

The Social Determinants of HIV Serostatus in Sub-Saharan Africa: An Inverse Relationship Between Poverty and HIV?

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SYNOPSIS

Contrary to theories that poverty acts as an underlying driver of human immunodeficiency virus (HIV) infection in sub-Saharan Africa (SSA), an increasing body of evidence at the national and individual levels indicates that wealthier countries, and wealthier individuals within countries, are at heightened risk for HIV. This article reviews the literature on what has increasingly become known as the positive-wealth gradient in HIV infection in SSA, or the counterintuitive finding that the poor do not have higher rates of HIV. This article also discusses the programmatic and theoretical implications of the positive HIV-wealth gradient for traditional behavioral interventions and the social determinants of health literature, and concludes by proposing that economic and social policies be leveraged as structural interventions to prevent HIV in SSA.

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That poverty acts as an underlying driver of human immunodeficiency virus (HIV) infection in sub-Saharan Africa (SSA) has become a common refrain in the global health field.^{1,2} Scholars and activists have assumed that because Africa is on average the poorest continent on earth, then it must be the poorest people who are disproportionately vulnerable to contracting HIV and subsequently developing acquired immunodeficiency syndrome (AIDS). However, contrary to most health disparities whereby health outcomes tend to improve with rising wealth, an increasing body of evidence at the national and individual levels indicates that wealthier countries in SSA, and wealthier individuals within countries in SSA, are at heightened risk for HIV infection.³⁻¹⁰ Examining Demographic and Health Survey (DHS) data from eight African countries, Mishra et al. found that, even after controlling for an array of covariates, wealthier individuals were still more likely to be HIV-positive than poorer individuals, concluding that “these findings question the basis for poverty-driven programs for HIV/AIDS prevention in developing countries.”¹¹ Ecologic studies have further demonstrated that relative poverty (having more to do with income distribution or economic inequality) rather than absolute poverty is correlated with high rates of HIV infection.¹²⁻¹⁴

These findings have profound implications for theorizing on the social determinants of HIV infection, particularly in the developing world context. Given the relative resistance of HIV to traditional behavior change interventions in SSA, understanding the complex interactions among economic distribution, wealth, and HIV can help shed light on structural and policy approaches to HIV prevention in SSA.

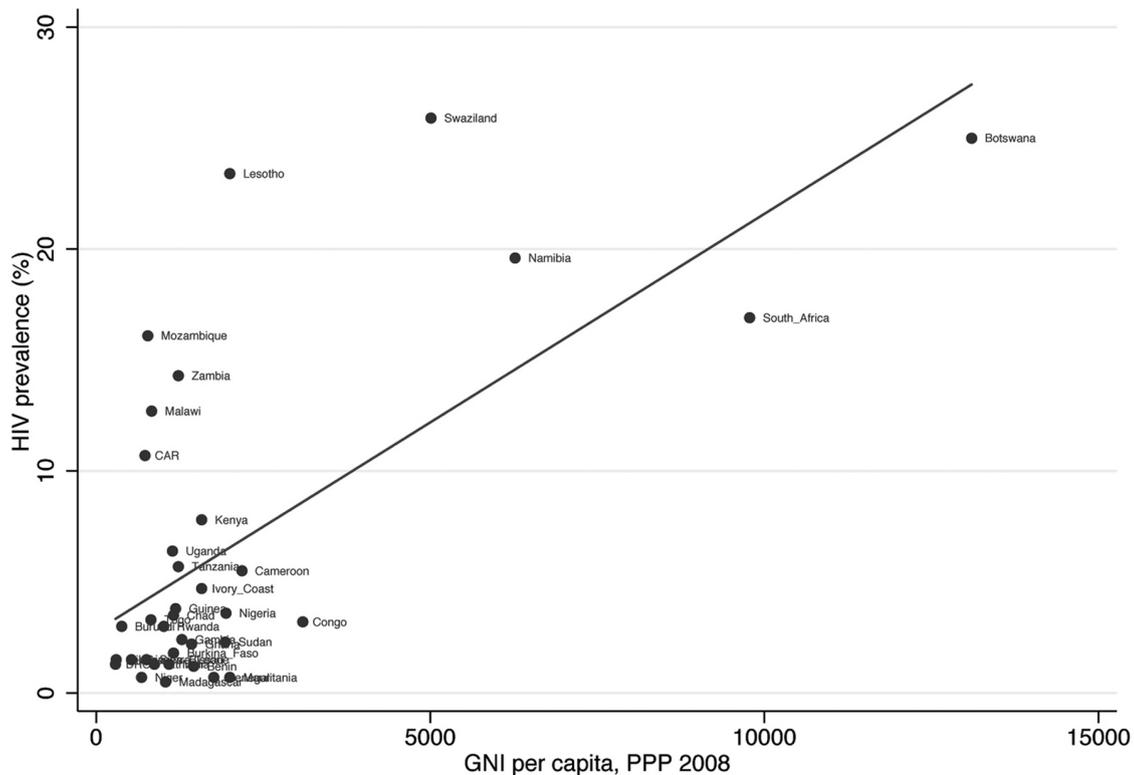
BACKGROUND: THE POSITIVE-WEALTH GRADIENT IN HIV INFECTION

At the national level, it has been established that within SSA, the countries that have been most adversely affected by HIV/AIDS are not necessarily the poorest countries.¹⁵⁻¹⁷ In fact, countries such as South Africa and Botswana with some of the highest HIV prevalence rates in the world are considered to be middle-income countries by global standards and are the richest countries in Africa (Figure 1). Evidence further shows that HIV tends to be concentrated in richer regions within countries and in urban areas, which tend to be richer than rural areas.^{5,17} While socioeconomic factors may operate differently at varying levels (e.g., individual, household, and neighborhood) and through various causal pathways,¹⁸ at the ecologic level, HIV appears to accrue most heavily to wealthier rather than poorer areas.

