INTERVENING UPSTREAM

A GOOD INVESTMENT FOR HIV PREVENTION

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STRIVE

STRIVE is a research consortium based at the London School of Hygiene and Tropical Medicine, with partners in India, Tanzania, South Africa and elsewhere, focusing on the structural forces - in particular stigma, gender-based violence, limited livelihood options and drinking norms - that combine in different ways to create vulnerability to HIV transmission and to undermine prevention. STRIVE is funded by UKaid from the Department for International Development. However, the views expressed do not necessarily reflect the department's official policies.

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INTRODUCTION

Today's HIV prevention, care, and treatment strategies are based largely on the science and insights of biomedicine and epidemiology, two disciplines that have traditionally emphasised biological interventions and individual behaviour change over measures that address social or structural sources of risk. Most research has focused on the biological co-factors that affect transmission dynamics, such as the presence of concomitant sexually transmitted infections (STIs), the level of viral load in the bloodstream, or the use of condoms or other prevention methods that reduce the likelihood of transmission. But what about non-biological factors that influence behaviour and the likelihood of transmission, such as alcohol use immediately prior to sex, internalised stigma, economic and consumer pressures that encourage transactional sex, or exposure to violence and/or the impact of rigid gender norms? These factors also affect HIV transmission, but they operate earlier in the causal chain through more varied and complex pathways.

Consistent with its roots in biomedicine, HIV prevention science has traditionally emphasised expanding access to biomedical prevention tools, such as STI treatment, medical male circumcision (MMC), treatment as prevention TasP), and condoms. Such biomedical interventions are important, but need to be complemented by responses that address the structural drivers of HIV vulnerability. Indeed, if public health and HIV prevention were more grounded in the social sciences—sociology, economics, cultural studies, and social psychology—it is likely that today's HIV programmes would look vastly different [1]. They would place greater emphasis on context and on the social, economic, and political forces that condition people's behaviour. They would recognise the "messiness" of real life, and acknowledge that there is seldom a single pathway that universally predicts the association between distal factors—such as migration for work—and HIV acquisition. Rather, diverse pathways may operate for different individuals in different settings.

Increasingly, scientists and policy makers have begun calling for increased attention to the structural forces that create environments of risk [2, 3]. The touchstone of future programming, they argue, must be "combination prevention," an approach that combines biomedical, behavioural, and structural interventions [4]. Some authors particularly align "combination prevention" with efforts to apply multiple types of interventions in one setting to affect population-level incidence [5], whereas others highlight the synergistic impact of combined strategies on both population levels of HIV and the risk practices of particular individuals [1, 3, 6].

To help advance a new "combination approach" to prevention, AIDS Support and Technical Assistance Resources (AIDSTAR-One) and the STRIVE research consortium have commissioned a set of papers to explore structural sources of risk and resiliency to HIV. AIDSTAR-One is a knowledge exchange programme funded by the U.S. Agency for International Development (USAID), and STRIVE is a research consortium funded by the UK Department of International Development (DFID). This short paper examines some of the evidence linking structural factors to HIV risk and explores the advantages of taking a "structurally informed" approach to HIV planning and implementation.

