HIV Prevention 4

Structural approaches to HIV prevention

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This is the fourth in a Series of six papers about HIV prevention

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Recognition that social, economic, political, and environmental factors directly affect HIV risk and vulnerability has stimulated interest in structural approaches to HIV prevention. Progress in the use of structural approaches has been limited for several reasons: absence of a clear definition; lack of operational guidance; and limited data on the effectiveness of structural approaches to the reduction of HIV incidence. In this paper we build on evidence and experience to address these gaps. We begin by defining structural factors and approaches. We describe the available evidence on their effectiveness and discuss methodological challenges to the assessment of these often complex efforts to reduce HIV risk and vulnerability. We identify core principles for implementing this kind of work. We also provide recommendations for ensuring the integration of structural approaches as part of combined prevention strategies.

Introduction

A fundamental goal of HIV prevention is to change the behaviour that puts individuals at risk of infection. For the past two and a half decades, HIV prevention has been dominated by individual-level behavioural interventions that seek to influence knowledge, attitudes, and behaviours, such as promotion of condom use, or sexual-health education, and education of injecting drug users about the dangers of sharing equipment.

Coates and colleagues[1] show in their review of individual behaviour change strategies in this Series that, although some individually oriented interventions have shown results in reducing risk behaviour their success is substantially improved when HIV prevention addresses the broader structural factors that shape or constrain individual behaviour, such as poverty and wealth, gender, age, policy, and power.

Causal pathways link so-called structural factors—social, economic, political, and environmental factors—and risk of HIV. Efforts to address these underlying factors are commonly referred to as structural approaches and seek to change the root causes or structures that affect individual risk and vulnerability to HIV. However, as Merson and co-workers[2] point out in this Series, structural approaches are just part of an overall HIV prevention strategy and must be complemented by other prevention options and HIV treatment to achieve maximum reductions in HIV risk and vulnerability.

Progress in incorporating structural approaches into HIV prevention has been limited because of a lack of conceptual and technical consensus on definition and implementation, and because of methodological challenges in their assessment. Because many structural approaches address deeply entrenched social, economic, and political factors—such as gender or income inequality and social marginalisation—that are difficult to change, they are commonly viewed as long-term initiatives that belong within the purview of broader economic and social development as measured through development achievements, such as the UN Millennium Development Goals (MDGs),[3] rather than within the scope of HIV prevention.

We review existing theoretical frameworks and use evidence and examples to define structural factors and

Key messages

- HIV prevention efforts cannot succeed in the long term without addressing the underlying drivers of HIV risk and vulnerability in different settings. HIV prevention programmes therefore need to incorporate structural approaches
- Structural factors include the physical, social, cultural, organisational, community, economic, legal, or policy features of the environment that affect HIV infection. These factors operate at different societal levels and different distances to influence individual risk and to shape social vulnerability to infection
- Structural approaches to HIV prevention seek to change social, economic, political, or environmental factors determining HIV risk and vulnerability. They should be implemented in a contextually sensitive way, in recognition of both the need for situational relevance and the interaction between different levels of influence
- Like all features of HIV prevention, structural approaches can be challenging to assess. They are not always amenable to assessment with comparative experimental designs because of their situational specificity and the need to address multiple interacting elements. Alternative methods for rigorous assessment do exist, but further developments are needed

Search strategy and selection criteria

Information for this paper was obtained from various sources, which included initial searches of databases including Medline and PubMed, Embase, Psychological Abstracts, and Social Sciences Citation Index. The emerging nature of the subject does not lend itself to the systematic literature review methods. Most cited literature does not yet appear on searches using key words such as "structural approach" or "structural intervention", as these terms are not mainstream. Instead, work with key structural elements were identified from the authors' own experience, through consultation with others involved in such work, and by manually searching reference lists of well-respected publications on the topic.

structural approaches. We discuss the limited evidence available on the effectiveness of such approaches and the methodological challenges to the assessment of complex, multilayered social, economic, and political efforts to reduce HIV risk and vulnerability. Crucially, we build on insights gained through experience implementing these approaches in different settings to identify some core principles and guidelines, making a structural approach to HIV prevention more feasible. We conclude with recommendations on directions for research and action to integrate a structural approach into combination prevention.