More surprising, however, has been the finding that wealthier rather than poorer individuals have higher HIV infection rates in SSA, a phenomenon that is increasingly becoming known as the positive-wealth gradient in HIV infection (Figure 2). Despite a good deal of literature documenting that more educated individuals had higher HIV infection rates early in the epidemic,¹⁹⁻²¹ the overwhelming assumption has been that HIV disproportionately afflicts the poor in both developed²² and developing countries.²³ Until the introduction of the DHS with HIV biomarkers in 2001, no national probability samples of HIV prevalence existed. Most estimates of HIV prevalence were modeled from sero-surveillance data of pregnant women at antenatal clinics and at-risk populations with questionable generalizability to the population at large and no means of assessing the social and demographic composition of infected populations. With the introduction of the DHS with HIV biomarkers, which are based on national and sub-national probability samples, it is now possible to derive representative estimates of HIV prevalence for a series of social and demographic characteristics.²⁴

This finding of a positive-wealth gradient in HIV infection in SSA is striking because there are myriad reasons to think that richer people (especially the richest people) should have lower infection rates, including higher educational attainment, a greater level of exposure to government messages and mass media, and better access to condoms. Empirical analyses have additionally shown that this positive gradient in HIV infection holds even more strongly for education as for wealth, with adults with six years of schooling being as much as three percentage points more likely to be infected with HIV than adults with no schooling.⁸ In addition, evidence from Tanzania’s DHS shows that professionals are two to three times more likely to be infected with HIV than agricultural workers. While the construct used to measure wealth has been criticized for its possible urban bias and potential measurement error,⁵ the fact that this positive gradient holds as much for education and occupation as for wealth indicates that the association represents a socioeconomic status gradient and not a wealth gradient alone.⁸

In explaining the positive HIV-wealth gradient, studies demonstrate that a number of risk factors for HIV also increase with both wealth and education, including the number of multiple and nonmarital sexual partners⁷ and the likelihood of premarital sex.⁸ Though questions have been raised about possible selection bias given the high refusal rates to the HIV-testing module in certain countries (e.g., high refusal rates among the poor would tend to obscure their relative risk of infection), these refusal rates are in fact highest among wealthy, more educated, and urban individuals.²⁴ That

Figure 1. HIV prevalence (most recent year) by GNI (most recent year) in sub-Saharan Africa^a

^aSource: HIV data from the Joint United Nations Programme on HIV/AIDS (UNAIDS) Epidemiological Update, most recent year available; GNI data from the World Bank's World Development Indicators Database

HIV = human immunodeficiency virus

GNI = gross national income

PPP = purchasing power parity

the relationship between wealth and HIV infection persists even after accounting for high refusal among the wealthy indicates that the underlying relationship is, if anything, attenuated by nonresponse and is, in fact, stronger than is currently captured.

What is even more striking is that wealthy men are not infecting poorer women, as the “sugar daddy” literature would suggest; the positive association between wealth and HIV is as steep for women as it is for men (Figure 3). Men and women of the same socioeconomic group are equally likely to be infected. This finding is quite remarkable given the amount of scholarship that has gone into expounding the pathways through which poverty makes women vulnerable to HIV infection.

The role of complex gender norms in explaining women's disproportionate vulnerability to HIV/AIDS became a popular field of investigation when researchers noted that unlike the concentrated epidemics in developed countries and other parts of the world, SSA's generalized epidemic was resulting in higher infection rates among women rather than men. By 2003, 57% of the people living with HIV/AIDS in SSA

were women.¹⁶ In most African countries, the majority of people infected with HIV are women, and, in some cases, women are more than twice as likely as men to be infected with the virus.²⁴

Initially, women's disproportionate vulnerability was explained as resulting from their economic reliance on men, which made women prone to coercion and placed them in a position requiring an exchange of sex for money or housing.^{25–27} Researchers demonstrated that many sexual relationships contained a transactional element (variably termed “survival sex” or “sex for favors”), and even when not explicitly a commercial activity, these types of sexual relationships placed women at risk for HIV.

However, a number of studies have now begun to question the theoretical and empirical basis for the notion of survival sex, pointing out that women may engage in transactional sex not just to survive, but also to gain access to material possessions. For instance, Leclerc-Madlala²⁸ identified the notion of “consumption sex,” arguing that transactional sex occurs along a continuum of needs and wants. Hunter²⁹