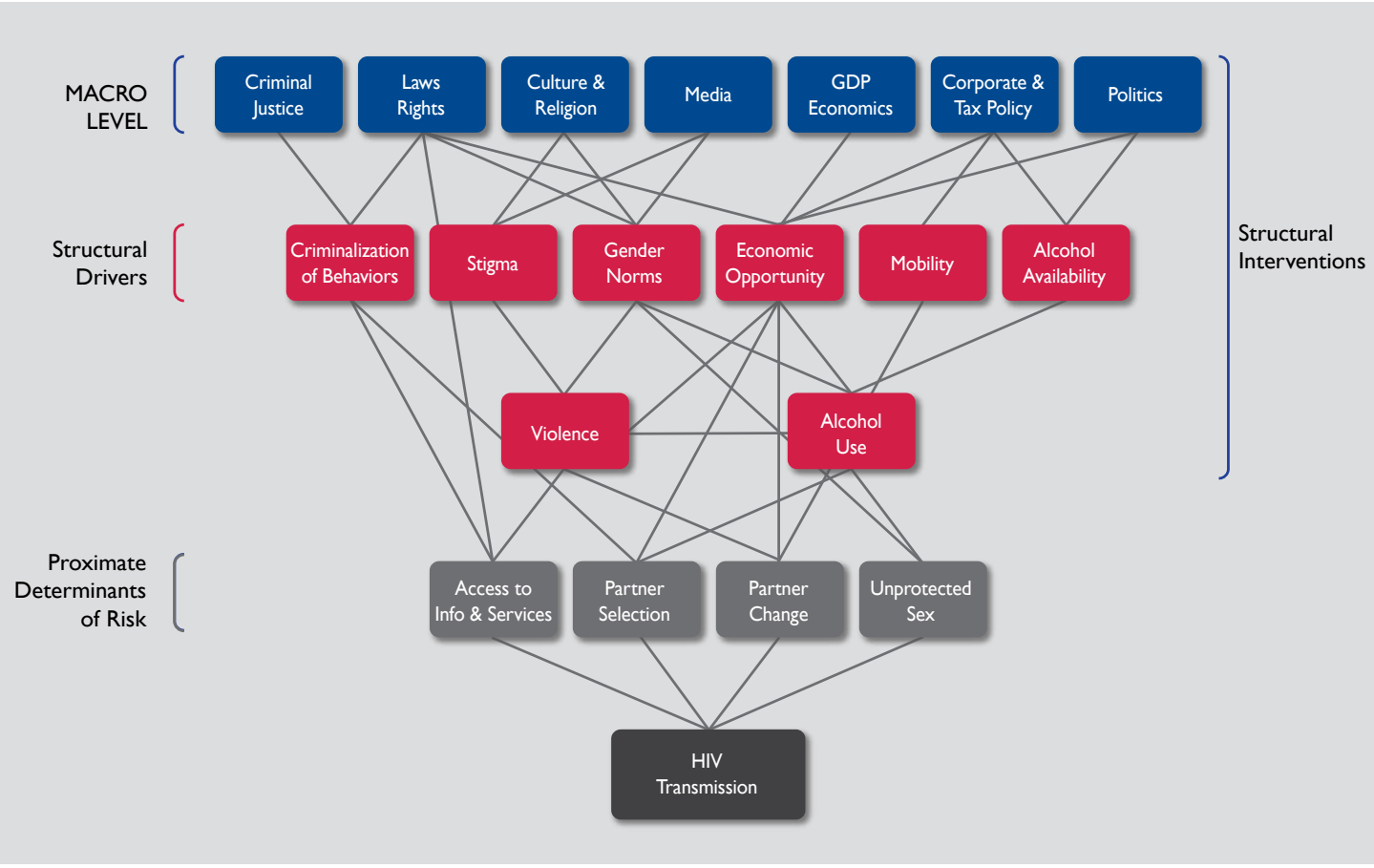
INTRODUCTION TO STRIVE

What is it about the social, economic, and political environment that affects the likelihood that HIV transmission will take place? Likewise, how do specific distal factors operate to shape individual HIV risk practices?

STRIVE is a five-year, DFID-funded research and action consortium dedicated to tackling these questions and expanding the evidence base on how structural forces affect HIV vulnerability. The STRIVE research agenda is based on a conceptual framework that explicitly recognises that within any setting there is a complex range of factors that affect the HIV risk of individuals and couples, as well as HIV incidence (Figure 1). These factors interact at multiple levels to affect downstream behaviours such as use of HIV services, choice of sexual partner, number of partners, and use of condoms.

Macro-level factors, such as cultural and religious institutions, policies, and laws, shape society's views on the appropriate roles for men and women. They dictate attitudes towards practices such as prostitution and homosexuality. These in turn foment social prejudice and influence the extent to which certain behaviours (such as

FIGURE 1.
CONCEPTUALISING THE INTERACTION BETWEEN MACRO-LEVEL STRUCTURAL DRIVERS AND HIV RISK



homosexuality or commercial sex) are criminalised, and they restrict access these groups have to legal protection. Traditional cultural norms, religious beliefs, and the media all mould social attitudes toward issues such as sex, condoms, rape, sexuality, and HIV infection, which in turn influence gender roles and notions of appropriate sexual behaviour. Economic and political forces—including gross domestic product (GDP), educational and development policies, corporate and tax policy—likewise influence more proximate structural factors, such as access to jobs and economic opportunities, levels of mobility, and the availability and pricing of alcohol.