What are structural factors?

Several attempts have been made to define, identify, and categorise structural factors in HIV epidemics. In 2000, the journal *AIDS* dedicated an entire issue to structural factors, defined as physical, social, cultural, organisational, community, economic, legal, or policy aspects of the environment that impede or facilitate efforts to avoid HIV infection.[4] Because of the wide range of factors that can be defined as structural, there have been several attempts to classify them. These frameworks can be used to analyse the effect of structural factors on HIV risk (the probability that someone will contract HIV) and vulnerability (the societal context that affects an individual's ability to control health outcomes).[5]

Barnett and Whiteside[6] describe a model that incorporates structural factors on the basis of a continuum of distance from risk. More distal factors determine risk through a longer, and thus usually more variable, series of causes and effects than proximal factors. Macroenvironmental factors, such as national economic context, culture, or governance, are the most distal. Microenvironmental factors, such as migration and urbanisation characterise the local context, are less distal and their influence on HIV risk is more direct.

Sweat and Denison[7] offer an alternative framework based on the level at which structures operate, in which superstructural factors (eg, economic development and national cultural attitudes) affect nations, structural factors (including laws and policies) affect a segment of the population, and environmental factors (eg, living conditions or opportunities available) affect the conditions and resources of individuals, and individual factors affect how environmental factors are experienced (figure 1).

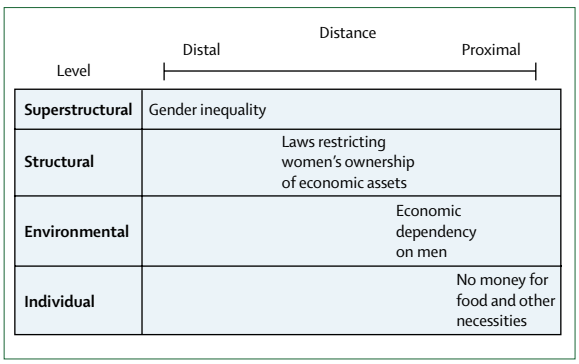

Figure 1: **Use of two frameworks to analyse how a structural factor (gender inequality) might lead women to risk behaviour (eg, unsafe transactional sex)**

Evidence linking structural factors and HIV

For many people, the simple fact that 90% of the world's HIV infections occur in developing countries is evidence that social, economic, and political structures drive risk behaviours and shape vulnerability. However, there are many types of evidence showing the importance of structural factors in HIV epidemics.

Some studies show an association between structural factors and HIV risk without establishing direct causality. These include studies of the macrolevel correlates of infection, such as income per head, gender inequality, and social marginalisation; cross-sectional studies examining the relation between HIV prevalence and factors such as migration or location of residence;[8–12] and cross-sectional studies associating risk behaviour with factors such as past exposure to domestic violence, school enrolment, and being orphaned.[13–18] These factors help shape a context of vulnerability that either contributes to increased individual risk of exposure to HIV or compromises the ability to protect oneself from infection. Mapping the way in which each of these factors increases individual HIV vulnerability is essential to determine the most appropriate type and level of response.

Other studies have more explicitly described the mechanisms by which structural factors can affect HIV risk. For example, sexual violence, a manifestation of gender inequality, has been linked to an increased risk of HIV transmission.[19,20] Other examples include the role of migration in influencing HIV risk, such as studies on the lives of mine workers in South Africa, which have established the ways in which risky working conditions, lack of social support, and separation from family can lead to unprotected sex with prostitutes.[21–23]

Other evidence for the importance of structural factors comes from qualitative studies explaining cause–effect chains or processes affecting the vulnerability of particular subpopulations (eg, poor women, adolescent girls, injecting drug users, or truck drivers) or shaping particular social factors associated with HIV vulnerability (eg, gender-based violence, HIV/AIDS-related stigma, and transactional sex).

