How Between-Group Inequality Influences HIV/AIDS Stigma and Collective Action for Public Goods

Radhika Gore, PhD[1]
Ashley Fox, PhD[2]

[1]Columbia University, Mailman School of Public Health, rjg150@cumc.columbia.edu
[2]University at Albany, Rockefeller College of Public Affairs, Public Administration and Policy, afox3@albany.edu

Abstract

Policies for HIV/AIDS prevention and treatment have substantial development consequences. Yet the global response to HIV/AIDS has been uneven; where some governments have reacted swiftly, others have lagged in constructing an appropriate response to the epidemic. One explanation for the divergent global response is ethnic diversity. Applying AIDS as an exogenous shock, political scientist Evan Lieberman shows that national policy response has been weaker in countries that have higher ethnic fractionalization. The causal mechanism involves the mediating role of boundary institutions, which are rules and procedures that are used to monitor and regulate the population. In ethnically divided societies, it is difficult to develop a sense of shared risk across groups because issues such as HIV/AIDS stigma are cast in ethnic terms. Countries with high ethnic fractionalization are said to weakly adopt HIV/AIDS policies because the stigma associated with HIV/AIDS potentially undermines ethnic group status and esteem, which causes citizens and group leaders to mute their demand for and acceptance of AIDS policies.

In this paper I argue that in relying solely on the social salience of ethnicity, the above causal mechanism assumes that cultural difference proxies for all preference differences between ethnic groups. In analyzing ethnic divisions as the source of the lack of demand for or acceptance of HIV/AIDS policies, it undermines the role of other attributes of groups, particularly economic inequality between and within groups.

I use Demographic and Health Survey (DHS) data for ten sub-Saharan African countries and apply a multi-level model to examine attitudes towards HIV/AIDS, mainly as reported on a question that asks whether respondents would keep the HIV+ status of an infected family member a secret. If Lieberman's thesis is correct, then we would expect that in more ethnically fractionalized countries, ethnic groups are more likely to express preferences for keeping HIV+ status in the family a secret. We would also expect that differences in economic status between groups will not be associated with group level (aggregate) responses to the question on HIV+ status. I find that between-group differences in wealth do explain how people respond to expressing attitudes towards HIV+ status.

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Policies for HIV/AIDS prevention and treatment have substantial development consequences. Yet the global response to HIV/AIDS has been uneven; where some governments have reacted swiftly, others have lagged in constructing an appropriate response to the epidemic, even where incidence rates have been high (UNAIDS, 2008). One explanation for the divergent global response, as argued by Evan Lieberman (2009) in his book *Boundaries of Contagion*, is ethnic diversity. Applying AIDS as an exogenous shock, Lieberman shows that national policy response[1] has been weaker in countries that have higher ethnic fractionalization. The causal mechanism involves the mediating role of boundary institutions, which are rules and procedures that are used to monitor and regulate the population. When boundary institutions are strong, then rules and procedures, both formal and informal, ranging from census categories and affirmative action policies to political discourse, reinforce ethnic divides through the labels that they employ. In ethnically divided societies, it is difficult to develop a sense of shared risk across groups because boundary institutions, which determine how issues are framed and interpreted by citizens and elites, cast issues such as AIDS stigma in ethnic terms. Countries with high ethnic fractionalization are said to weakly adopt AIDS policies because the stigma associated with AIDS potentially undermines ethnic group status and esteem, which causes citizens and group leaders to mute their demand for and acceptance of AIDS policies.

Lieberman's argument is notable for its contribution as a political analysis of cross-national AIDS policy and its theoretical basis in the social construction of risk of disease, both of which are fundamental to understanding how structural inequalities impact public health outcomes. As an empirical test, Lieberman's cross-national study confirms the negative causal relationship between ethnic diversity and public goods

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[1] Policy response was measured by per capita expenditure on AIDS by governments and donors, attention to AIDS in national budget speeches, anti-retroviral (ARV) treatment coverage, and scores on the AIDS Program Effort Index. The analysis controls for the size of the epidemic and government capacity in each country.

provision. Moreover, it offers a causal mechanism, an answer to 'why' the relationship exists, by describing and studying boundary institutions and their divisive consequences in selected countries[2].

However, as I argue in this paper, its causal mechanism hinges on the assumption that AIDS-related stigma operates through ethnicity, that AIDS stigma is detrimental to an ethnically-derived group social status, and that ethnic identity determines how groups make demands for AIDS policy. In relying solely on the social salience of ethnicity, as reflected in the strength of boundary institutions, the study assumes that cultural difference proxies for all preference differences between ethnic groups. According to Baldwin and Huber (2009), this assumption exemplifies a characteristic shortcoming of analyses of ethnic diversity and public goods. The argument does not assume *a priori* preferences for AIDS policies among ethnic groups, but it does assume that policy preferences will be built along ethnic lines and that ethnic groups will try to distance themselves from stigma and blame. It refers to ethnic identities as 'sociopolitical constructions,' yet in analyzing ethnic divisions as the source of the lack of demand for or acceptance of AIDS policies, it undermines the role of other attributes of groups, particularly economic inequality between and within groups.

In this paper I test the causal mechanism in *Boundaries of Contagion*. I use Demographic and Health Survey (DHS) data for ten countries from sub-Saharan Africa to examine attitudes towards HIV/AIDS, mainly as reported on a question that asks whether respondents would keep the HIV+ status of an infected family member a secret. I apply the "politically relevant ethnic group fractionalization" (PREG) index (Posner, 2004a), which Lieberman shows has a negative association with AIDS policy outcomes[3]. If Lieberman's thesis is

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[2] The three case study countries are Brazil, South Africa and India. Brazil is presented as an example of an ethnically diverse population but one that is not divisive or fractionalized, and has responded quickly and effectively to the AIDS epidemic. South Africa and India are studied as being marked by deep ethnic rifts in society and having failed to respond appropriately to AIDS.

[3] The PREG index was created by determining which ethnic groups were politically active in policy-making processes, specifically macroeconomic policy. These groups are assumed to be relevant for AIDS policies as well, given the relatively high involvement of donor funding for AIDS in many countries, the level of resources and expertise that AIDS interventions require, and the potentially negative impact of AIDS on economic growth. However, if AIDS stigma operates through cultural difference as Lieberman posits, then the PREG index may not tell the whole story. I also apply Fearon's (2003) index of cultural fractionalization (see Table 1), which captures the cultural resemblance of two ethnic groups based on the linguistic distance between them. While the cultural fractionalization index may help in understanding the ethnic fault lines along which AIDS-stigma is transmitted, it does not necessarily indicate which groups matter for public policy. I focus on the PREG index in this paper since the argument in *Boundaries of Contagion* is about the socio-political construction of ethnic identity and ethnic divisions.

correct, then we would expect that in more ethnically fractionalized countries, ethnic groups are more likely to express preferences for keeping HIV+ status in the family a secret. We would also expect that the average wealth of ethnic groups, or differences in economic status between groups, will not be associated with group level (aggregate) responses to the question on HIV+ status. Further, if class is only weakly mobilized and is "closely tied to the boundaries that divide ethnic groups" (Lieberman, 2009, p. 58), then we should not find an association between individual wealth and preferences for secrecy of HIV+ status.

In the following section I review the literature on the causal relationships between ethnic diversity and public goods outcomes and discuss Lieberman's argument in this context. Next, I describe the hypotheses that will be tested, followed by the data, methods, and results. The final sections discuss the findings and conclude.

Causal mechanisms between ethnic diversity and public goods outcomes

The mechanisms that describe why polarized groups are unable to cooperate relate to the preferences of individuals and the strategies they employ in their interaction. Ethnic groups with divergent preferences may be unable to agree upon common policies or the nature of public goods that are to be provided, whereas co-ethnics would find it easier to decide upon and negotiate outcomes. "Other-regarding" preferences may lead individuals to be willing to bear the cost of public goods for co-ethnics but not for out-group beneficiaries (Habyarimana, Humphreys, Posner, and Weinstein, 2007). An ethnic group may have strategies for collective action that are available only to its members, which would make it easier for homogenous communities to cooperate, and individuals may behave differently when interacting with non-co-ethnics in ways that undermine cooperation (Habyarimana et al, 2007).