The research conducted by the STRIVE consortium largely focuses on the contextual factors (such as those shown in the lighter blue and green boxes in Figure 1) that shape patterns of HIV risk behaviour and transmission. Structural interventions are taken to be those that include an explicit programmatic focus on one or more of these factors or that attempt to modify one or more of the macro-level factors through political advocacy or other means.

Parkhurst (in this series) offers an additional useful distinction between structural "drivers" versus "factors." He argues that the term "driver" should be reserved for cases where a specific factor has been shown empirically to influence risk behaviour in a particular setting. By contrast, "factor" is a more generic term that can be used to refer to any element that shapes HIV risk and vulnerability, even if it is not operative in the case at hand.

Most structural factors have multiple pathways through which they can act to influence HIV transmission. For example, in one setting, poverty may drive HIV transmission by encouraging young girls to engage in transactional sex in order to secure the fees and uniforms necessary to attend school. Elsewhere, financial hardship may work by forcing men to migrate for work, thus separating families and encouraging outside relationships. The distinction between driver and factor encourages programming to assess what factors are important in a particular setting and to focus change processes on these.

Addressing structural factors is the cornerstone of recent calls for building more HIV-resilient communities. Building resiliency involves efforts to buffer individuals and groups from the socioeconomic and political forces that create vulnerability [7]. This may entail action at a local level, such as building community cohesiveness and collective empowerment among marginalised groups [8], or it may involve more macro-level, political strategies to reform laws, such as those that criminalise homosexuality, sex work, or possession of injecting equipment.

One of the challenges of implementing structural approaches to HIV is that the skill set of those tasked with designing and executing HIV programmes is generally technical and their sphere of influence local or regional. Yet many of the macro-level changes that could reduce vulnerability at a population level require political processes that are better pursued by advocacy and policy groups than by project implementers. Catalyzing structural change will likely require collaboration with change agents—like social movements and nongovernmental organisations (NGOs)—that can advocate for law reform and hold governments accountable, as well as transformation in the design of HIV-related prevention programmes.

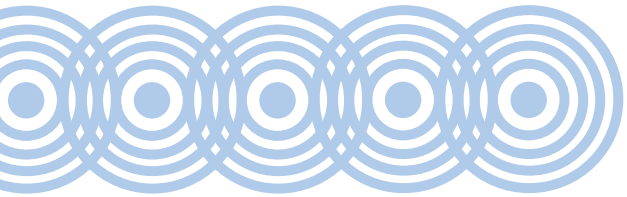
STRUCTURAL FACTORS AND HIV: WHAT DO WE PRESENTLY KNOW?

There is a growing body of quantitative and qualitative evidence that shows how various social and economic forces interact to heighten vulnerability to HIV infection, and undermine the effectiveness of proven intervention options. These are supplemented by a rich cache of qualitative accounts of how various forces interact to create "high-risk environments" in the lives of vulnerable individuals, such as mine workers in South Africa [9] or sex workers in Brazil [10], among others.

Ecological studies find correlations between the population-level prevalence of HIV or risk behaviours and macro-level factors, including poverty, wealth, gender inequality, social marginalisation, income inequality, and national income [11–15]. There is also evidence that the relationship among some of these factors, especially poverty and education, may be context-specific and change over time [16–18].

Ecological studies with a longitudinal perspective, for example, suggest that the relationships between socioeconomic position (SEP) and HIV is a dynamic process whereby wealth initially increases risk for HIV acquisition and later becomes protective [13, 19]. Hargreaves posits that rates of HIV acquisition decline more rapidly among wealthier individuals because they are better positioned to take advantage of new knowledge and to access available services. This explanation, known as the "inverse equity hypothesis," suggests that unless special effort is made to reach the poorest and most marginalised individuals, HIV programming may, ironically, exacerbate health inequalities to the detriment of the poor [20].