Experience shows that structural factors can act as barriers to individually oriented HIV prevention and care services and the adoption of HIV-preventive behaviours. For example, fear of HIV/AIDS-related stigma and discrimination discourages people from seeking HIV counselling and testing[24] and from disclosing their status to their sexual partner.[25] And women who regularly experience gender-related violence might be unable to negotiate condom use.[19,26]

***Panel 1:* The Sonagachi project**

The Sonagachi project—a community oriented project addressing the needs of sex workers in Calcutta, India—is widely regarded to have achieved dramatic HIV prevention outcomes among participants.[42–44] According to Basu and colleagues[45] who assessed the programme, an HIV prevalence of 10% was achieved, which although quite high, is significantly lower than the 50–90% among sex workers in other large Indian cities. In addition, condom-use among Sonagachi project participants apparently rose from 3% to 90% during implementation of the programme in the 1990s. Sonagachi worked at a community level, and because the programme organisers could not address broader more distal determinants of women's lack of power in India, or men's desire for paid sex, Sonagachi took a structural approach at a local, proximal level, by mobilising and empowering sex worker groups.

According to Jana and co-workers[43] the key ingredient of the project's success was not the implementation of a specific set of activities, per se, but the fact that the project focused on responding to the targeted community's needs. They go on to explain that it is necessary to create an enabling environment that allows the members of a community to act on their own behalf.

In the Sonagachi approach, activities were not decided upon by outsiders and implemented locally. Instead, a process was put in place to allow members of the specific community to decide what they needed, and to take action accordingly.

The relation of structural factors to HIV vulnerability, however, can be complex and variable. For example, cross-national studies suggest the association between economic status and HIV prevalence varies.[27,28] A common assumption is that poor people are most vulnerable to HIV. This assumption is bolstered by the fact that the bulk of the world's HIV infections have been in sub-Saharan Africa, the poorest region of the world,[29] and the well established correlations between poverty and broader indicators of health status, such as life expectancy at birth and infant mortality.[30,31] Research suggests, however, that the relation between poverty and HIV/AIDS is not this straightforward. For example, within sub-Saharan Africa, the wealthiest nations are those most affected by HIV/AIDS.[32–34]

The complex relations between structural factors and HIV risk is also evident at the household level, although definitions of wealth are relative, and in some settings even so-called wealthy households are just above the poverty line.[35] A longitudinal study in Zimbabwe found that individuals in relatively wealthy households experienced much higher rates of HIV than those from households with the lowest asset holdings, with the exception of the very richest groups.[36] Similarly, an analysis commissioned by UNAIDS of eight recent population-based surveys from sub-Saharan Africa on the relation between household wealth and HIV prevalence, found that across six of the eight countries, prevalence among adults was much higher in the wealthiest 20% of the population than among the poorest 20%.[33] However, the relation between wealth and risk might reverse as epidemics mature with increased risk behaviour in low socioeconomic groups.[14,15,17]

Structures affecting risk are not static and may change, both in their form and in their effect as an epidemic evolves. A clear example of this is the effect of education on HIV risk. Studies before 1995 found high rates of HIV infection in educated women, possibly linked to higher socioeconomic status and mobility and having more sexual partners than less educated women. However, as the epidemics developed over time, the relation changed with education becoming more protective.[37]

What are structural approaches?

Structural approaches include structural actions implemented as single policies or programmes that aim to change the conditions in which people live, multiple structural actions of this type implemented simultaneously, or community processes that catalyse social and political change. These approaches can be applied in combination with behavioural or medical interventions targeted at individuals. When a structural approach is taken, it can result in activities or services being delivered to individuals, but the approach is different from more individually oriented behaviour change efforts because it addresses factors affecting individual behaviour, rather than targeting the behaviour itself. Microcredit programmes, for example, offer a direct service to individual women, providing them with the capital to start their own income-generating activities. In so doing, however, they can operate structurally by addressing the broader issue of women's economic dependency that contributes to their HIV vulnerability.