The possibility of holding multiple identities can complicate this picture. If individuals can choose between identities—for example, national versus class identity—then the range of preferences and policy outcomes expands. Group social status can factor into individual preferences. Poor individuals may choose the high-status of a national identity over their low-status class identity[4], and prefer policy outcomes that enhance

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[4] In this view, group status is related to consumption and wealth within a group, so that richer groups enjoy higher group social status (Shayo, 2009).

group social status even if the policies do not secure material payoffs, thus leading to under-provision of public goods (Shayo, 2009).

On the other hand, a strong sense of national identity, which can be fostered by nation-building reforms, might improve collective action outcomes by making it easier for non-co-ethnics to collaborate. Miguel (2004) compares the effect of government nation-building policies on ethnic relations and public policy outcomes in two nearby districts, one in Kenya and one in Tanzania. Using the colonial-era boundary between Kenya and Tanzania as a "natural experiment," Miguel shows that the two districts, while having similar geography and historical legacies, and similarly diverse communities, differ in public goods provision because of the stronger nation-building efforts of the government in Tanzania.

Relative group size may also matter. For instance, Posner (2004b) studies Chewa and Tumbuka communities in Zambia and Malawi, and find that while the two groups are culturally similar, ethnic relations between them are different on each side of the border. In Zambia, where the groups form a smaller proportion of the population, they are less politically mobilized along ethnic lines and inter-group relations are friendlier than in Malawi, where the groups are relatively large and ethnicity is more amenable to being used in political competition.

Preliminary evidence from the 2008 Afrobarometer survey shows a threshold effect for group size and identification with ethnic versus national identity. Among the countries in the survey, national identity was found to increase until a group reached approximately 40 percent of the population, after which it decreased (Robinson, 2009).

Other perspectives predict contrary outcomes for group size. If there are diverse and sizable ethnic groups among the poor, and if ethnicity is more salient than class-specific attributes, then the poor may dissociate from their low-status class and select an ethnic or national identification. The result would be lower public goods provision, since in distancing themselves from class interests, the poor would not prioritize distributive outcomes in their policy preferences (Shayo, 2009). This argument explains how diversity within the poor can reduce redistribution and why minorities are under-served, but it hinges on the ability of individuals to switch identity between class, nation, and ethnicity.

An alternate argument for how economic class and ethnic identity can interact focuses on the overlap of ethnicity and economic standing at the group level. Preferences may diverge across ethnic groups not because of cultural differences or group size, but because of economic inequality between groups (Baldwin and Huber, 2009). Where standard measures of ethnic diversity account for number and size of ethnic groups, a measure of between-group inequality (BGI) underscores the relative importance of cultural and economic differences between groups, and how these differences affect policy outcomes. It also questions the scale—local or national--at which ethnic diversity affects collective action. For instance, if elites can cooperate across ethnic lines, or if democratically elected representatives are not constrained in cooperating with non-co-ethnics in public policy-making, then the scale at which public decisions are made matters (Baldwin and Huber, 2009). Collective action for local public goods provision may involve mechanisms that are distinct from the dynamics of national policy processes.

A related point concerns the effect of differences in ethnic divisions at national and subnational levels. Ethnic diversity can manifest differently in rural and urban settings, specifically in relation to the interaction between ethnic identity and voting behavior. For instance, if individuals choose their identity depending on which identity fetches them the greatest access to resources, then political candidates in rural areas may be able to win votes from ethnic constituencies and downplay a national policy agenda in favor of particularistic policies (Posner, 2005).

The above discussion shows that ethnic diversity may not be the only factor that determines public goods provision. Members of different ethnic groups may not necessarily care less about the welfare of non-co-ethnics or have divergent preferences (Habyarimana, Humphreys, Posner, and Weinstein, 2009). In both ethnically heterogeneous and homogeneous societies, AIDS policy outcomes could be a function of economic differences among ethnic groups rather than a result of cultural difference and its political salience. While AIDS stigma may be pervasive at the level of community interaction and everyday transactions, constraints on policy decisions for HIV/AIDS may not lie along ethnic lines.

The distinction and limitations of the argument

The argument in *Boundaries of Contagion* is notable for several reasons. For one, as a cross-national *political* analysis of AIDS policy, it provides a necessary and under-studied perspective on the political reasons--as opposed to administrative or development practice-related factors—behind variation in AIDS policy. It addresses the question of why governments have ignored or defied existing evidence (Friedman et al, 2006), as well as the call for social science research on the structural inequalities that are implicated in the epidemic (Parker, 2002).

Secondly, it offers a causal mechanism that is theoretically distinct. The link between ethnic diversity and poor public goods provision is commonly explained as a problem of collective action (Easterly and Levine, 1997; Alesina, Baqir and Easterly, 1999; Miguel, 2004; Miguel and Gugerty, 2005). In general, the causal mechanism is theorized to depend on the preferences of individuals and the strategies they employ in social interaction; where preferences diverge and strategies do not enable cooperation, the result is a failure to secure public goods. In *Boundaries of Contagion,* the causal mechanism involves the social construction of risk in ethnically divisive societies. The causal pathway is developed around the following ideas: (i) the social construction of risk, where the risk perception of disease is not objectively understood but is socially and politically constructed, and (ii) boundary institutions, those formal and informal rules and procedures by which citizens are monitored or regulated according to group identity (Gauri and Lieberman, 2006, p. 47). I discuss each aspect of the argument below.

The idea of social construction of risk of disease is well known in public health research. For instance, Chiao, Mishra, and Sambia (2009) have noted the nonacceptance of people living with HIV/AIDS and the "complacency in groups untargeted, yet at risk for HIV infection" (p. 742). Nepal (2007) has studied how AIDS-related stigma varies according to the behaviors associated with its transmission, the pre-existing characteristics of the at-risk groups, and the public image of the affected populations. In *Boundaries of Contagion,* the central argument is that when a society has many distinct ethnic groups—defined as organized collectivities that share culture, history, and interests—then it becomes extremely difficult to develop a sense of shared risk across

groups, because the perceptions and messages about the risk of disease are socially constructed and portrayed along ethnic lines (Leiberman, 2007).

Ethnic boundaries play a critical mediating role since, as institutions, they form the basis for how issues are framed and interpreted by citizens and elites, and thus give meaning to and reinforce group identities. For example, formal state-sanctioned boundaries can be created through state efforts to monitor large populations, which require information about group identities in order to allocate rights and responsibilities. Such information can be used to deny privileges to certain groups of citizens, to give extra privileges to rectify past injustice, or simply to keep track of socioeconomic and cultural composition of the country. Boundary institutions are "strong" when the same group labels and categories are used across institutional forms and when state-sanctioned labels and categories correspond with everyday racial or ethnic divisions. Under such conditions, access to citizenship, political parties, and rights to employment may be explicitly organized around group lines. Boundary institutions are "weak" when group labels are not used, or are used inconsistently or flexibly. Boundary institutions are likely to be weakened if interethnic associations are prevalent, or due to deliberate political strategies to break down group divisions, such as through political nation-building strategies.

According to the argument in *Boundaries of Contagion*, countries with high ethnic fractionalization fail to obtain AIDS policy not because members of ethnic groups have diverse preferences or cannot coordinate their actions, but because boundaries within societies are a source of intergroup conflict, which "in turn structures how information is disseminated and how citizens and elites are likely to understand their own risks of being affected by social processes and policy interventions" (Gauri and Lieberman, 2006, p. 48). For issues that potentially undermine ethnic group status and esteem, such as the social deviance and stigma associated with AIDS, perceptions of risk of disease and blame for its spread are constructed along ethnic lines. Policy advocates then have a harder time persuading the public that the risk is common or generalized. Since ethnic political competition is driven by pursuit of group esteem and status, the risk of AIDS is not seen as shared, and the result is neither widespread demand for nor acceptance of AIDS policies from citizens and elites.

