



## Corruption and averting AIDS deaths

Willa Friedman

University of Houston, United States



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### ABSTRACT

This paper looks at the impact of corruption on the effectiveness of antiretroviral drugs in preventing AIDS deaths and the potential channels that generate this relationship. This is based on a unique panel dataset of countries in sub-Saharan Africa, which combines information on all imported antiretroviral drugs (ARVs) from the World Health Organization's Global Price Reporting Mechanism, with measures of corruption, estimates of the HIV prevalence, and the number of AIDS deaths in each year and in each country. Countries with higher levels of corruption experience a significantly smaller drop in AIDS deaths as a result of the same quantity of ARVs imported. This is robust to different measures of corruption and to a measure of overall death rates as well as HIV-specific death rates as the outcome. A case-study analysis of the Kenyan experience illustrates one potential mechanism for the observed effect, demonstrating that disproportionately more clinics begin distributing ARVs in areas that are predominantly represented by the new leader's ethnic group.

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### 1. Introduction

Today antiretroviral drugs are widely available in sub-Saharan Africa, with more than 12 million people receiving treatment in 2015 according to the World Health Organization. Until the last decade, this level of provision was considered inconceivable as the drugs were prohibitively expensive, and this enormous expansion in access has been credited with extending the lives of millions of people across the continent. At the same time, corruption in governments is associated with inefficient distribution of public goods, and this could limit the effectiveness of imported drugs in saving lives if the drugs do not reach the intended clinics or individual recipients, or if they are distributed with insufficient guidance.

This paper addresses the role of corruption in changing the effectiveness of antiretroviral drugs in reducing HIV mortality in sub-Saharan Africa. This is first done using a cross-country analysis comparing the impact of imported drugs on HIV deaths across countries with different levels of corruption. This is done using an original panel dataset of countries in sub-Saharan Africa from 2000–2007. This dataset combines standard measures of corruption used in economics and political science, information about HIV prevalence and deaths, and records of the quantities of antiretroviral drugs imported into each country. Using year and country fixed effects, this data provides evidence that HIV deaths are reduced less in corrupt countries given the same quantity of

medicine, and the effect is even larger if the relevant quantity of drugs is measured in dollars spent.

There are many channels through which corruption – broadly defined – could influence the effectiveness of health investments. For example, drugs can be purchased and then diverted either outside the country or within the country. The supply chain can fail if governments with higher levels of corruption are generally less capable of delivering public goods. Additionally, corruption within a government can facilitate targeting of public goods based on political or other motivations, rather than need.

Scholars have used many different definitions of corruption, usually following the general idea of “the abuse of public office for private gain” (Bussel, 2015), but varying widely in what qualifies under this umbrella. This paper will use a broad definition, encompassing a wide range of interpretations of what is met by “private gain.” Cross-country measure of corruption rely on perceptions of corruption, which are likely to be consistent with a broad definition. In addition, many studies on corruption in the health sector, use a similarly broad definition, specifically including behaviors such as absenteeism, diversion of supplies, shirking, and even not choosing the most cost-effective methods as forms of corruption (See for example: Azfar & Gurgur, 2008; Mackey & Liang, 2012; Vian, 2008). Definitions of corruption and the connection between cross-country measures of perceived corruption and ethnic targeting of goods is discussed in more detail in Section 2.

Diversion of drugs could happen if drugs purchased by governments are resold. Although studies of ARV diversion to illicit markets in developing countries are limited, researchers have

E-mail address: [whfriedman@uh.edu](mailto:whfriedman@uh.edu)

documented its existence in the US (Tsuyuki, Surratt, Levi-Minzi, O'Grady, & Kurtz, 2015). Even in a context with a less uncertain supply, a back-up stock of ARVs is reported as a key motivation for purchasing ARVs in an informal market. This resale could be particularly lucrative in sub-Saharan Africa for at least two reasons. First, in nearly all countries of sub-Saharan Africa, supply is not nearly sufficient to meet demand and so treatment is rationed. For instance, in Kenya, the National AIDS Control Council estimated 367,985 adults needed ART while only 168,234 received it (NASCO, NACC, 2007).<sup>1</sup> For the same year, UNAIDS estimated that 31% of those needing antiretroviral drugs in low- and middle-income countries received them (HIV/AIDS, 2008). This makes resale valuable because some of those excluded are likely to be willing to pay for the treatment. Second, because of international agreements with pharmaceutical companies, ARVs are sold at an enormous discount to governments and NGOs working in many countries in sub-Saharan Africa. This variation in price between different countries creates a substantial opportunity for arbitrage. Vian (2008) discusses the substantial threat of supply chain leakages distributing valuable antiretroviral drugs in sub-Saharan Africa. Further, there is evidence in South Africa of ARVs being used recreationally (Grelotti et al., 2014), another way for the drugs to miss their intended targets.