Another study, using data from 170 regions from 16 African Demographic and Health Surveys (DHS), demonstrates that individuals living in regions with higher socioeconomic inequality are at greater risk of HIV, even after adjusting for individual wealth. Using multilevel analysis, the study also shows that the relationship between HIV infection and individual wealth varies between wealthier and poorer regions. In wealthier regions or countries, individuals who are poorer are at higher risk of acquiring HIV, whereas in poorer regions or countries, the opposite is true [21].



There are also substantial data (mainly qualitative) confirming the importance and relevance of stigma and discrimination and their negative consequences on all aspects of the HIV response [22, 23]. Vulnerable groups, such as women and girls, sex workers, men who have sex with men, people living with HIV/AIDS (PLHIV), and people who inject drugs (PWID), experience the harshest forms of stigma, including ostracism by family members, violence by intimates and others, and the refusal to be served by health and other services [24]. Legal frameworks that justify discrimination, such as laws that criminalise sexual behaviour or HIV transmission, remain common, with a recent estimate finding 60 countries with specific laws that criminalise HIV transmission or exposure, 116 countries and territories have punitive laws against sex work, and 78 low- and middle-income countries with laws that prohibit sexual intercourse between people of the same sex [25].

Gender inequality and violence against women also pose major challenges to HIV prevention, especially in sub-Saharan Africa, where 60 percent of HIV infections among 15–49-year-olds are among women, and 75 percent of HIV infections among young people are among females [24]. Domestic violence is emerging as an important risk factor for HIV acquisition. A longitudinal study from the Eastern Cape of South Africa, for example, found that both unequal relationship power and partner violence were independently associated with an increased risk of incident HIV, highlighting the importance not only of violence, but also of gender inequality in relationships as a structural determinant of HIV vulnerability [26].

Evidence suggests that vulnerability is heightened in situations where men or women need to migrate to find work—either moving within a country or abroad. Labour migration splits families and erodes social capital and community support. Not surprisingly, it has been linked to risk of HIV infection for both migrants and their partners [27–31].

Research also shows that men who are unemployed or poorly paid, and who have poor living conditions, lack hope for the future, and engage in behaviours that yield short-term rewards, such as drinking and casual sex [9, 32, 33]. A systematic review of research on labour migration found that the policy determinants most often associated with HIV risk were difficult working and housing conditions, prolonged or frequent absences, and financial status. Also predictive across studies were norms related to sexual fidelity and masculinity, substance abuse, the absence of community and social support, and family separation [34]. Among male migrants in Mumbai, for example, the odds of reporting extramarital sex within the last 12 months were 2.5 times higher for mobile men whose wives were left behind, compared to non-mobile men who had a resident spouse [35].

Women—whose employment opportunities are even more constrained then men's—often depend on sexual partners for resources, with either an implicit or explicit social contract that sex will be provided in return. Women may also use sex as their primary livelihood strategy by engaging in sex work, which is often stigmatised, dangerous, and insecure. A longitudinal cohort study enrolling 1,077 young women in South Africa, for example, found that those who engaged in transactional sex had double the odds of incident HIV, independent of their number of sex partners or their partners' age [36, 37]. Likewise, a population-based study of adults in Botswana and Swaziland found that women who reported not having enough food to eat over the past year had 80 percent higher odds of exchanging sex for either money or resources, 70 percent higher odds of engaging in unprotected sex and reporting lack of sexual control, and 50 percent higher odds of intergenerational sex [38]. Food insecurity had only a minimal effect on sexual risk taking among men.

Although not often highlighted as a structural factor, there is strong evidence that widespread alcohol availability and norms that encourage binge drinking are closely associated with HIV risk. In a systematic review and meta-analysis of 20 African studies, alcohol drinkers had 57–70 percent greater risk of being HIV infected than non-drinkers [39]. Similarly, alcohol consumption has consistently been linked to risky sexual behaviours, including multiple sex partners and lack of condom use [40]. Drinking venues themselves are associated with HIV risk. For example, in Cape Town, South Africa, men and women who met sex partners at informal bars (shebeens) engaged in heavier drinking, had more sexual partners, and had higher rates of unprotected sex compared to people who did not meet their partners at shebeens [41]. Problematic alcohol use is also commonly found to be associated with the perpetration and experience of sexual assault and rape [42].