Weaknesses of the argument

A key weakness of this model is its unitary focus on ethnicity and ethnic group status, its perspective that individuals constrain their demand for AIDS policies to avoid disclosing the incidence of AIDS within their ethnic group and to maintain high group social status. It says that ethnic elites "may divide the infected from the rest of the ethnic group through new labels and discourses" (2009, p. 50). This implies that weaker AIDS policy outcomes are as much a problem of within-group cohesion as they are a problem of between-group difference, yet Lieberman's study focuses on the latter. It collapses all group differences into ethnic affiliations, and underplays the heterogeneity of voices within ethnic groups as well as the reasons for this heterogeneity, including plausible socioeconomic differences. This is especially relevant for HIV/AIDS in sub-Saharan Africa, which has a complex epidemiology. In many countries, HIV prevalence is higher among richer individuals than poorer individuals; among women than men, particularly young women; in urban than rural areas; and among certain occupational groups (UNAIDS, 2006, 2008; Mishra et al, 2007). A focus on ethnic blaming and the framing and labeling of incidence of AIDS in ethnic terms--strategies that pit one ethnic group against another— disregards the potential lack of cohesion within groups as well as non-ethnic differences between groups, such as due to gender and income or class.

Economic inequality between groups may reflect structural inequalities in society and economic inequality within groups may be associated with a heterogeneity of preferences, interests, and affiliations within groups. A theory of ethnic preferences (i.e. preferences for maintaining one's own group status and blaming the other) that is based on ethnic identity and group esteem ignores the effect of the average wealth of ethnic groups, and the economic inequality within each ethnic group, on perceptions of risk of disease. In this regard, using indices of ethnic fractionalization may not capture sources of difference between groups other than cultural difference (Baldwin and Huber, 2009).

Further, a focus on between-group economic inequality resonates with a long debated question in public health research, namely the impact of income on health outcomes. In an extensive review of the debate, Lynch et al (2004) found that evidence of a causal effect of income inequality (measured in terms of individual income) on population health is inconclusive (see also Deaton, 2003). However, structural factors, including aggregate social and environmental factors, as opposed to individual characteristics, have been theorized and shown to

affect individual health as well as population health outcomes (Diez-Roux 2001; Schwartz and Diez-Roux, 2001; Link and Phelan, 2001, 1995; Parker and Aggleton, 2003).

Structural inequalities that are responsible for the higher prevalence of AIDS among some sub-groups might also contribute to how groups experience AIDS and express its associated stigma, as well as the weaker voice of some groups in policy decisions. For instance, in a study of attitudes towards persons living with HIV/AIDS in Kenya, women showed less tolerant attitudes than men, suggesting that gender differences in attitudes reflect the different mechanisms through which men and women experience the burden of HIV/AIDS. For example, women bear greater social responsibilities in caring for the sick, which in turn affects how they form their stigmatizing attitudes (Chiao, Mishra and Sambisa, 2009).

Another structural inequality is class. Where *Boundaries of Contagion* refers to class, it notes that the epidemic has affected both poor and rich, and further points out that AIDS policies are not downward redistributive as are, for example, social welfare benefits targeted explicitly to poorer population groups. It thus suggests that interests or preferences for AIDS policy should not be seen as lining up along class lines. It considers groups organized along income or class or along gender lines to be less relevant for AIDS policy in the developing world, and understands any effects such groups may have on policy decisions in terms of "broader patterns of boundary politics, closely tied to the boundaries that divide ethnic groups" (Lieberman, 2009, p. 58). It perceives social cleavages other than ethnic boundaries as being not "as well institutionalized or politicized in the developing world," and therefore not strongly effective in their policy impact (Lieberman, 2009, p. 59).

In dropping other social cleavages from its analysis and emphasizing a single category of identity and difference, *Boundaries of Contagion* takes a "unitary" rather than "intersectional" approach to the study of AIDS policy (Hancock, 2007, p. 67). It places ethnic identity ahead of other simultaneously held identities. This may be analytically expedient, but, as Hancock (2007) discusses, it comes at the expense of not accounting for how "multiple marginalizations" of ethnicity, class, or gender create social and political stratification. In examining the interaction of these categories, intersectionality theory advocates going beyond the social construction of identity, and proposes examining who has the authority to define public policy goals that are in

the interest of particular groups and explaining the "wide variations in political resources and political outcomes" within groups (p. 66).

Hypotheses: Testing the implications of Lieberman's thesis

A key problem in testing a hypothesis based on the sociopolitical construction of risk, identity, and stigma is that people may not openly proclaim their ethnic affiliations or preferences that reflect unfavorable attitudes. Instead, as Leiberman (2009) notes, they may use "euphemisms and heuristics" to communicate information (p. 45). This makes it difficult to test boundary institutions by examining how people account for their actions and preferences, since people may not reveal what they actually do or feel.

However, there are various approaches to quantify measures of stigma and discrimination related to HIV/AIDS, and some questions, upon field testing, have been found to reasonably indicate levels of stigma in a population (Nyblade and MacQuarrie, 2006). One aspect of HIV/AIDS-related stigma is the shame associated with the disease. Nyblade and MacQuarrie (2006) recommend two survey questions in this regard: whether individuals say they would be ashamed if someone in their family had HIV/AIDS or was infected with HIV.

In this paper, I use a question from the Demographic and Health Survey (DHS) on secrecy about HIV/AIDS in the family as a rough proxy for silence, denial, or concealment in order to maintain ethnic group status. While questions that ask respondents about shame and blame about HIV/AIDS in the community (versus in the family) directly speak to the 'boundary institutions' argument about ethnic blaming, such questions may violate construct validity and may not be a better option. For instance, in Tanzania, the high proportion of positive responses to a DHS question that asked whether the community should know an individual's HIV/AIDS status were found to stem from people wishing to protect themselves from the infected individual, not from an open or tolerant attitude towards AIDS (Nyblade and MacQuarrie, 2006). Therefore, I refer to a question in DHS, detailed further below, which asks whether respondents would want to keep the HIV+ status of a family member a secret.

If Lieberman's (2009) thesis about the construction of AIDS stigma along ethnic fault lines is correct, then the following hypotheses about individual and aggregate group responses towards disclosing HIV+ infection status are likely to be true:

We would expect that ethnic groups will express greater preferences for secrecy about HIV status in countries that are ethnically divided than in countries that are ethnically homogeneous. We would also expect that economic differences between groups do not explain variation in responses across ethnic groups. That is, there is likely to be no association between the average economic status of an ethnic group and the (aggregate) attitude of that group towards secrecy about HIV. Further, if class is only weakly mobilized and class-based groups are aligned along ethnic boundaries, then we should not find, on average, an association between an individual's class (i.e. wealth category) and preferences for secrecy of HIV+ status, except possibly in ethnically divided countries.

I test whether these hypotheses hold using DHS data on ten African countries as described below. I also draw upon Posner's (2004b) study of Zambia and Malawi, which takes advantage of the colonial-era border between the two countries as a natural experiment, to examine attitudes towards HIV among the same ethnic groups on either side of the border. Since the argument in *Boundaries of Contagion* is about the politicization of ethnicity in public discourse and its implications for policy response, I study whether the political salience of ethnicity in Zambia and Malawi is associated with higher levels of secrecy about HIV+ status among its ethnic groups, specifically the Chewas and Tumbukas.

Data

I use cross-sectional data from the DHS for Burkina Faso (2003), the Democratic Republic of Congo (2007), Ghana (2003), Guinea (2005), Kenya (2003), Malawi (2004), Mali (2006), Niger (2006), Senegal (2005), and Zambia (2002). The countries and survey years were selected based on availability of information on ethnicity and HIV biomarker data, as well as to obtain a range of levels of ethnic fractionalization based on PREG index scores (Posner, 2004a).

The DHS survey is a nationally representative household survey that collects data on a range of information including knowledge and attitudes about HIV/AIDS and accepting attitudes toward PLHIV. The data covers women and men aged 15-49 years. Women and men differ substantially in their attitudes to PLHIV (Chiao, Mishra, and Sambisa, 2009), and HIV prevalence rates vary for men and women (World Bank, 2008).

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For the purposes of this paper, I did not substantively interpret the gender variation, even though I did include gender in the statistical analysis. The analysis was restricted to respondents who had ever heard of AIDS.