Therefore, the defining characteristic of structural approaches, regardless of whether they are single policies or programmes (eg, legal actions to combat or reform a discriminatory practice) or transformational processes (eg, social mobilisation to oppose a harmful traditional practice), is that they aim to change the social, economic, political, or environmental factors that determine HIV risk and vulnerability in specified contexts.

There are several examples of HIV and AIDS responses that have taken structural approaches. A structural intervention for HIV prevention among injecting drug users involves creation of a policy and legal environment allowing syringe and needle exchange.[38] Syringe exchange and provision programmes, which are part of a larger harm reduction approach, are structural because they commonly require a shift in policy in contexts where the possession or use of certain drugs is illegal.[39] These programmes also require service reorientation from prohibition and cure to maintenance and harm minimisation. They also target the drivers of HIV risk in populations of drug users, as opposed to education messages alone, which do little to affect the factors leading to needle sharing. Drug control policies that stigmatise and marginalise drug users can act as barriers to medical and social services and foster behaviours, such as sharing equipment and sex work. A review of 24 articles on needle and syringe exchange programmes and

methadone treatment found evidence of efficacy for needle and syringe exchange programmes without associated adverse effects. Combination of such programmes with efforts to increase syringe availability by modifying restrictive laws and regulations and outreach to increase pharmacist involvement in syringe sales holds major promise for reducing HIV infection.[39]

Structural approaches to reduce risk and vulnerability in sex workers have included policy actions such as the 100% condom use policy implemented in Thailand and the Dominican Republic, in which brothel managers and (in the case of Thailand) bar managers and the police had a key role in the promotion of condom use.[40,41] Other efforts have gone beyond single-policy interventions to create an enabling environment to reduce vulnerability. A commonly cited example is the Sonagachi project in the red-light district of Calcutta, India, which fostered solidarity and empowered sex workers through community mobilisation and resulted in a combination of activities to support HIV prevention (panel 1).[42–45]

Some structural approaches seek to transform social norms that contribute to HIV vulnerability. Examples include Program H in Brazil and the intervention with microfinance for AIDS and gender equity (IMAGE) project in South Africa. Program H encouraged young men to question traditional gender norms and promoted both discussion and reflection about the costs of inequitable definitions of masculinity and the advantages of more gender equitable behaviour. The programme lowered the proportion of men who endorse gender inequitable norms.[46]

The IMAGE project sought to reduce gender-based HIV vulnerabilities, such as sexual violence, women's economic dependency on men, and women's lack of in-depth information about HIV and its transmission. IMAGE addressed these three issues by partnering with a local microfinance institution to enable women to pursue microenterprises, while offering participants HIV education and creating opportunities to discuss and mobilise local action against gender-based violence.[47] This approach significantly reduced levels of intimate partner violence and improved household wellbeing, social capital, and empowerment (panel 2).[48–50]

Structural approaches do not work the same way or have the same effect in all populations and settings because people and contexts differ. Specific details of both the people and the settings that make particular programme or policy inputs relevant and effective must be established and analysed.

Microcredit programmes for reducing women's HIV vulnerability by strengthening their economic options offer a useful example.

Sometimes leading to reductions in vulnerability by reducing the level of intimate-partner violence[50] and sometimes having little or even negative effects.[51,52] This variation occurs because a lack of credit does not affect the risk and vulnerability of women to the same extent or in the same way in every setting. In urban Kenya, for example, such a programme might have created an increased risk by forcing young women to rely on sexual networks to raise the funds needed to meet the conditions of the loan.[50] These issues with generalisability have often limited the development and application of structural approaches.

Implementation of structural approaches

Structural factors and, by inference, approaches, are sometimes passed over by the health sector as being too broad, too diffuse, and outside the remit of health programming. Often this is a reaction to the fact that risk and vulnerability can be, and often are, linked to distal, society-level factors, such as gender inequality or social marginalisation, that are beyond the control of individual health-service providers or clients. However, total change of a distal structural factor might not be needed to exert its effect on HIV vulnerability. For example, rather than seeking to eliminate gender inequality, a structural approach might simply prosecute more vigorously men who are violent to women. Thus, policy changes or programmes can address the ways in which the broader structural factors increase HIV risk or vulnerability.