Such supply chain leakages divert drugs from reaching those who need them most, and they may leave the country entirely. It should be noted that if these drugs are sold to others within the same country, then a change in allocation may not prevent them from reaching someone who needs them. However, if they are diverted to those who need them less – perhaps to those for whom the disease has not progressed as far and their risk of opportunistic infection is reduced or to those who have another source and want the security of accumulating a buffer stock – then this will prevent the drugs from having the same national impact on HIV-related mortality. Taking evidence from the education sector, Reinikka and Svensson (2004) measured how much of an education grant that was supposed to go to schools arrived at the intended beneficiaries, and found that, on average, 13% of the funds arrived successfully. In a study that similarly followed the money, Gauthier and Wane (2008) found only 18% of non-wage health expenditures made it to health facilities in Chad. While it can be difficult to directly measure some of the channels through which supplies are lost or not making it to the targeted beneficiaries, many of them – including shirking, illicit payments, and pilfering drugs – are still readily reported to researchers in qualitative studies (Ferrinho et al., 2004; Lindelow & Serneels, 2006).

Identifying the ideal beneficiaries is open to debate, but not targeting the sickest could dramatically change the immediate impact on mortality. Many researchers have argued that providing ARVs – particularly during drug trials – to those with the most advanced HIV infections “maximizes the number of deaths averted” (McGough, Reynolds, Quinn, & Zenilman, 2005). Recent debates challenge this claim as the likelihood of treatment success may be higher for those with earlier-stage infections, and providing treatment to those in or potentially in sero-discordant couples may additionally prevent future infections. While both of these factors may be important in the ethical consideration of who should receive a limited supply of a treatment, these arguments rely on averting deaths *in the future* rather than immediately. Thus targeting anyone other than the sickest patients would reduce immediate impacts of ARVs on mortality, although this may not be a persistent effect.

Using ethnicity as a factor in determining allocation undermines any other rules designed to reach the most in need. Variation

in responses to drugs due to the pre-treatment health of the recipient demonstrates that the benefits will not be realized equally by any person with HIV. Thus a re-allocation to a different person does not only change whose death is averted but whether a death is averted. The link between ethnic targeting and corruption and whether such favoritism should be considered a form of corruption is discussed in detail in Section 2.

Besides the potential prevention of immediate deaths averted, allocating treatment based on ethnicity would strike many as unfair. McGough et al. (2005) write about ARV allocation: “It is also important to operate within a human rights framework to prevent the systematic discrimination in access to treatment according to such factors as sex, ethnicity, and sexual orientation.”

Studying the impacts of corruption in the context of ARV provision is particularly appropriate for a few different reasons. First, many important outcomes may be only indirectly linked to welfare, whereas the relevant outcome in this study of deaths averted is clearly of direct importance. Second, during this time period there was virtually no domestic production of Antiretroviral Drugs and there is no substitute for these treatments. The next best alternative (good nutrition and treatment and prevention of opportunistic infections through antibiotics) does not have nearly the impact on morbidity and mortality that these drugs do. Therefore, while other studies that look at corruption and public goods provision will be unable to measure the entire supply of those goods, this is possible in this case.

Corruption in government could also limit the effectiveness of local supply chains in a number of ways. If promotion within the public sector is not based on performance, there is less incentive for employees to manage transport or work hard at health facilities. Thus the drugs may remain in the country, but sit unused. Callen, Gulzar, Hasanain, and Khan (2016) demonstrate this channel by showing lower effort among health-service providers in Afghanistan when the providers are politically connected, particularly in uncompetitive areas. Similarly, if health facilities are plagued by high absenteeism, drugs may either sit idly or be prescribed with insufficient guidance so that clients are less likely to adhere. Because of its quick rate of mutation, HIV is particularly susceptible to the development of drug resistance resulting from low adherence to the prescribed regimen.<sup>2</sup>

An additional channel through which corruption could influence the impact of imported drugs is through changing allocations within a country. Guaranteeing treatment to those who have low CD4 cell counts and therefore have the most compromised immune system is the most efficient way to immediately avert deaths using ARVs. However, there is also a benefit to an individual of treatment before the CD4 count is extremely low, and the World Health Organization recently increased the recommended CD4 count threshold of eligibility from 200 to 350. With the higher threshold, demand for the drugs increases and without sufficient supply, other systems of allocation besides targeting those with the lowest CD4 count arise. One notable alternative system of allocation of any health expenditure is political favoritism, including, for example, targeting core supporters or co-ethnics.

Using data from Kenya about ARV provision before and after an election, I test for politically motivated targeting of new ARV clinics in one country with a high estimated corruption (186th out of 210 in 2009 according to Kaufmann, Kraay, & Mastruzzi (2011)) and high HIV prevalence. This is done using an original dataset containing all health facilities in Kenya that provide antiretroviral drugs, along with the year in which they began distribution and their GPS locations. This information is linked with ethnicity records

<sup>1</sup> The same report estimated that 1.38 million adults were living with HIV. Only those with low CD4 counts were included in the estimate of need.

<sup>2</sup> It should be noted that adherence to HIV treatment regimens is generally measured to be quite high in developing countries (Mills et al., 2006).

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