For Zambia, DHS reports 67 categories of ethnicity, which were reduced to 21 categories by dropping groups for which there was information on less than 50 individuals (which is 6.7 percent of the sample) in the all-female sample (the female samples are typically larger than the male samples for each country dataset), since calculating HIV prevalence rates for very small ethnic groups could misrepresent the picture. This reduced the total sample size for Zambia by about 10 percent. The 'other' category of ethnicity was excluded for all datasets, as were categories such as 'foreign' and 'ECOWAS', since these do not constitute political groups in the electorate.

Measures and methods

Dependent variables

The outcome variable is the binary outcome on a hypothetical question that asks respondents: "If a member of your family became infected with the AIDS virus, would you want it to remain a secret?" Answers are coded 1 for 'yes' and 0 for 'no'. A greater proportion of 'yes' responses within a group indicates a more secretive, closed attitude toward HIV/AIDS. It reflects, as Nyblade and MacQuarrie (2006) describe, a higher level of the shaming attitude associated with a morals- or values-based stigma. I examine individual responses as well as the proportion of individuals within each ethnic group who say they would want to keep the HIV+ status of a family member a secret.

Two other outcome variables are examined as a contrast to the above variable on secrecy, and to emphasize that the values-based stigma it captures is a specific, distinct construct. The two variables are responses to the following questions: "If you knew that a shopkeeper or food seller had the AIDS virus, would you buy fresh vegetables from them?" and "If a female teacher has the AIDS virus but is not sick, should she be allowed to continue teaching in school?" These questions represent the "fear of causal transmission and refusal of contact with people living with HIV/AIDS," which reflects the direct underlying cause of stigma (fear of HIV transmission) and the resulting stigmatizing action (refusal of contact with people living with HIV/AIDS) (Nyblade and MacQuarrie, 2006, p. 4).

Independent variables

Group HIV prevalence is calculated as the percentage of HIV+ cases within an ethnic group weighted by the sampling weights used in the HIV biomarker section of each DHS survey.

The proportion of 'richest' individuals in an ethnic group is calculated as the proportion of individuals in that ethnic group who are in the top wealth quintile in the country. This is an approximation of wealth inequality within the group. It is not possible to use the DHS wealth index[5] to construct a Gini coefficient or other measure of inequality that is defined over positive real numbers (Sahn and Stifel, 2003), because the distribution of the asset scores is designed to have a mean of zero and variance of one. The asset index can take positive and negative values, but negative values cannot be used in the formula for the Gini coefficient. Therefore, I rely on wealth quintiles to measure asset inequality. Previous analysis using the asset index has shown its appropriateness as a measure of poverty and its performance as a predictor of non-income measures of well-being (Sahn and Stifel, 2003).

Individual wealth level is the wealth quintile of the individual. Average wealth level of an ethnic group is the mean wealth level of individuals in the ethnic group.

I included control variables to examine whether knowing someone who has AIDS or has died of AIDS, level of education, reading a newspaper, listening to the radio, knowing the correct transmission methods for AIDS (knowledge score), living in a rural area, and age affect individuals' attitudes towards secrecy. An AIDS knowledge score is constructed from the total number of correct responses to upto ten items that test the respondents' understanding of the modes of transmission of AIDS and ways to reduce the risk of getting infected. (Not all items were asked in each country.) Education is measured in level of education completed.

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[5] As described by Rutstein and Johnson (2004), the DHS wealth index is a composite measure of the cumulative living standard of a household. It is calculated using data on a household's ownership of selected assets, such as televisions and bicycles, materials used for housing construction, and types of water access and sanitation facilities. It is generated using principal components analysis, and it places individual households on a continuous scale of relative wealth. Each household asset for which information is collected is assigned a weight or factor score generated through principal components analysis. The resulting asset scores are standardized in relation to a standard normal distribution with a mean of zero and a standard deviation of one. These standardized scores are then used to create the break points that define wealth quintiles. Each household is assigned a standardized score for each asset, where the score differs depending on whether or not the household owned that asset. These scores are summed by household, and individuals are ranked according to the total score of the household in which they reside. The sample is then divided into population quintiles.

Frequency of media exposure is indicated by whether the respondent read a newspaper or listened to the radio at least once a week. Place of residence is indicated as rural or urban.

Statistical analysis

I ran two sets of analyses, one at the individual level and one at the group level. At the individual level, for an initial descriptive examination of the data, as shown in Table 1, I calculated proportions of individuals who said they would keep HIV+ a secret according to four categories in each country. The categories represent the intersection of wealth levels (poor/rich) of the individual with HIV prevalence (low/high) in their ethnic group[6]. I then ordered the countries by their PREG values in order to examine whether countries with higher PREG values have generally higher proportions of individuals who would keep HIV+ a secret, even if there was some variation within countries.

Also at the individual level, I ran logistic regressions with country fixed effects, where the dependent variable was the individual response on keeping HIV+ status a secret, and the independent variables were sex, age, rural/urban, education, newspaper and radio access, wealth level, knowledge of AIDS, and HIV prevalence in the ethnic group. Standard errors were clustered at the level of the primary sampling unit ('cluster' or community level). Individual responses were weighted by the sampling weights provided in DHS. Odds ratios and 95 percent confidence intervals for the logistic regression are presented in Table 3a. Table 3b contains results from running a logistic regression with 'ethnic group' fixed effects for individual attitude towards family HIV+ status.

At the group level, I ran a random effects model. The proportion of 'keep HIV+ secret' responses in each ethnic group—there are 100 ethnic groups and 10 countries—were grouped at the country level. The dependent variable was the aggregate ethnic group response to the secrecy question, i.e. proportion of 'yes' responses per ethnic group. The independent variables were the average group wealth level, the proportion of richest individuals in the ethnic group (as described above), and the HIV prevalence in the group. Further, I added PREG scores at the country level. Table 2 contains the results.

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[6] 'Poor' indicates that the individual belongs to wealth level (quintile) 0, 1 or 2, and 'rich' indicates level 3 or 4. HIV prevalence of the ethnic group is set as low or high based on the median HIV prevalence in each country.

Finally, I examined the responses of two ethnic groups in Zambia and Malawi, the Chewas and Tumbukas, to study the pattern, if any, of concerns for secrecy among the groups.

Results

Ethnic heterogeneity and economic status

Table 1 shows that while the proportion of individuals who favor keeping HIV+ status a secret varies across countries, it does not appear to follow the level of ethnic fractionalization implied by the PREG score. For instance, among the 'poor' individuals (belonging to lower three quintiles), approximately the same proportion of individuals favor keeping HIV+ status a secret in Burkina Faso (PREG score 0.00), as they do in the DRC (PREG 0.80). Overall, we see a low of 21 percent among poorer individuals in Guinea (PREG 0.48), to a high of 74 percent among richer people in both Senegal (PREG 0.14) and the DRC (PREG 0.80).

Ethnic heterogeneity as measured by Fearon's cultural fractionalization index also does not appear to play a role in determining attitudes to HIV+ status. The percent of poor people who would keep HIV+ a secret are about the same in Niger and in Ghana, even though their scores of cultural fractionalization are 0.20 points apart. Countries in which approximately half of poor respondents say they would be secretive about HIV+ status vary in cultural fractionalization from 0.70 for Burkina Faso to 0.93 for the DRC. If disclosure about HIV+ status is an indicator of public openness and affinity, then stigmatizing attitudes, when examined as an aggregate of ethnic group responses, do not seem to depend upon the level of ethnic fractionalization in the country.

Further, as seen in Graph 1, the average response to HIV+ status by wealth level does not seem higher in countries with higher PREG values. Graph 1 shows how responses in the ten countries vary across wealth quintiles within each country and also allows us to compare responses across countries. What is notable here is that the countries with the lowest PREG scores, e.g. Burkina Faso and Mali, have among the highest proportion of 'yes' responses in each of the five wealth categories. This is contrary to the argument in *Boundaries of Contagion*, which says that in societies that are characterized by higher levels of ethnic fractionalization, individuals are more likely to discount the severity of disease in their own group. Burkina Faso and Mali should have among the lowest proportion of people who keep HIV+ status a secret, not the highest.