The process of implementing structural approaches must, therefore, begin with analyses of how social, political, economic, and environmental factors are operating and the pathways leading to risk in a given community. Some structural factors might be driving HIV risk or vulnerability proximally, while others will be distal, working through

Panel 2: Intervention with microfinance for AIDS and gender equity (IMAGE)

The IMAGE study sought to determine HIV risk by intervening structurally at community and individual levels and offers some important insights on the challenges of assessing a structural approach by use of conventional methods (ie, a randomised community trial with preintervention and postintervention comparisons and experimental and control comparisons).

Predicated on evidence that the rising prevalence of HIV in that country was a product of prevalent migrant labour, widespread poverty, and entrenched gender inequalities,[48] the study combined a poverty-focused microfinance initiative with a participatory learning and action curriculum on gender and HIV education. IMAGE sought to determine whether the involvement of women in the programme would improve household economic wellbeing, social capital, and empowerment and thus reduce vulnerability to intimate partner violence (a known risk factor for HIV[19]). The project also sought to assess "whether such measures could raise levels of communication and collective action on HIV and gender issues within communities and reduce the vulnerability of 14–35-year old household and village residents to HIV infection".[49] A key feature of this study was that it also hoped to prove a direct link between action around these specific structural factors and HIV incidence.

Despite several methodological challenges because of the lack of easy fit between the nature of the intervention and the study design, the IMAGE project did make important findings. The study team estimated that over 2 years, levels of intimate partner violence were reduced by 55% in the intervention group relative to the comparison. Additionally, there was evidence that the intervention improved household wellbeing, social capital, and empowerment. Disappointingly, however, there appeared to be no direct effects on HIV incidence.[49]

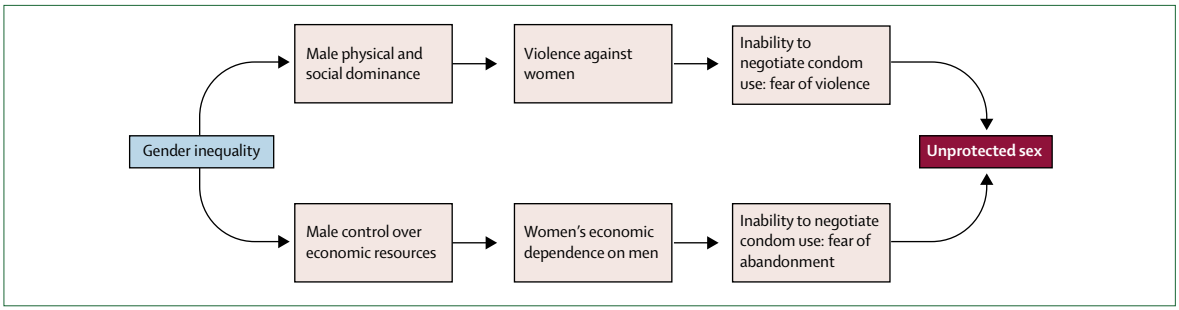

Figure 2: **Different causal chains can link the same distal structural factor (gender inequality) and HIV risk behaviour (unprotected sex)**

Panel 3: Access to housing and HIV-related risk

Aidala and colleagues[55] examined housing as a contextual factor affecting sexual and drug-related risk behaviours in people living with HIV/AIDS. Secondary analysis of pooled data for 2149 people presenting for services at 16 medical and social service agencies was done. The odds of recent drug use (odd ratio 3·58, 95% CI 2·31–5·53), needle use (1·75, 1·02–2·99), or sex exchange (3·52, 2·06–6·01) at baseline interview were higher in people who were homeless than in those with stable housing. Similar patterns prevailed for those who were unstably housed (1·86, 1·54, and 2·69, respectively).