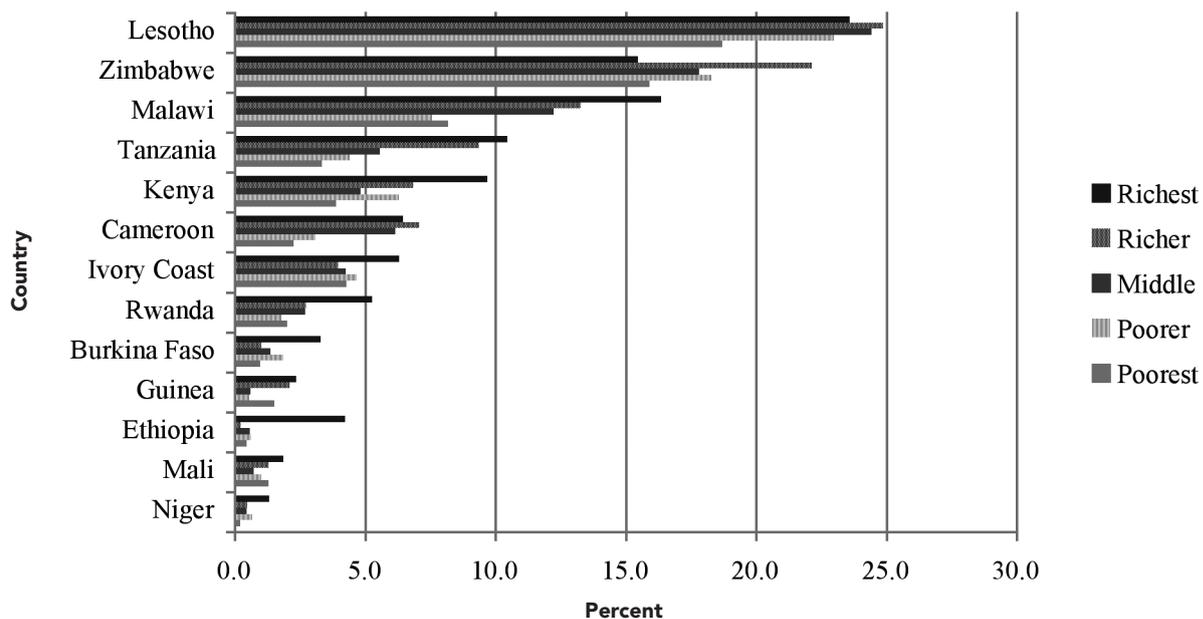
pointed to the same phenomenon, finding that it is the “pursuit of modernity” that puts women at risk for HIV through transactional sex rather than economic privation as such. Unlike the notion of survival sex, which points to women’s economic dependence or desperation as a source of HIV risk, the “sugar daddy” phenomena paints a picture of older men lavishing money and gifts on their younger partners.³⁰ Further, researchers have identified a phenomenon called the “3-C’s boyfriend”—who provides a woman with coveted cash, cars, and cell phones—in countries such as Kenya and South Africa, where the lure of modern consumer goods and materialism drives sexual transactions rather than absolute deprivation.³¹ Thus, having multiple partners may be a means of achieving upward mobility for women, while for men it is a demonstration of their sexual prowess and social status.

Similarly, evidence from the collaborative ethnographic “Love, Marriage, and HIV” project found that the pursuit of modern identities creates particular patterns of risk, even in the context of marriage, especially where formalized polygamy has become stigmatized and replaced with riskier, informal concurrent sexual network structures.^{32,33} For instance, in the case of Uganda, Parikh found that “there ... has been a gradual transformation from formal polygamy, in

which households of co-wives were somewhat interconnected, to a pattern of informal secondary households that often remain autonomous and hidden from each other.”³² Smith identified similar, though locally contextualized trends in Nigeria. He observed that in Nigeria, even where “Christian discourses exalting mutual monogamy” are strong, historical polygamy and changing economic conditions have created “contradictory moralities” for men and women, leading men to conceal their extramarital partners.³³

Numerous studies have pointed to the role of economic migration and seasonal work, especially the mining industry, in the spread of HIV.³⁴ These studies generally assumed that the transmission of HIV flowed from men who migrate for work to their wives and partners. However, recent studies of sero-discordance in couples in high migration settings have found that the direction of spread of the epidemic is not only from returning migrant men to their rural partners, but also frequently from women to their migrant partners.³⁵ Thus, it may not exclusively be the case that women are at risk because of their relationship with their primary partners who are the household breadwinners, but rather because women are also engaging in concurrent sexual relationships while their primary partners are away.

Figure 2. HIV prevalence (percent of population) by wealth quintile in 13 African countries^a



^aBased on author’s own calculations from Demographic and Health Surveys data (available from: URL: <http://www.measuredhs.com/>); data weighted for probability of selection.