WHAT ARE THE RESEARCH GAPS?

PATHWAYS

While evidence supporting hypothesised linkages is emerging, there are still numerous research gaps in the literature. Evidence is weak, for example, on the pathways through which factors affect HIV vulnerability. For example, to what extent is transactional sex driven by poverty versus consumer aspirations and/or dreams of love and romance? Does criminalising homosexuality undermine safer sex primarily through pushing sexual behaviour underground, by hampering health care–seeking, or through promoting internalised stigma and undermining self-efficacy? Because structural factors are further back in the causal chain, there are often a variety of different pathways that could reasonably account for an observed association. Part of the unfinished research agenda focuses

on teasing out these various causal chains: How does gender inequality translate into increased HIV transmission for different age groups? Is it similar or vastly different in different settings, depending on cultural and historical context and on the stage and type of epidemic? More mixed-methods studies that integrate qualitative data collection with longitudinal studies will help investigators elucidate the mechanisms of influence.

INTERACTION AMONG FACTORS

A second area in need of elaboration is how various structural factors interact both among themselves and with individual risk behaviours. As described further below, there is increasing evidence that some structural factors tend to cluster together, creating common patterns of vulnerability across settings. As mentioned previously, many women who sell sex in Southern Africa do so from informal shebeens. Both sex workers and their potential clients congregate in these settings, increasing the likelihood that drinking will accompany sex and reducing the likelihood of condom use. Local drinking norms often encourage binge drinking, which in turn increases the chances of alcohol-induced violence and coerced sex. Such patterns are especially common in settings where men migrate for work and women have few alternate forms of income due to gender inequalities in access to secondary education and the formal wage economy. This suggests that local alcohol venues may be a node of influence worthy of increased attention in prevention planning.

EVIDENCE OF IMPACT

Although there is growing recognition of the social determinants of HIV, there is less evidence about how best to intervene. While a number of novel programmes are under way, few have been rigorously evaluated, especially against HIV as a biological outcome. A recent review of structural interventions that combine gender equality and livelihood security, for example, identified only nine in East and Southern Africa that met methodological criteria for inclusion [37].

Moreover, there are ongoing debates about how best to assess the impact of interventions aimed at catalyzing complex social change processes around norms, entitlements, power relations, and sexual behaviour [43]. Public health practitioners often use a hierarchy of evidence that mirrors that in biomedicine, where randomised controlled trials (RCTs) with a clear counterfactual are perceived as the preferred methodology for yielding a "true" and unbiased assessment of impact. However, there is danger that this high standard of evidence leads to a selective bias towards more "downstream," individually focused interventions that are more amenable to rigorous evaluation. Important and potentially far-reaching structural interventions may go unconsidered simply because they are inherently more difficult to evaluate.

The demand to show an impact on HIV directly, rather than also valuing how change processes may impact key risk factors and the proximal determinants of HIV transmission, also limits the breadth and forms of evidence that end up being considered when weighing policy options. Intervention trials that measure HIV outcomes commonly cost millions to conduct, and so will generally be used only to evaluate a limited range of interventions. Such trials are more suited to demonstrating proof of concept, rather than assessing the generalisability of any achieved effect.

Within the field of public health there is a growing debate about the nature of "evidence" and how best to capture change in complex systems [44]. Mixed methods are undoubtedly the most effective strategy for establishing whether and how structural approaches catalyze change in key outcomes. Even the staunchest proponents of RCTs have come to recognise the value of qualitative research and ongoing, "process evaluation" in helping to interpret trial results and elucidate pathways of influence [45, 46].