The above evidence points to the importance of economic status of groups. Graph 1 shows that the proportion of people who would keep HIV+ a secret tends to increase and is highest in the richest quintile for most countries, except in two countries in which it rises (Kenya and Zambia), and one in which it stays roughly the same (Ghana).

The case of Kenya, where the poor are more likely than the rich to keep HIV+ status a secret, can perhaps be explained by the nature of its HIV/AIDS epidemic. Kenya has a mixed[7] epidemic, where population sub-groups who are highly affected by AIDS are also among the marginalized sections of society (World Bank, 2008). Studies using DHS data have shown that in Kenya, social acceptance of persons living with HIV is relatively high: between 86 - 89 percent of people surveyed said that they would care for an infected household member[8] and being HIV infected did not appear "to be a rare or deviant event in the daily experiences of the Kenyan populace" (Chiao, Mishra & Sambisa, 2008, p. 19). Yet the results here show that poor individuals are more reluctant than rich individuals to disclose HIV+ status of a family member. One explanation is that stigma reproduces "relations of power and control," and poverty and inequality causes the most at-risk groups to experience discrimination and be underserved in terms of AIDS policies (Parker & Aggleton, 2003, p. 16; Link & Phelan, 2001).

In Zambia, the AIDS epidemic is generalized in the population. Zambia has among the highest HIV prevalence rates in the world, as do Malawi and other southern African countries. I briefly discuss Zambia further below in comparison with Malawi.

Proportion of responses by ethnic group, nested within countries

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[7] The HIV/AIDS epidemics in East Africa have previously been classified as "generalized" or firmly established in the general population, but recent evidence shows that the epidemic may more appropriately be called "mixed," whereby "the contribution of high risk subpopulations, such as sex workers, to the spread of HIV epidemic may continue to be substantial, due to very high HIV prevalence, high rates of partner change and suboptimal levels of condom use among these populations" (World Bank, 2008, p. 10).

[8] Of the people surveyed, 60 – 75 percent said they would be willing to buy vegetables from an infected street vendor or allow an infected female school teacher to continue teaching.

Table 2, which presents results from the random effects model, provides further evidence that PREG values do not explain cross-national variation in secrecy about HIV+ status, and suggests the plausibility of economic inequality in explaining ethnic groups' responses.

The motivation to model country random effects instead of fixed effects is to make use of information about both how ethnic groups vary within a country (within-country variation, which a fixed effects model would reveal) and how they vary across countries (between-country variation, modeled by random effects), and is illustrated by Graphs 2-4. Graph 2 plots the proportion in each ethnic group who would keep HIV+ status a secret by the average wealth of the ethnic group. The fitted line indicates the pooled linear prediction (with no control variables) for the entire sample of 100 ethnic groups. Graph 2 shows that in some countries, ethnic groups lie entirely above the fitted line, and in some countries entirely below the line. In Graph 3, which presents the same scatterplot as Graph 2, the fitted line in each country graph indicates a separate un-pooled regression for each country. The intercepts and slopes for each country differ.

It is also illustrative to examine the residuals obtained from running a regression without controls, i.e. to regress secrecy on average wealth of ethnic groups. Graph 4 shows the distribution of residuals, ordered by PREG values from lowest (least ethnically heterogeneous) to highest (most ethnically fractionalized). The residuals vary substantially between countries as well as within countries across ethnic groups. But the variation between countries does not seem to be related to their PREG values. We would expect to see higher levels of secrecy at higher PREG values, but the residuals do not appear to show an upward trend[9].

Results from the random effects model are not conclusive; PREG value does not contribute significant variance to the overall variation across ethnic groups' responses. As Table 2 indicates, in the empty or null model, in which the proportion of 'secrecy' responses of each ethnic group are grouped according to country, the country random effect (varying intercept) contributes about 75 percent of total variance (grouping factor variance + residual variance) in the ethnic group variance. Thus, between-country variation seems to explain part of the total variation in average response across ethnic groups. However, when the country PREG value is

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[9] I ran the same regression with 'proportion of rich' as the independent variable and obtained the same result of no systematic pattern when the residuals were ordered according to PREG values.

included in the model, the estimate of the variance of the PREG values has an extremely high standard error. Though PREG contributes 11 percent of total variance, this is not significant.

With respect to the effect of economic status, the average wealth level of ethnic groups does not explain variation in their responses, as Table 2 shows. Rather, what does appear to be statistically significant is the proportion of richest individuals in each ethnic group, that is, those who belong to the top wealth quintile in the country. The *distribution* of wealth within an ethnic group seems to be more relevant than the *average* level of wealth of an ethnic group.

Individual responses - Logistic regression with country fixed effects

I next examine the effect of individual economic status on individual responses to the question on secrecy, controlling for a number of factors that could affect a person's stated preferences for maintaining secrecy about HIV. As Table 3a shows, belonging to the richest wealth quintile has a strongly significant effect on individual response in the direction of keeping HIV+ status a secret, while being anything less than among the richest in a country does not affect the odds of the person favoring secrecy. Results from a logistic regression with 'ethnic group' fixed effects also show that the wealthiest individuals in each ethnic group are more likely to want to keep HIV+ in the family a secret (Table 3b).

Men are less likely than women to keep HIV+ status a secret, as are rural residents compared to urban residents. There are significant but small effects for some variables, such as education and media exposure through reading the newspaper, and insignificant effects for other variables, such as listening to the radio. Notably, HIV prevalence of the ethnic group is not associated with individual response to the secrecy question, and knowledge about AIDS serves to increase the odds of secrecy, not decrease them, indicating the complexity of stigma attached to AIDS. Comparing individual responses to other questions on stigma, as discussed below in the section on construct validity, throws more light on the intricacies of AIDS-related stigma.

Drawing upon Posner's (2004b) study of Zambia and Malawi

I turn to the case study of Zambia and Malawi to examine how political mobilization of ethnic groups might contribute to expressions of closed attitudes towards HIV. According to Posner (2004b), the Chewas and Tumbukas are allies in Zambia and adversaries in Malawi because these two otherwise culturally similar ethnic

groups are relatively large sized groups in Malawi, and their ethnic identity is subject to greater political salience there, whereas in Zambia they are small sized groups. Table 4 shows another feature of the two groups: the proportion of 'richest' individuals (belonging to the top quintile in the respective country) in each ethnic group, and their responses to the question on secrecy. Contrary to what we might expect given Posner's analysis and Lieberman's argument, the proportion of individuals who say they would keep HIV a secret is essentially the same in each ethnic group, i.e. the differences are not statistically significant.

One part of the explanation could be that both Zambia and Malawi have generalized epidemics and high HIV prevalence rates, and thus similar dynamics of epidemic transmission as well as patterns of stigma.

The proportions of richest individuals in each ethnic group might indicate another side to the story: the Chewas and Tumbukas in Zambia have about the same proportions of rich individuals (23 and 26 percent), while in Malawi, the distance between the groups is wider apart (18 and 31 percent). Graph 5 illustrates the distribution of ethnic groups according to their 'proportion of richest' and their relative size in each country, and places these group attributes in national context. The Chewas and Tumbukas are close together in Zambia (as indicated by the black squares), while they are far apart in Malawi (black triangles). This difference in economic inequality within groups might help explain the greater adversarial relations in Malawi as analyzed by Posner.

While inter-group relations might be more strained in Malawi, the two ethnic groups in Malawi do not differ either from each other or from their counterparts in Zambia in terms of their aggregate response to AIDS-related stigma. Rather, the difference in response seems to be between 'rich' and 'poor' individuals. As Table 1 shows, the rich (top two wealth quintiles) in Malawi express different attitudes to HIV stigma than do the poor. In Zambia, the rich and poor do not differ in their attitudes.

This calls into question the relevance and impact of boundary institutions on AIDS policy and on structuring public discourse on AIDS-related stigma. While boundary institutions might use ethnic labels, the expression and experience of AIDS-related stigma might operate along structural inequalities that are more complex than a unitary focus on ethnicity would suggest.