HIV = human immunodeficiency virus

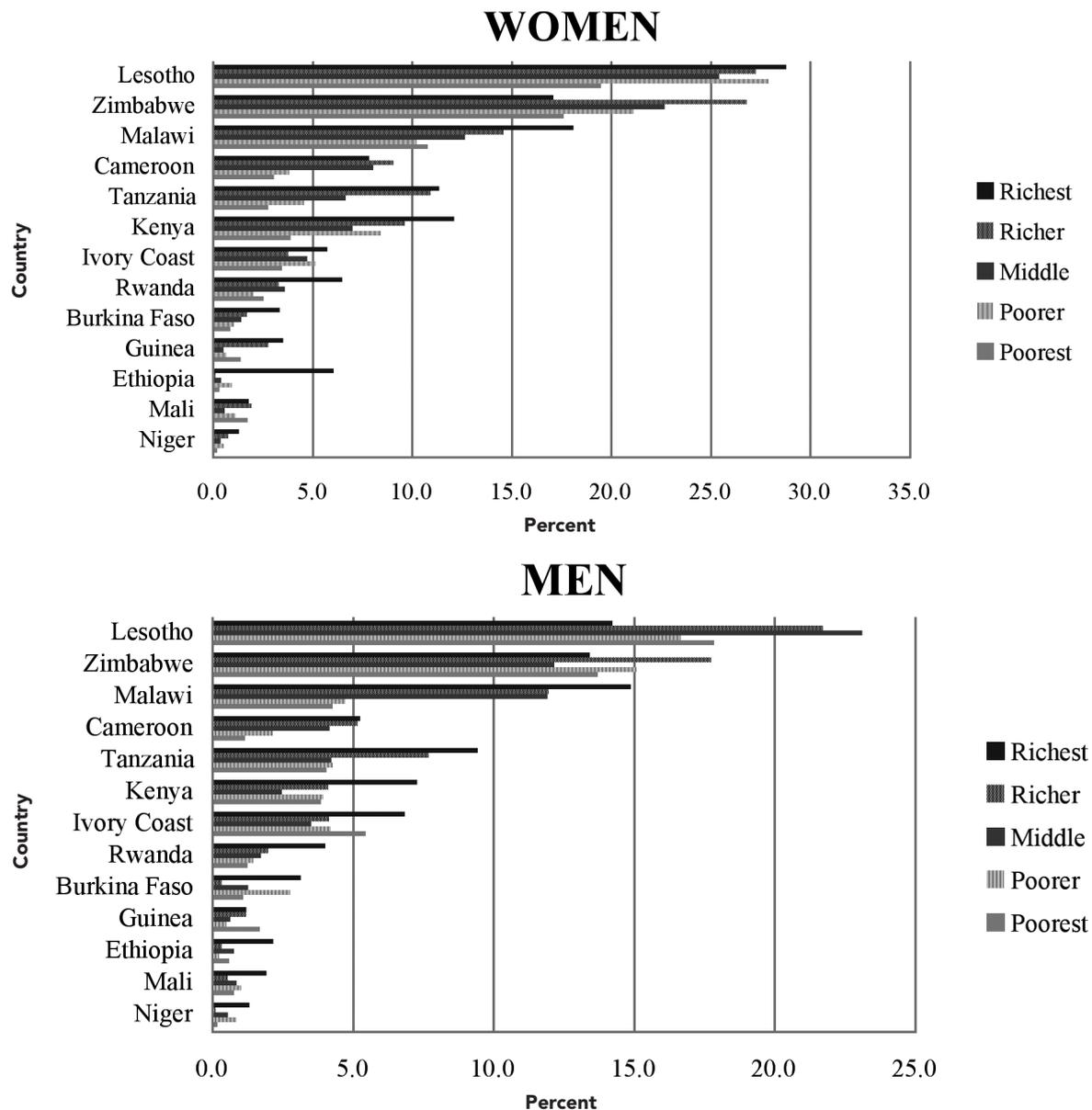
IF POVERTY IS NOT THE PROBLEM, THEN WHAT IS?

Southern African countries with high HIV prevalence all share a common trait—they are among the most unequal countries in the world. Whereas South Africa is typically held up as the most unequal country globally, in fact, southern Africa on the whole is home to a host of highly unequal countries including Namibia,

which tops the world charts with a Gini coefficient of 0.70 (Figure 4). (The Gini coefficient is a common measure of inequality or the distribution of economic resources in society ranging from 0 to 1, where 0 is perfect equality and 1 is perfect inequality.)

Economic inequality has been found to be significantly positively correlated with a number of health outcomes and health-related behaviors, including violence,³⁶ crime,³⁷ overall life expectancy,³⁸ chronic

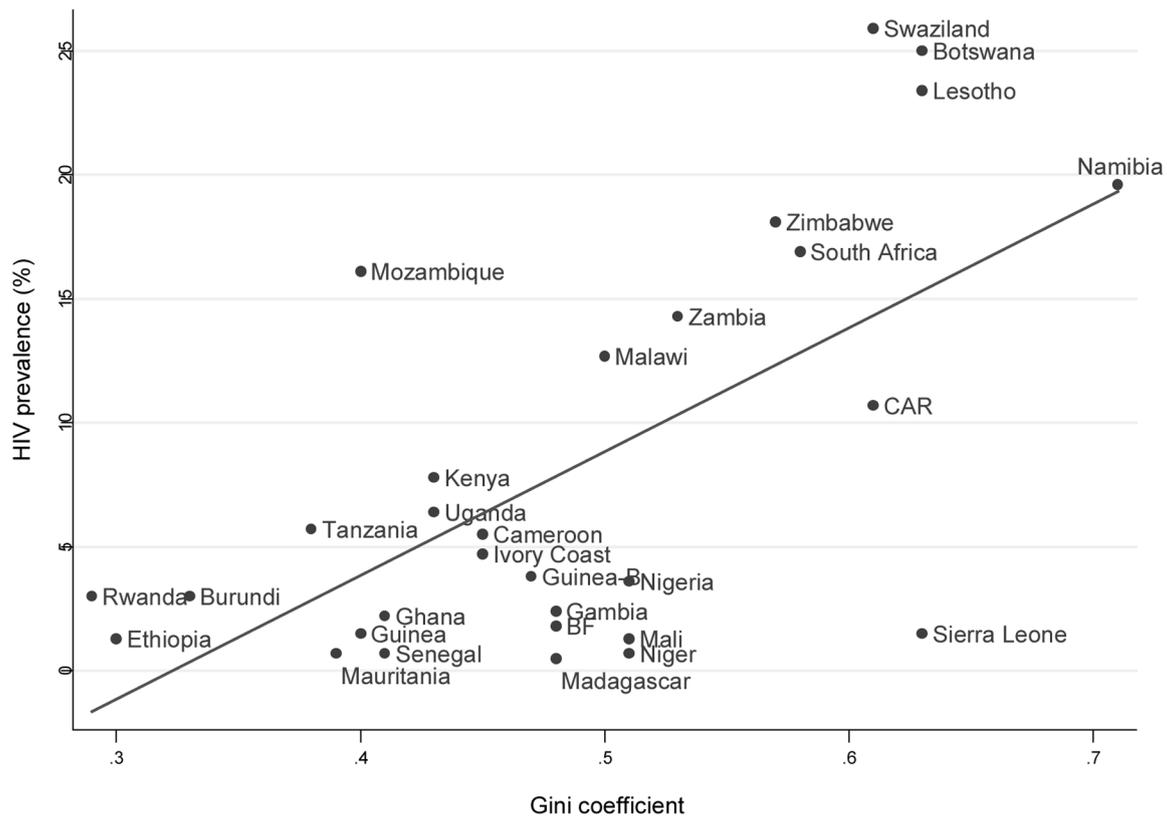
Figure 3. Female and male HIV prevalence (percent of population) by wealth quintile in 13 African countries^a