Despite these challenges, there are programmes that demonstrate that intervening "upstream" can positively influence the proximal determinants of HIV risk and onward transmission. (See Pronyk and Lutz in this series.) A case in point is the Sankalp project implemented by the Karnataka Health Promotion Trust to reduce HIV-related vulnerability among female sex workers as part of India's Avahan project, funded by the Bill & Melinda Gates Foundation. The programme, which originally emphasised condom promotion and STI treatment, went on to implement a multifaceted strategy that addressed a range of factors that exacerbate sex-worker risk, including violence and harassment by the police, local gangs, and clients; social isolation; lack of bargaining power to access government entitlements; and pervasive stigma that was reproduced and intensified through the media [47]. This combined approach reduced reported violence and harassment, increased condom use, and reduced both STI and HIV prevalence among sex workers [48, 49].

Given the limited investment in structural interventions, demonstration projects are a central research priority. It is important that evaluation studies not only assess both whether an intervention "works" to reduce HIV acquisition and transmission, but also why, under what circumstances, for whom, and at what financial cost.

THE ADVANTAGES OF STRUCTURAL THINKING

By its very nature, structural thinking shifts the focus of attention from the immediate, biological process of HIV transmission to the underlying forces that condition that risk. Our analysis does not question the need for biomedical interventions, but rather suggests that this approach needs to be complemented by responses that address the structural drivers of HIV vulnerability. There is a risk, especially in the current economic climate, that upstream interventions will be seen as a luxury rather than a necessity for HIV programmes. Although, intuitively, it may seem that it makes most sense to focus the majority of interventions on the immediate determinants of transmission (such as unsafe sex), it is not necessarily the case that downstream interventions will be the best use of resources.

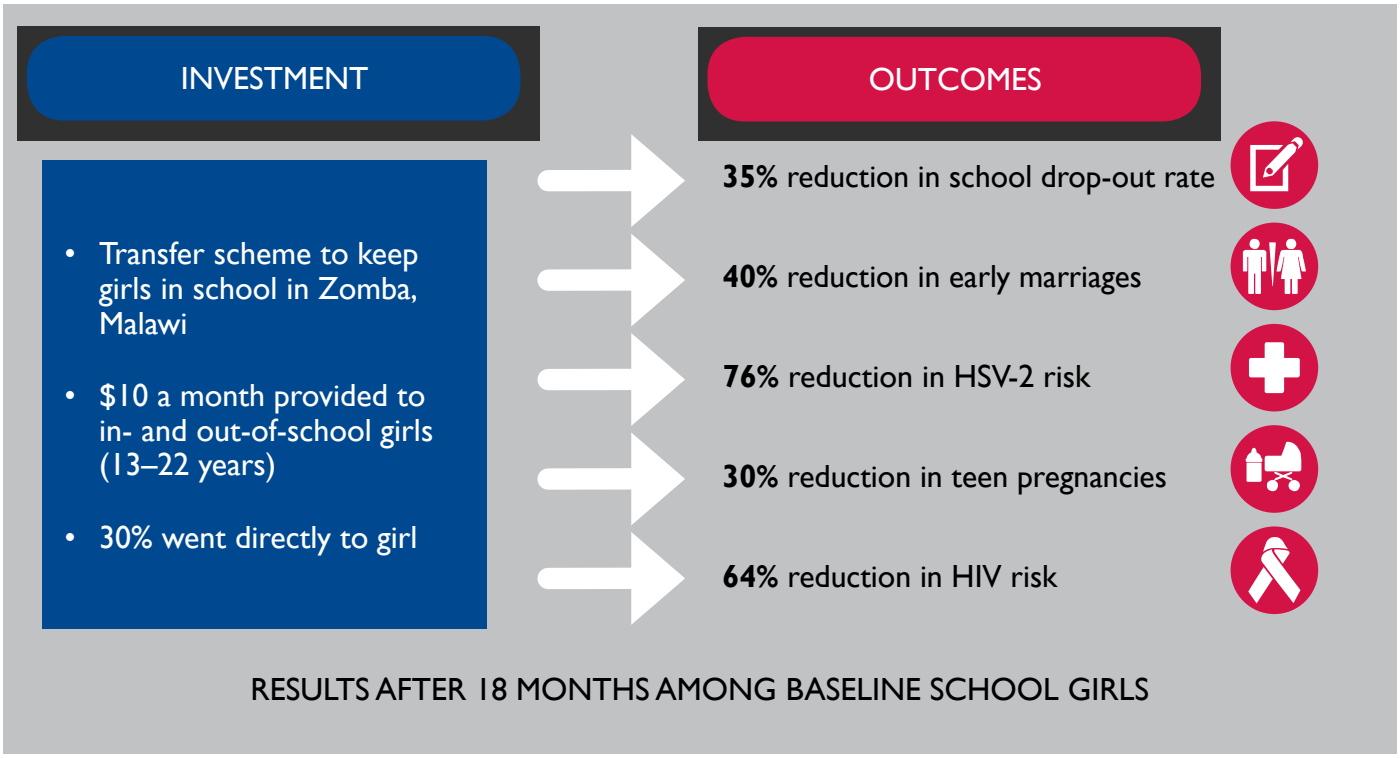
In particular, there are two important issues related to the potential efficiencies that are often overlooked when considering the potential benefits of intervening upstream in the causal pathway to HIV transmission.