The next section compares results for alternate measures of stigma and underscores the multiple and complex expressions of stigma.

Construct validity of the questions on stigma in DHS data

Citizens and elites may not openly proclaim preferences that reflect stigma against other ethnicities. Instead, they may use "euphemisms and heuristics" to communicate information (Lieberman, 2009, p. 45). This makes it difficult to test boundary institutions by asking people to account for their actions and preferences, and to draw valid inferences about what people mean from what they say.

DHS surveys ask several questions about AIDS-related stigma and discrimination. Apart from the one used in the present analysis, namely attitudes towards revealing HIV+ status in the family, two other questions, as described above, ask respondents about their everyday interaction with infected persons, namely whether they would buy food from an infected vendor and allow an infected female teacher to continue teaching. Each of these questions could be subject to the confounding effects of reporting bias: people know that discrimination is uncivil, and so report less discriminatory attitudes than they might actually hold. However, the nature of the bias might not be the same for each question, since the questions capture different constructs, as discussed below.

Firstly, the two questions about everyday social interactions are uncorrelated with the question about secrecy. Responses to the two questions on community-interactions have a correlation coefficient of 0.5, while the correlations between each of the social interaction questions and the question about keeping HIV/AIDS status a secret are effectively zero.

Secondly, discriminatory attitudes towards an HIV+ food vendor and female teacher drop sharply for respondents who have higher levels of wealth, education, and knowledge about AIDS; live in urban areas; and belong to ethnic groups in which HIV prevalence is high. Men are more likely to discriminate against a food vendor than are women, but attitudes towards the female teacher are the same for both men and women.

The secrecy question captures an entirely different construct of stigma. As Table 3a shows, high HIV prevalence of the individual's ethnic group does not affect the odds that the individual would want to keep HIV+ in the family a secret, but it does lower the odds that the person will report stigmatizing attitudes in social interactions. Moreover, control variables such as education and exposure to media are associated with more secretive attitudes towards family HIV status, but are associated with more *accepting* attitudes towards outsiders, i.e. the food vendor and female teacher. Having knowledge about the transmission of AIDS is

associated with *increased* likelihood (odds ratio=1.14) of reporting a secretive attitude towards HIV+ in the family, but knowledge about AIDS *decreases* stigmatizing attitudes towards the food vendor and female teacher. Rural respondents are less secretive about HIV+ in the family than urban respondents, but rural respondents express more stigma in everyday social interactions. Gender differences in responses are also evident. Men are *less* likely than women to report a secretive attitude toward HIV+ in the family and to report a stigmatizing attitude towards the food vendor.

Most relevant for this paper are responses according to wealth level, which presents a major source of difference between the two types of questions. For the questions on everyday social interactions, wealthier individuals are less likely to report stigmatizing attitudes. However, for the family HIV+ question, wealthier individuals in each country are *more* likely to report secrecy of infection status, specifically individuals in the wealthiest category (odds ratio=1.22). Running a logistic regression for the secrecy question with 'ethnic group' fixed effects shows the same result for wealthiest individuals in each ethnic group (Table 3b).

This not only highlights the role of economic inequality, but also the complex patterns and expressions of stigma. People might report open attitudes in their everyday community interactions, but with respect to disclosure of HIV+ status of a family member, their attitudes might be conditioned by other factors. Education, factual knowledge about AIDS, and media exposure may significantly lower expressions of stigma in everyday transactions, but may not influence concerns about revealing HIV+ status in the family.

Conclusion

In explaining the negative relationship between ethnic diversity and public goods provision, the argument in *Boundaries of Contagion* emphasizes that boundary institutions do not enable a sense of shared risk among ethnic groups. Its causal mechanism hinges on the assumption that AIDS-related stigma operates along ethnic lines, and that ethnic identity determines how groups make demands for public goods. As I discuss in this paper, this constitutes a unitary approach to understanding fractionalization, and does not capture multiple stratifications, including economic inequality between and within ethnic groups.

I use DHS data for ten countries from sub-Saharan Africa and examine attitudes towards HIV/AIDS as reported on a question that asks whether respondents would keep the HIV+ status of an infected family member

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a secret. If the argument about boundary institutions is correct, then we would expect to see systematic differences in the responses of ethnic groups in ethnically homogeneous countries versus diverse countries and a limited role of economic status in explaining individual and group responses.

I find that wealth does explain how people respond to expressing attitudes towards HIV+ status. Rich and poor individuals in each country and in each ethnic group respond differently to HIV+ status of a family member; on average, the rich are more likely to not want to disclose HIV+ status. In each country, wealthier individuals from both low and high HIV prevalence ethnic groups have similar attitudes to secrecy about HIV+ status.

The question on secrecy about HIV+ in the family captures a specific construct of stigma, distinct from the stigma and discrimination associated with everyday social encounters with HIV infected persons. Education, knowledge about AIDS, and wealth, which indicate a greater awareness of HIV/AIDS and possibly a greater voice in policy decisions, are associated with *less* stigmatizing attitudes in everyday social encounters. However, these same explanatory factors produce the opposite results for the question on family secrecy about HIV+; individuals who are educated, wealthier, and are informed about AIDS transmission are more likely to keep HIV+ a secret. Men report less stigmatizing attitudes than women, and rural residents report less stigmatizing attitudes than urban residents, but only for the secrecy question. This points to the complexity of AIDS-related stigma and the importance of accounting for multiple stratifications rather than a unitary focus on ethnicity.

In the specific case of Zambia and Malawi, the Chewas and Tumbukas report the same attitudes towards secrecy even though they are more politically mobilized in Malawi than in Zambia. Notably, the distance between the two groups is not only ethnic; the groups are further apart in terms of the proportion of 'rich' individuals in the group in Malawi, and closer in composition in Zambia, which might explain some part of why they are adversaries in Malawi and allies in Zambia. Their similar responses on the HIV+ secrecy question again calls into question the operation of AIDS-related stigma through ethnic divisions, and suggests that AIDS policy outcomes may be a result of social and political mechanisms other than ethnicity.

In sum, cultural difference does not reflect all preference differences between groups; between-group economic inequalities do seem to matter. Weak AIDS policy outcomes are likely to be as much a result of

within-group heterogeneity as they are a problem of between-group divergence and the difficulty of developing a sense of shared risk of disease between groups. Given the complex epidemiology of HIV/AIDS, a lack of cohesion within ethnic groups may account for a part of the collective action failure. A more complete picture of how ethnic diversity operates in undermining public goods provision would consider the role of economic inequalities between and within groups.

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http://siteresources.worldbank.org/INTHIVAIDS/Resources/375798-1132695455908/WestAfricaSynthesisNov26.pdf

Table 1: Proportion in ethnic groups who would keep HIV+ status in the family a secret

	PREG	Fearon	Median group HIV prevalence (%)	Ethnic group of respondent	*Percentage of respondents who say they would keep family HIV+ status a secret (with std. errors)*		Difference between rich and poor (percentage points)
					Poor (wealth level 0-2)	Rich (wealth level 3-4)	
BURKINA FASO	0.00	0.70	1.8	Low prev ethnic group	56 (1.3)	62 (1.9)	6*
				High prev ethnic group	50 (0.9)	60 (1.0)	10*
				Difference	-6*	-2	
MALI	0.13	0.75	1.5	Low prev ethnic group	49 (1.4)	49 (1.9)	0
				High prev ethnic group	59 (0.9)	59 (1.3)	0
				Difference	10*	10*	
SENEGAL	0.14	0.73	0.9	Low prev ethnic group	63 (0.6)	74 (0.1)	11*
				High prev ethnic group	46 (1.6)	72 (0.3)	26*
				Difference	-17*	-2*	
GHANA	0.44	0.85	2.4	Low prev ethnic group	35 (1.4)	40 (2.2)	5
				High prev ethnic group	42 (1.4)	41 (2.2)	-1
				Difference	7*	1	
GUINEA	0.48	0.67	1.6	Low prev ethnic group	24 (1.0)	33 (1.3)	9*
				High prev ethnic group	21 (0.9)	29 (1.4)	8*
				Difference	-3	-4	
NIGER	0.51	0.64	0.7	Low prev ethnic group	35 (1.0)	39 (1.0)	4*
				High prev ethnic group	35 (3.1)	42 (2.6)	7
				Difference	0*	3	
MALAWI	0.55	0.83	15.0	Low prev ethnic group	32 (1.0)	41 (1.2)	9*
				High prev ethnic group	31 (1.0)	36 (1.4)	5*
				Difference	-1	-5	
KENYA	0.57	0.85	6.2	Low prev ethnic group	34 (1.4)	38 (1.8)	4
				High prev ethnic group	45 (1.1)	37 (1.0)	-8*
				Difference	-11*	-1	
ZAMBIA	0.71	0.73	13.0	Low prev ethnic group	47 (1.5)	49 (1.5)	2
				High prev ethnic group	50 (1.4)	48 (1.4)	-2
					3	-1	
DRC	0.80	0.93	1.6	Low prev ethnic group	54 (1.5)	70 (1.3)	16*
				High prev ethnic group	50 (1.8)	74 (1.2)	24*
				Difference	-4	4	