^aBased on author's own calculations from Demographic and Health Surveys data (available from: URL: <http://www.measuredhs.com/>); data weighted for probability of selection.

HIV = human immunodeficiency virus

Figure 4. HIV prevalence (most recent year) by Gini coefficient^a (most recent year) in sub-Saharan African countries^b



Note: HIV infection rates are higher in more unequal (higher Gini coefficient) African countries.

^aThe Gini coefficient is a common measure of inequality that typically ranges from zero (most equal) to one (most unequal).

^bSource: Deininger & Squire Measuring Income Inequality Database, most recent year available; HIV prevalence data from the Joint United Nations Programme on HIV/AIDS (UNAIDS) 2009 report on the global AIDS epidemic

HIV = human immunodeficiency virus

AIDS = acquired immunodeficiency syndrome

disease,³⁹ and rates of tuberculosis,⁴⁰ as well as sexually transmitted diseases and HIV in the developed world context.⁴¹ While all societies have been shown to have social gradients in health (generally such that wealthier individuals have better health outcomes), economic inequality has been demonstrated to worsen health outcomes across all economic strata in society.^{38,42} Ecologic studies of HIV risk have found that national income inequality is significantly positively correlated with HIV/AIDS levels, after controlling for an array of underlying factors.^{13,14}

Where inequality has been shown to produce higher rates of disease at the ecologic level, an individual's relative deprivation—i.e., where he or she stands on the social ladder—has been shown to increase risk for a host of diseases.³⁸ A variety of diseases and risk factors have been found to form social gradients, with health

improving as one moves up the socioeconomic ladder, though evidence also suggests a diminishing return to more economic resources at higher socioeconomic status levels.⁴³ These studies have primarily been conducted in developed countries where poverty is best characterized as relative rather than absolute.

With regard to the developing world, the literature on the social determinants of health makes a distinction between diseases associated with absolute poverty (deprivation of basic needs) and diseases associated with relative poverty (basic needs satisfied but variation in other economic and symbolic resources).^{38,39} Examples of diseases associated with absolute poverty include malnutrition, diarrheal disease, and what are now considered to be neglected tropical diseases. These diseases are argued to be subject to a threshold effect such that once a country overcomes the conditions

that give rise to them (i.e., eradicates conditions of absolute poverty), these diseases tend to decline on their own.³⁸

Relative poverty, on the other hand, refers to a situation where people's basic needs have been met, but relative to other individuals, they have fewer resources.³⁸ Diseases under these conditions tend to form a gradient such that the farther down the social ladder one is, the worse his/her health is. This, at least, is the trend in rich countries, where poverty is best characterized as relative rather than absolute (most everyone has at least his/her basic needs met). However, in poor countries, conditions of absolute poverty persist alongside conditions of relative poverty and affluence.

The wealth index that is used to measure the relationship between economic status and HIV likely captures both the absolutely poor (those who lack adequate food, water, and sanitation) and the relatively poor (those whose basic needs are satisfied but have wide variation in terms of the number of luxury goods owned). In this sense, the mistaken idea that HIV is a poverty-related illness may simply reflect a definitional sleight-of-hand—the *relatively* poor have higher HIV infection rates in SSA compared with the *absolutely* poor. Further, given the available ethnographic evidence, the principal driver of risk behaviors associated with HIV appears not to be absolute economic privation, but rather aspirations for social mobility and demand for consumer goods. Though the cross-sectional DHS studies are unable to assess change over time, the cumulative evidence suggests that HIV infection is descending the social gradient and increasingly becoming a disease of the relatively poor.¹⁷ Although the wealth gradients appear to be reversed or in the process of reversing in some countries and regions within countries, the initial risk to the wealthiest individuals seems to have accrued from their relative prestige and power, which allowed wealthier men to seek out and gain multiple sexual partners, and women (whether initially wealthy or not) to benefit financially from their liaisons with well-off men.

IMPLICATIONS OF THE POSITIVE-WEALTH GRADIENT IN HIV INFECTION FOR ADVOCACY AND PRACTICE AROUND THE SOCIAL DETERMINANTS OF HEALTH

How does the evidence that HIV affects the rich more than the poor in SSA affect advocacy and theory around the social determinants of health? One implication of this finding is that social inequalities do not always result in greater harm for the least advantaged.