THE VALUE OF INFLUENCING CLUSTERED RISK FACTORS

Firstly, emerging evidence suggests that structural-level risk factors frequently cluster together, making them an especially attractive target for intervention. A compelling example is the tendency for high risk sexual behaviour, harmful alcohol consumption, and violent and controlling behaviour toward women to cluster together. Research from South Africa, India and North America has shown that men who are violent toward their partners are also more likely to have multiple sexual partners, have unprotected sex with sex workers, drink large quantities of alcohol, have concurrent STDs, and practice anal sex [26, 50–52]. Other studies have found that men who force women into sex, are more likely to frequent sex workers, have large numbers of sexual partners, engage in transactional sex, and beat their wives or girlfriends [53, 54].

This suggests that women's risk of contracting HIV manifests through multiple pathways. They are both less able to negotiate condom use (due to forced sex and fear of physical abuse) and more exposed to the possibility of

FIGURE 2.
TRANSACTIONAL SEX AND HIV: CONDITIONAL CASH TRANSFER TRIAL IN ZOMBA, MALAWI



infection through the high risk sexual behaviour of their husbands. It is yet unclear exactly why these risk factors cluster together. One theory is that they all represent manifestations of a dominant form of masculinity that encourages men to prove their manhood through exerting control over women, having multiple sexual partners, and using alcohol [53]. It is also possible that the clustering partially reflects common genetic and/or personality traits that reflect low impulse control and/or a proclivity for sensation seeking and taking risks [55]. Quite possibly, the observed clustering is a function of both factors working together.

Since developmental and genetic factors are not open to manipulation, the above analysis suggests that working to transform social norms around masculinity (and parallel norms around female obedience and passivity) may be a productive approach to reducing vulnerability to HIV. To the extent that masculinity norms encourage multiple partners, excessive drinking, and violence against women, programmes aimed at transforming such norms could potentially reduce HIV incidence both directly by changing sexual behaviour as well as indirectly through its their impact on alcohol use and violence. By seeking to affect the "causes of causes," strategies that intervene further up the causal chain both affect downstream risk factors that magnify HIV risk and yield the direct health and social benefits that come from reducing harmful drinking and violence against women. Indeed, strategies to affect more distal factors need not have an explicit focus on HIV to have a potential impact on risk behaviours and HIV incidence.

THE POTENTIAL TO INFLUENCE MULTIPLE OUTCOMES

A second major efficiency that accompanies structural thinking is the ability to affect multiple downstream outcomes through a single intervention. An example of such potential synergies is the Zomba trial in Malawi, which was designed to evaluate the impact of cash transfers as a mechanism to reduce HIV acquisition among adolescent girls in rural Malawi. The trial compared the impact of providing different amounts of cash to girls and their families, with one group being required to attend school to receive the payments and a second group receiving payments regardless of school attendance. Analysis of the trial's impact at 18 months suggested that it reduced (see Figure 2) HIV prevalence among both the group of girls required to attend school in order to receive the transfer and those in the non-conditioned study arm. The authors argue that the HIV impact appeared to result from a reduction in girls' number of sexual partners and sex with older men, thus reducing young women's risk of acquiring HIV [54].