Table 2: Random effects with ethnic groups nested within countries

Proportion in ethnic group who would keep HIV+ status a secret	Model 1: Empty	Model 2: With explanatory variables
	Coefficient	Coefficient
Average wealth level		-0.027 (0.025)
Proportion of rich		0.335*** (0.118)
HIV prevalence		0.045 (0.203)
Constant	0.449*** (0.038)	0.426*** (0.050)
Random-effects Parameters		
Grouped by: Country		
Variance – PREG score		0.0023 (0.0317)
Variance - Constant	0.0142 (0.007)	0.0139 (0.0104)
Variance - Residual	0.0048 (0.0007)	0.0043 (0.0006)
Number of observations (ethnic groups)	100	
Number of groups (countries)	10	
Obs per group:		
Min	6	
Avg	10	
Max	21	

Table 3a: Logistic regression with country fixed effects –
Probability that an individual will keep HIV+ status in the family a secret

Keep HIV+ status in family a secret	Odds Ratio	95% Confidence Interval	
Wealth level of individual (Ref=Poorest)			
Poorer	0.98	0.93	1.04
Middle	1.04	0.97	1.10
Richer	1.06	0.99	1.14
Richest	1.22***	1.12	1.32
Male	0.76***	0.72	0.81
Age	0.99***	0.99	0.99
Rural	0.87***	0.80	0.94
Education	1.05**	1.02	1.08
AIDS knowledge score	1.14*	1.02	1.28
Read newspaper	0.96**	0.94	0.98
Listen radio	1.02	1.00	1.03
HIV prevalence in ethnic group	1.75	0.81	3.77

Table 3b: Logistic regression with 'ethnic group' fixed effects –
Probability that an individual will keep HIV+ status in the family a secret

Keep HIV+ status in family a secret	Odds Ratio	95% Confidence Interval	
Wealth level of individual (Ref=Poorest)			
Poorer	1.00	0.94	1.05
Middle	1.05	0.99	1.12
Richer	1.08**	1.01	1.16
Richest	1.20***	1.10	1.30
Male	0.76***	0.72	0.80
Age	0.99***	0.99	0.99
Rural	0.86***	0.80	0.93
Education	1.06**	1.03	1.09
AIDS knowledge score	1.11	0.99	1.24
Read newspaper	0.97***	0.94	0.99
Listen radio	1.01	0.99	1.03

Number of countries	10
Number of observations	115,537
Std. error adjusted for	3,767 clusters

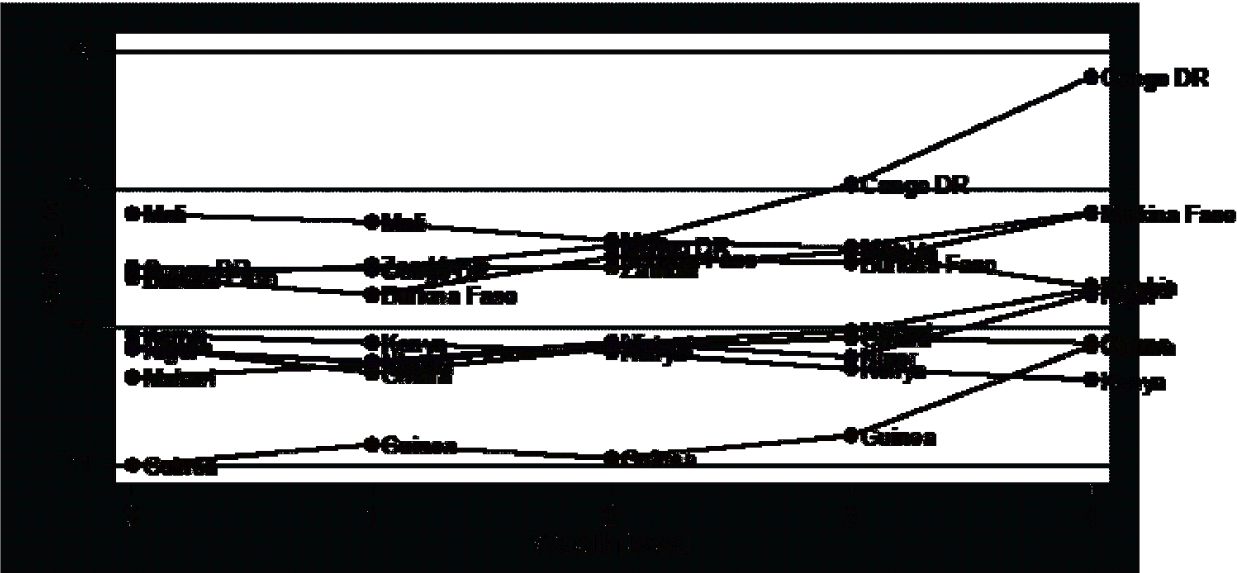## Table 4: Chewas and Tumbukas in Zambia and Malawi

	Proportion of individuals in each ethnic group who would keep HIV+ status a secret		Proportion of 'rich' individuals in each ethnic group (%) Average wealth index score for each ethnic group	
	Chewa	Tumbuka	Chewa	Tumbuka
Malawi (Adversaries) PREG = 0.55	41%	42%	18% 70,167	31% 117,015
Zambia (Allies) PREG = 0.71	45%	49%	23% 132,019	26% 134,649

Table 5: Comparing results for alternate measures of stigma (dependent variable) – Logistic regressions for individual responses with country fixed effects

	Odds Ratio	[95% Conf.	Interval]	Odds Ratio	[95% Conf.	Interval]	Odds Ratio	[95% Conf.	Interval]
Explanatory variables	Keep HIV+ in family a secret			Not allow female teacher to continue teaching			Not buy food from vendor		
Wealth level (ref=poorest)									
Poorer	0.98	0.93	1.04	0.91**	0.85	0.97	0.88***	0.83	0.94
Middle	1.04	0.97	1.10	0.84***	0.79	0.90	0.77***	0.72	0.82
Richer	1.06	0.99	1.14	0.69***	0.64	0.74	0.61***	0.57	0.66
Richest	1.22***	1.12	1.32	0.50***	0.46	0.55	0.46***	0.42	0.51
Male	0.76***	0.72	0.81	0.98	0.93	1.04	0.74***	0.70	0.78
Age	0.99***	0.99	0.99	0.99***	0.99	0.99	0.99***	0.99	0.99
Rural	0.87***	0.80	0.94	1.29***	1.18	1.40	1.16***	1.07	1.25
Education	1.05**	1.02	1.08	0.64***	0.62	0.67	0.59***	0.57	0.61
AIDS knowledge score	1.14*	1.02	1.28	0.35***	0.31	0.40	0.36***	0.31	0.41
Read newspaper	0.96**	0.94	0.98	0.82***	0.80	0.85	0.87***	0.85	0.89
Listen radio	1.02	1.00	1.03	0.92***	0.90	0.94	0.91***	0.90	0.93
HIV prevalence in ethnic group	1.75	0.81	3.77	0.17***	0.08	0.37	0.36**	0.18	0.69