However, much of the momentum around the social determinants of health rests on the notion that improving economic conditions will advance health in the developing world, not make health worse.⁴⁴

A possible implication of the positive-wealth gradient in HIV infection is that poverty is not the problem, but rather development is. Initially, the implication of the HIV-poverty thesis was that to address HIV, it would be necessary to tackle poverty as an indirect mechanism that is fueling the epidemic. For instance, as Fenton stated, "Poverty reduction will undoubtedly be at the core of a sustainable solution to HIV/AIDS."⁴⁵ However, the finding of increasing HIV risk with increasing wealth could raise the somewhat absurd question of whether poverty should actually be encouraged, as it appears to be protective against HIV. In keeping with this observation, recent declines in HIV prevalence in Zimbabwe have been attributed to the economic crisis in that country, which has been postulated to have reduced transmission of HIV, as men increasingly lack the resources to maintain multiple partnerships or take on new wives.⁴⁶

Although poverty reduction may not be an effective means of preventing HIV, there are many important benefits of poverty reduction for HIV/AIDS relating to the sustainability of services for HIV treatment and care. Poverty reduction also contributes to growth that is pro-poor or inequality-reducing, which should narrow health inequalities. Further, poverty reduction would likely alleviate many of the diseases in SSA most closely related to conditions of absolute poverty (including opportunistic infections). Given the numerous benefits of pro-poor growth, deemphasizing poverty reduction as a broad-based public health strategy is hopefully not a recommendation that researchers will draw from the evidence on positive-wealth gradient in HIV infection.

These collective findings on the positive-wealth gradient in HIV infection can help to explain why traditional behavior change models have been so ineffectual in producing HIV "risk reduction" in SSA.⁴⁷ The ongoing transformation of developing countries into market economies and the growth of middle-class consumers generate a social risk environment that cannot be reformed by simply confronting individual behaviors.⁴⁸ Booysen et al., for instance, showed an increase in the presence of consumer goods (e.g., refrigerators, radios, and telephones) since the 1980s, but a reduction in the access to public goods (e.g., piped water and flushing toilets) across multiple African countries.⁴⁹ The increasing availability of consumer goods side by side with the relative scarcity of basic needs generates simultaneous pressures for both consumption and

survival sex. One reason that HIV has been able to proliferate so rapidly in SSA, despite the absence of a high degree of formal sex work that comprises a major source of risk in other parts of the world,⁵⁰ is the presence of informal transactional relationships, which are much more difficult to identify and intervene in than formal sex work.^{47,50} Similarly, the proliferation of informal secondary households in lieu of formalized polygamy appears to be more risky than polygamous relationships, as women in the absence of a formal marital bond may have more freedom to have additional partners. Recent evidence from DHS suggests that in many countries, it is women who are bringing HIV into the relationship rather than men, as commonly presumed, even in ongoing relationships.⁵¹

The role of fidelity and reducing sexual concurrency, particularly among the wealthy, constitutes a potential mid-level intervention apart from broad-based inequality reduction to contain HIV in SSA. As a result of the ongoing narrative that the poor are the most at risk for HIV in SSA, it is possible that the wealthy underestimate their own risk for contracting HIV in spite of having more sexual partners. Prevention campaigns targeted to the poor may inadvertently reinforce a false sense of security among the wealthy. While male circumcision, in addition to sexual concurrency, has been recently identified as a neglected prevention strategy,⁴⁷ evidence from a number of countries suggests that wealthier men are more likely to be circumcised than poorer men and yet still carry a higher burden of HIV infection.⁷ This finding indicates that the social-contextual drivers of HIV in SSA potentially surpass the biological vulnerability of being uncircumcised. Thus, a broad-based “social” vaccine targeted at partner reduction, especially among the wealthy, may be required above and beyond biologically driven male-circumcision campaigns.

Individualized economic interventions such as microfinance schemes, developed to reduce transactional sex by empowering women, have had mixed results in SSA. While these programs have proven successful across a range of health indicators in countries such as Bangladesh,⁵² microcredit schemes in Zimbabwe have been shown to increase risk for sexual exploitation, as women and girls who do not successfully pay back the loans may feel pressured to engage in transactional sex to recoup the loss.⁵⁰ A promising randomized trial of a microloan program in South Africa found that although women’s risk for intimate-partner violence decreased after the program, their rate of unprotected sex with a non-spousal partner did not change.⁵³ Though these interventions are described as “structural” in that they are aimed at empowering women to have control over their own financial

resources,⁵⁴ they may fail to address the underlying risk environment that fuels sexual economies due to their individualized nature.

CONCLUSIONS

Despite the popular and rhetorical attention that has been given to the role that poverty plays as an underlying cause of HIV in SSA, the cumulative evidence suggests that there is a need for a much more nuanced understanding of the interaction between poverty and HIV, especially in the context of low- and middle-income countries. The social epidemiology of HIV belies simplistic assumptions that negative health outcomes will always disproportionately accrue to the poor.

Researchers and advocates have assumed that because Africa is the poorest continent on earth and has the highest HIV prevalence rates in the world, the poorest countries and individuals in SSA are the most at risk for HIV. This fallacy has also resulted from a conflation of the concepts of relative poverty, experienced in developed countries, and absolute poverty, which persists largely in developing countries. Because HIV predominantly affects the poor and marginalized in developed countries, researchers have assumed that the same dynamic should hold true in SSA. Yet, poverty in the context of developed countries cannot be conceptualized in the same way as poverty experienced in the developing world. Poverty in the developing-world context encompasses individuals who do not have their basic needs met and primarily live at a subsistence level. Conceptualized in this absolute sense, poverty may not in fact be associated with HIV.

