0.86	1	0.35	0	1
Attended School	0.54	1	0.50	0	1
Currently in School	0.16	0	0.37	0	1
Primary Degree	0.40	0	0.49	0	1
Secondary Degree	0.12	0	0.33	0	1
Higher degree	0.01	0	0.08	0	1
Wage Labor	0.26	0	0.44	0	1
Catholic	0.64	1	0.48	0	1
Muslim	0.04	0	0.19	0	1
Protestant	0.24	0	0.43	0	1
Lives Alone	0.06	0	0.24	0	1
Lives with Parents	0.23	0	0.42	0	1
Lives with Spouse	0.54	1	0.50	0	1
Lives with Partner	0.03	0	0.18	0	1
Married	0.64	1	0.48	0	1
Radio	0.41	0	0.49	0	1
TV	0.07	0	0.25	0	1

Table 1: Summary Statistics of household, individual and commune variables, 6076 observations.

	Violent Events in Local News	**UNHCR Repatriations**
Exclusion Restriction:		
Exit Points	4.61E+00	1.24E+04
	0.04	*0.05*
Commune Controls:		
Population	-9.77E-07	1.62E-01
	0.98	*0.00*
Terrain Elevation	-2.60E-03	-9.12E+00
	0.08	*0.00*
Latitude	1.32E+00	4.50E+03
	0.58	*0.64*
Dist. to Provincial Capital	-7.93E-02	2.43E+02
	0.04	*0.02*
Dist. to Bujumbura	-1.90E-02	1.78E+02
	0.45	*0.05*

Table 2: First stage estimates of the determinants of conflict events in local news and number of UNHCR repatriations at the commune level. 6076 observations, individual, household and commune variables, as well as provincial dummies included. P-values are in italics below estimates and standard errors were clustered at the commune level (N=102).

	Seroprevalence	Seroprevalence	Seroprevalence
	Age 15-49	Age 15-30	Age 31-49
Violent Events in Local News			
OLS	-3.29E-04	9.85E-04	-2.67E-03
	0.61	*0.24*	*0.01*
IV	6.31E-04	1.43E-04	5.57E-04
	0.78	*0.95*	*0.90*
Exogeneity Test	*0.67*	*0.71*	*0.45*
Rare Events Logit	-2.48E-03	3.21E-02	-4.96E-02
	0.90	*0.23*	*0.12*
Rare Events Logit-IV	-6.12E-02	-1.04E-01	-1.15E-02
	0.58	*0.43*	*0.95*
UNHCR Repatriations			
OLS	1.97E-07	4.81E-07	-3.33E-07
	0.38	*0.14*	*0.52*
IV	2.35E-07	5.58E-08	1.89E-07
	0.79	*0.95*	*0.90*
Exogeneity Test	*0.96*	*0.57*	*0.70*
Rare Events Logit	-3.76E-06	4.95E-06	-2.66E-05
	0.74	*0.75*	*0.16*
Rare Events Logit-IV	-2.28E-05	-4.06E-05	-3.90E-06
	0.55	*0.49*	*0.95*

Table 3: OLS, IV and rare events logit estimates of the impact of conflict events or the number of UNHCR repatriations at the commune level. 6076 observations in the full age sample, 3606 observations in the age 15-30 sample, 2470 observations in the age 31-49 sample. Individual, household and commune variables, as well as provincial dummies are included. P-values are in italics below estimates and standard errors were clustered at the commune level (N=102) for the OLS and IV model. Standard errors were bootstrapped in the rare events logit-IV.

	Used Condom First Intercourse	Thinks Condoms Protect	Victim of Sexual Violence
Violent Events in Local News			
OLS	-1.25E-03	-8.99E-04	-9.06E-04
	0.14	*0.78*	*0.11*
IV	-5.53E-03	-9.43E-03	-8.52E-04
	0.09	*0.42*	*0.73*
Exogeneity Test	*0.17*	*0.42*	*0.98*
Probit	-8.04E-03	-2.51E-03	-1.25E-02
	0.16	*0.76*	*0.14*
Probit-IV	-4.61E-02	-2.63E-02	-1.46E-02
	0.27	*0.44*	*0.72*
UNHCR Repatriations			
OLS	-8.39E-07	-2.19E-08	2.62E-07
	0.01	*0.99*	*0.16*
IV	-2.05E-06	-3.51E-06	-3.16E-07
	0.10	*0.42*	*0.74*
Exogeneity Test	*0.30*	*0.37*	*0.54*
Probit	-6.42E-06	1.09E-08	5.95E-06
	0.02	*0.99*	*0.15*
Probit IV	-1.72E-05	-9.79E-06	-3.24E-06
	0.28	*0.49*	*0.84*

Table 4: OLS, IV and probit estimates of the impact of conflict events or the number of UNHCR repatriations at the commune level. 6076 observations, individual, household and commune variables, as well as provincial dummies are included. P-values are in italics below estimates and standard errors were clustered at the commune level (N=102).

	Knows Where to Get HIV Test	Got HIV Tested
Violent Events in Local News		
OLS	1.79E-03	1.48E-04
	0.53	*0.92*
IV	1.98E-02	-1.32E-02
	0.25	*0.02*
Exogeneity Test	*0.29*	*0.01*
Probit	5.84E-03	1.64E-03
	0.50	*0.78*
Probit IV	6.40E-02	-5.11E-02
	0.32	*0.09*
UNHCR Repatriations		
OLS	9.69E-07	1.15E-06
	0.50	*0.17*
IV	7.34E-06	-4.90E-06
	0.25	*0.02*
Exogeneity Test	*0.30*	*0.00*
Probit	2.49E-06	5.80E-06
	0.57	*0.11*
Probit IV	2.41E-05	-1.96E-05
	0.34	*0.18*

Table 5: OLS, IV and probit estimates of the impact of conflict events or the number of UNHCR repatriations at the commune level. 6076 observations, individual, household and commune variables, as well as provincial dummies are included. P-values are in italics below estimates and standard errors were clustered at the commune level (N=102).