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Number of countries	10
Number of observations	115,537
Std. error adjusted for	3,767 clusters

Graph 1: Proportion of individuals who would keep HIV+ a secret in each wealth quintile in each country

Graph 2: Proportion of individuals in each ethnic group who would keep HIV+ a secret, plotted against the average wealth level of the ethnic group, with linear prediction line for entire sample (pooled)
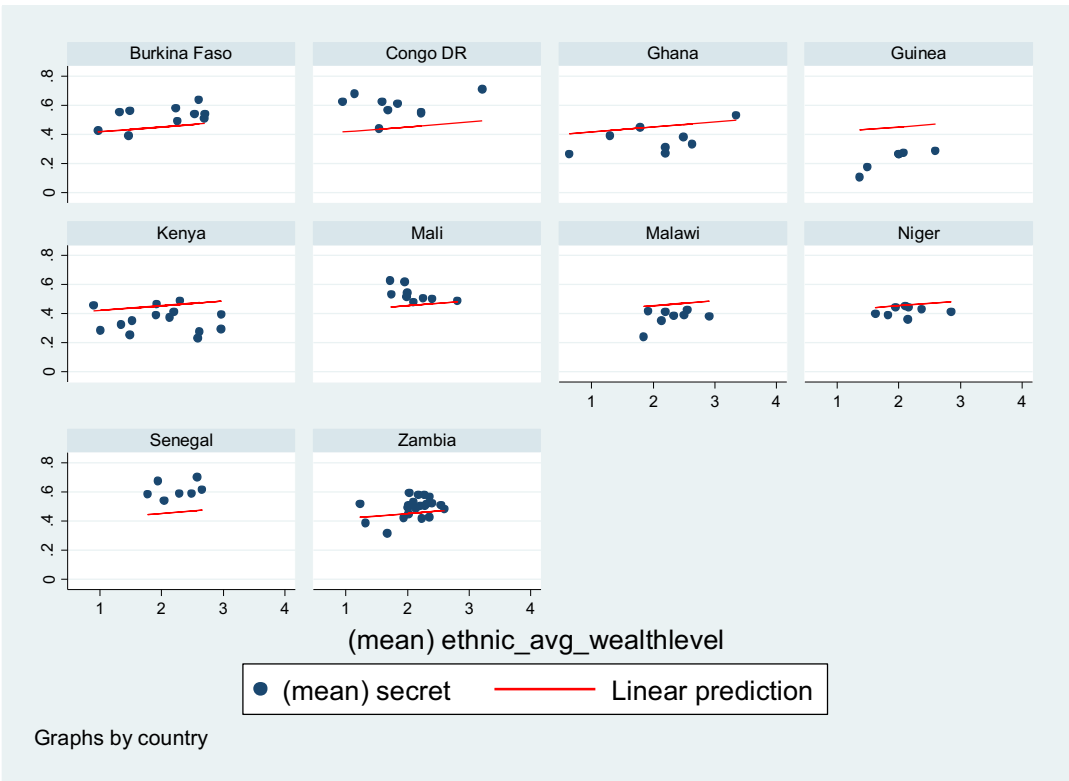
Graph 3: Proportion of individuals in each ethnic group who would keep HIV+ a secret, plotted against the average wealth level of ethnic group, with separate fitted line for each country (un-pooled)
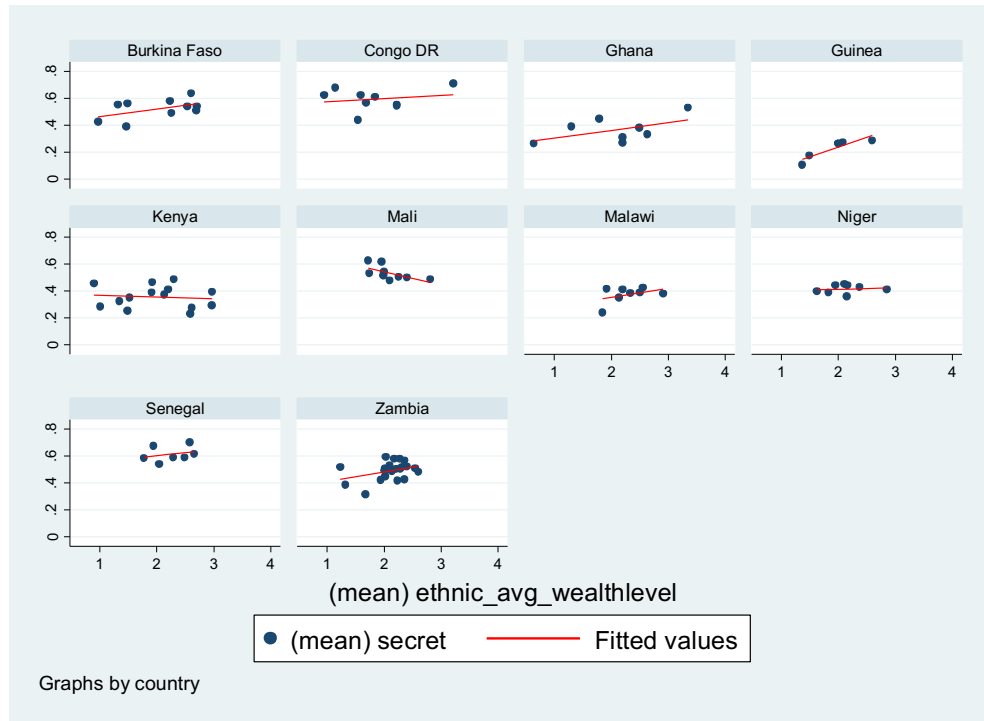
Graph 4: Residuals from regressing secrecy in ethnic group on the average wealth level of ethnic group, ordered by PREG values
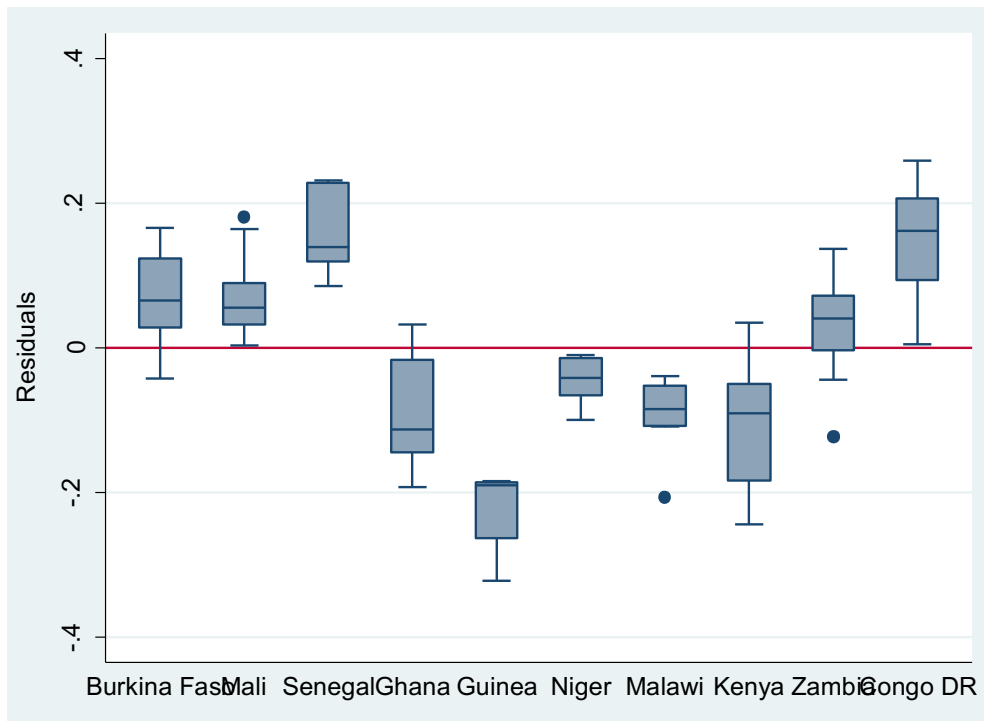
Graph 5: Zambia and Malawi – Group size and proportion of rich individuals in each ethnic group