Despite these findings, it is important to remember that both poverty reduction and attention to distributional concerns are important means of addressing the social determinants of health in developing countries. Growth that comes at the expense of equity may well contribute to the spread of HIV and other diseases whose incidence is associated with rising relative deprivation,⁵⁵ even in the face of declining absolute deprivation.

REFERENCES

1. Coovadia HM, Hadingham J. HIV/AIDS: global trends, global funds and delivery bottlenecks. *Global Health* 2005;1:13.
2. Stillwaggon E. *AIDS and the ecology of poverty*. New York: Oxford University Press; 2006.
3. Shelton JD, Cassell MM, Adetunji J. Is poverty or wealth at the root of HIV? *Lancet* 2005;366:1057-8.
4. Wojcicki JM. Socioeconomic status as a risk factor for HIV infection in women in East, Central and Southern Africa: a systematic review. *J Biosoc Sci* 2005;37:1-36.
5. Bingenheimer JB. Wealth, wealth indices and HIV risk in East Africa. *Int Fam Plan Perspect* 2007;33:83-4.

6. Lachaud JP. HIV prevalence and poverty in Africa: micro- and macro-econometric evidences applied to Burkina Faso. *J Health Econ* 2007;26:483-504.
7. Mishra V, Assche SB, Greener R, Vaessen M, Hong R, Ghys PD, et al. HIV infection does not disproportionately affect the poorer in sub-Saharan Africa. *AIDS* 2007;21 Suppl 7:S17-28.
8. Forston JG. The gradient in sub-Saharan Africa: socioeconomic status and HIV/AIDS. *Demography* 2008;45:303-22.
9. Msisha WM, Kapiga SH, Earls F, Subramanian SV. Socioeconomic status and HIV seroprevalence in Tanzania: a counterintuitive relationship. *Int J Epidemiol* 2008;37:1297-303.
10. Msisha WM, Kapiga SH, Earls FJ, Subramanian SV. Place matters: multilevel investigation of HIV distribution in Tanzania. *AIDS* 2008;22:741-8.
11. Mishra V, Bignami S, Greener R, Vaessen M, Hong R, Ghys P, et al. A study of the association of HIV infection with wealth in sub-Saharan Africa. *DHS Working Papers*, 2007 No. 31 [cited 2009 Apr 19]. Available from: URL: <http://www.measuredhs.com/pubs/pdf/WP31/WP31.pdf>
12. Piot P, Greener R, Russell S. Squaring the circle: AIDS, poverty, and human development. *PLoS Med* 2007;4:1571-5.
13. Drain PK, Smith JS, Hughes JP, Halperin DT, Holmes KK. Correlates of national HIV seroprevalence: an ecologic analysis of 122 developing countries. *J Acquir Immune Defic Syndr* 2004;35:407-20.
14. Talbot JR. Size matters: the number of prostitutes and the global HIV/AIDS pandemic. *PLoS One* 2007;2:e543.
15. O'Farrell N. Poverty and HIV in sub-Saharan Africa. *Lancet* 2001;357:636-7.
16. Joint United Nations Programme on HIV/AIDS (UNAIDS). Chapter 04: the impact of AIDS on people and societies. In: 2006 report on the global AIDS epidemic. Geneva: UNAIDS; 2006.
17. Fox A. Economic inequality as an underlying cause of HIV in Africa? The HIV-poverty thesis re-examined. Proceedings of the Population Association of America Conference; 2009 Apr 29–May 1; Detroit. Also available from: URL: <http://paa2009.princeton.edu/download.aspx?submissionId=91462> [cited 2009 May 1].
18. Gillespie S, Kadiyala S, Greener R. Is poverty or wealth driving HIV transmission? *AIDS* 2007;21 Suppl 7:S5-16.
19. Baker DP, Collins JM, Leon J. Risk factor or social vaccine? The historical progression of the role of education in HIV and AIDS infection in sub-Saharan Africa. *Prospects: Quarterly Rev Comparative Educ* 2008;38:467-86.
20. Hargreaves JR, Bonell CP, Boler T, Boccia D, Birdthistle I, Fletcher A, et al. Systematic review exploring time trends in the association between educational attainment and risk of HIV infection in sub-Saharan Africa. *AIDS* 2008;22:403-14.
21. Hargreaves JR, Glynn JR. Educational attainment and HIV-1 infection in developing countries: a systematic review. *Trop Med Int Health* 2002;7:489-98.
22. Krieger N, Waterman PD, Chen JT, Soobader MJ, Subramanian SV. Monitoring socioeconomic inequalities in sexually transmitted infections, tuberculosis, and violence: geocoding and choice of area-based socioeconomic measures—the Public Health Disparities Geocoding Project (US). *Public Health Rep* 2003;118:240-60.
23. Poku N. *AIDS in Africa: how the poor are dying*. Cambridge (UK): Polity Press; 2006.
24. Mishra V, Vaessen M, Boerma JT, Arnold F, Barrere B, Cross A, et al. HIV testing in national population-based surveys: experience from the Demographic and Health Surveys. *Bull World Health Organ* 2006;84:537-45.
25. Gilbert L. Urban violence and health—South Africa 1995. *Soc Sci Med* 1996;43:873-86.
26. Gilbert L, Walker L. Treading the path of least resistance: HIV/AIDS and social inequalities—a South African case study. *Soc Sci Med* 2002;54:1093-110.