Importantly, among girls in school at the beginning of the intervention (baseline schoolgirls), the impact of cash transfers appeared to be the same whether they were required to stay in school or not to receive the payments, suggesting that schooling may not have been the primary mechanism through which the interventions impact was achieved. Rather, qualitative research suggested that the direct payments to girls gave them a means to acquire necessities (such as school uniforms) and/or desired consumer items (such as cell phone minutes) without trading sex in exchange for gifts from male partners.

Importantly, this trial showed that the conditional arm not only impacted HIV risk, but also had a broader range of impacts, including reducing school dropouts, early marriage, herpes simplex virus–2 (HSV-2) risk, and teen pregnancy. This trial illustrates the degree to which upstream interventions may have multiple development benefits, in contrast to many downstream intervention options.

Similarly, it is likely that interventions that address other upstream drivers of HIV vulnerability, such as problematic alcohol use or poverty, will also have multiple health and development benefits, spanning, for example, child health, mental health, and crime.

STRUCTURAL INTERVENTIONS CREATE OPPORTUNITIES FOR CO-FINANCING

A more explicit recognition and discussion of the multiple benefits associated with structural interventions offer an important opportunity to encourage cost-sharing across different sectors. Especially as the global economic crisis has reduced available funding for HIV programmes, there is ever-increasing need to find creative means to achieve more with less and to share the costs of complex programming across ministries and agencies.

One of the factors that has worked against investment in structural interventions has been how health economists currently evaluate the comparative cost-effectiveness of different interventions. Traditionally in the fields of health and development, potential investments within any one sector or issue area, such as HIV, are evaluated against alternative uses of money within that same sector—for example, comparing the benefits of condom promotion efforts versus prevention of mother-to-child transmission. This allows measures of the cost per HIV infection averted for each intervention to be compared, with economic theory suggesting that resources be first used to fund the most cost-effective intervention.

Likewise, when assessing the potential value for money of a structural intervention, there is the risk that the cost-effectiveness analysis considers the costs of the intervention solely in terms of its HIV benefit alone. For example,

cost-effectiveness analyses of the Zomba trial produced estimates of USD$5000—$12, 500 per HIV infection averted (or USD$284—711 per disability-adjusted life-year [DALY] averted), making it more expensive than interventions such as male circumcision [54]. However, the proper comparison is not between the Zomba intervention and male circumcision, for it is not reasonable to expect an HIV programme to fully cover the costs of a transfer programme to keep girls in school. Rather, given the multiple benefits associated with this investment, the pertinent question becomes: what level of co-investment by AIDS programs is merited, using national-level thresholds on cost-effectiveness?

For example, if the Malawi HIV programme invested USD$310 per DALY averted, which is the equivalent to the country's GDP per capita and within the World Health Organisation's (WHO's) threshold for considering an HIV intervention cost-effective, this would finance at least 44 percent of the intervention's scale-up. Other sectors, such as education, could then potentially finance the rest [56].

This approach to co-financing has the potential to mobilise additional resources to support investment in the "critical enablers" and "development" identified within the Joint United Nations Programme on HIV/AIDS (UNAIDS) strategic investment framework [57]. It also provides an opportunity to support discussions about co-financing approaches that can be used to achieve several of the Millennium Development Goal (MDG) targets, potentially spanning a range of health and development outcomes.

CONCLUSION

Attention to structural forces that either heighten HIV vulnerability or create AIDS resiliency is an important but under-researched and under-programmed area of HIV prevention. There is long-standing evidence that demonstrates that a variety of social forces have both direct and indirect effects on HIV transmission, and undermine the effectiveness of proven biomedical prevention programmes. Intervening "upstream" yields multiple benefits: it allows programmes to potentially affect multiple risk factors at once (especially when they cluster), and it offers promise to influence a range of health and development outcomes through a single intervention. Far from being a luxury in an age of fiscal austerity, structural approaches to HIV prevention are an efficient and effective strategy we cannot afford to ignore.

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