27. World Health Organization. Women and HIV/AIDS: WHO fact sheet no. 242. June 2000 [cited 2009 May 1]. Available from: URL: <http://nzdl.sadl.uleth.ca/cgi-bin/library?e=d-00000-00-off-0cdl-00-0-10-0-0-direct-10-4-0-11-11-en-50-20-about-00-0-1-00-0-11-1-outfZz-8-00&cl=CL1.245&d=HASH1920747a34bf54c70fd612.2&x=1>
28. Leclerc-Madlala S. Transactional sex and the pursuit of modernity. *Soc Dynamics* 2003;29:1-21.
29. Hunter M. The materiality of everyday sex: thinking beyond “prostitution.” *African Studies* 2002;61:99-120.
30. Luke N. Confronting the “sugar daddy” stereotype: age and economic asymmetries and risky sexual behavior in urban Kenya. *Int Fam Plan Perspect* 2005;31:6-14.
31. Pisani E. *The wisdom of whores: bureaucrats, brothels, and the business of AIDS*. New York: Boydell & Brewer; 2008.
32. Parikh SA. The political economy of marriage and HIV: the ABC approach, “safe” infidelity, and managing moral risk in Uganda. *Am J Public Health* 2007;97:1198-208.
33. Smith DJ. Modern marriage, men's extramarital sex, and HIV risk in southeastern Nigeria. *Am J Public Health* 2007;97:997-1005.
34. Lurie M. Migration and AIDS in southern Africa: a review. *South African J Sci* 2000;96:343-7.
35. Lurie MN, Williams BG, Zuma K, Mkaya-Mwamburi D, Garnett GP, Sweat MD, et al. Who infects whom? HIV-1 concordance and discordance among migrant and non-migrant couples in South Africa. *AIDS* 2003;17:2245-52.
36. Bourguignon F. Crime as a social cost of poverty and inequality: a review focusing on developing countries. In: Yusuf S, Evenett S, Wu W, editors. *Facets of globalization*. Washington: World Bank; 2001.
37. Kennedy B, Kawachi I, Prothow-Stith D, Lochner K, Gupta V. Social capital, income inequality, and firearm violent crime. *Soc Sci Med* 1998;47:7-17.
38. Marmot MG. *Status syndrome: how social standing directly affects your health and life expectancy*. London: Bloomsbury Publishing; 2004.
39. Marmot MG, Wilkinson RG, editors. *Social determinants of health*. 2nd ed. New York: Oxford University Press; 2006.
40. Harling G, Ehrlich R, Myer L. The social epidemiology of tuberculosis in South Africa: a multilevel analysis. *Soc Sci Med* 2008;66:492-505.
41. Holtgrave DR, Crosby RA. Social capital, poverty, and income inequality as predictors of gonorrhoea, syphilis, chlamydia and AIDS case rates in the United States. *Sex Transm Infect* 2003;79:62-4.
42. Daniels N, Kennedy B, Kawachi I. Why justice is good for our health: social determinants of health inequalities. *Daedalus* 1999;128:215-51.
43. Wilkinson RG. Income distribution and life expectancy. *BMJ* 1992;304:165-8.
44. Commission on Social Determinants of Health. *Closing the gap in a generation: health equity through action on the social determinants of health*. Geneva: World Health Organization; 2008. Also available from: URL: http://www.who.int/social_determinants/thecommission/finalreport/en/index.html [cited 2009 May 1].
45. Fenton L. Preventing HIV/AIDS through poverty reduction: the only sustainable solution? *Lancet* 2004;364:1186-7.
46. Bengali S. Rare progress made in fight against HIV. *Miami Herald* 2007 Aug 12.
47. Potts M, Halperin DT, Kirby D, Swidler A, Marseille E, Klausner JD, et al. Public health. Reassessing HIV prevention. *Science* 2008;320:749-50.
48. Barnett T, Whiteside A. *AIDS in the twenty-first century: disease and globalization*. New York: Palgrave Macmillan; 2002.
49. Booyens F, van der Berg S, Burger R, von Maltitz M, du Rand G. Using an asset index to assess trends in poverty in seven sub-Saharan African countries. Paper presented at the International Poverty Centre International Conference on the Many Dimensions of Poverty; 2005 Aug 29–31; Brasilia, Brazil.
50. Epstein H. *The invisible cure: Africa, the West, and the fight against AIDS*. New York: Farrar, Straus and Giroux; 2007.
51. Mishra V. Why do so many HIV discordant couples in sub-Saharan Africa have female partners infected, not male partners? Paper presented at the HIV/AIDS Implementers' Meeting, MEASURE DHS Project, Macro International Inc.; 2007 Jun 18; Kigali, Rwanda.
52. Schuler SR, Hashemi SM. Credit programs, women's empowerment, and contraceptive use in rural Bangladesh. *Stud Fam Plann* 1994;25:65-76.
53. Pronyk PM, Hargreaves JR, Kim JC, Morison LA, Phetla G, Watts C, et al. Effect of a structural intervention for the prevention of intimate-partner violence and HIV in rural South Africa: a cluster randomised trial. *Lancet* 2006;368:1973-83.
54. Pronyk PM, Kim JC, Hargreaves JR, Makhubele MB, Morison LA, Watts C, et al. Microfinance and HIV prevention—emerging lessons from rural South Africa. *Small Enterprise Development* 2005;16:26-38.