Follow-up data at 6–9 months showed that change in housing status was associated with change in HIV-related risk behaviours. People whose housing status improved between baseline and follow-up had reduced risks of drug use, needle use, needle sharing (0·39, 0·18–0·84) and unprotected sex (0·37, 0·15–0·91) in comparison with individuals whose housing status did not change. For those whose housing status worsened, the odds of recently exchanging sex was over five times higher than for clients whose housing status did not change (5·11, 1·05–24·8).

intermediate links or causal pathways. Taking a structural approach, therefore, begins by understanding the causal pathways in order to identify the points of maximum effect for any given intervention or agency (figure 2).

For example, if gender inequality manifests violence against women, which in a local community results in women's fear of retribution, it reduces their ability or willingness to negotiate condom use. This causal chain points to several potential areas to intervene. Some agencies can promote civil rights for women, which might affect this causal chain distally by, for example, upholding women's property rights in cases of domestic abuse. Others may focus on prosecution of men who inflict violence. Still other local agencies can work with individual women's groups to offer havens for women or to empower women to oppose and punish violence.

To implement structural approaches, the social, political, economic, and environmental factors influencing both vulnerability and risk must be identified along with the causal pathways between the structural factor and the behaviour or behaviours that need to change. And these approaches require contextual analyses to diagnose the structures most affecting risk and vulnerability and to assess how they can best be addressed.

Contextual analysis can be done much like an orthodox health-planning exercise—with skilled personnel gathering data, identifying which structures are creating the problem, and then deciding how to intervene. Alternatively, this analysis can involve a more participatory approach, engaging communities in the process of problem-solving, building on local knowledge to generate an indigenous, organic response. Such an approach has a significant effect, as shown by the UNAIDS assessment of the AIDS Competence Programme, which relies on community ownership and local knowledge to achieve effective HIV prevention.[53] Although we recognise this approach to public-health planning is not common, the benefits include community ownership and relevance, which could lead to long-term sustainability.

When implementing a structural approach, there is no single blueprint that will work everywhere. Instead, strategy should be relevant to the particular needs of the population being served. For example, there have been various structural approaches adopted to address the vulnerability of mobile populations, such as truck drivers. In Burma, improvements in road surfaces reduced transportation times, which in turn reduced the number of overnight stops made by truck drivers along one particular route. This might have reduced exposure to risk (of infection and transmission of HIV) through interaction with indirect sex workers, such as restaurant hostesses.[54] Although this was a useful structural intervention to make in this context, road improvements might not work in the same way everywhere. In other contexts improved roads might increase traffic flow overall, leading to greater numbers of interactions between truck drivers and sex workers.

The lack of a structural magic bullet might be discouraging, but it is not necessary to reinvent the wheel in each new setting. Upon analysis of the social, economic, political, and environmental facilitators and barriers to risk, existing programmes that dealt with these same barriers and facilitators in other settings can

be adapted and adopted. Program H, for example, was developed in urban Brazil but has subsequently been adapted and applied in various settings, including several other Latin American countries and several countries in south Asia and North America. The approach is now being adapted for use in African settings and in southeast Asia. The success of these adaptations is dependent on rigorous contextual analysis before their application.

Are structural approaches effective?

A growing number of studies have assessed the outcomes and effects of structural approaches for HIV prevention. Since structural approaches involve different activities in different settings, there will not be a single level of effectiveness in reducing HIV incidence for all approaches any more than there is for approaches that promoted behaviour change at the individual level.

Assessment of effectiveness

Reviews of studies in which policy changes have allowed for needle exchange and methadone treatment programmes show substantial reductions in HIV risk in areas in which HIV is spread through injected-drug use.[44,45] The inclusion of drug users in the design and implementation of these programmes can further increase their effectiveness. Stable housing is another effective structural HIV prevention approach to reduce the risks associated with injecting drug use (panel 3).[55]

Structural approaches that have sought to reduce the HIV vulnerability of sex workers have ranged from policies to enforce condom use to programmes that sought to build solidarity among and empower sex workers. Assessment of the 100% condom use policy in Thailand revealed that condom use climbed to over 90% (figure 3).[40] Similar outcomes were reported from a more recent study of the effect of a 100% condom use policy combined with efforts to build community solidarity among sex workers in Puerto Plata in the Dominican Republic (panel 4).[41]

The Sonagachi project in Calcutta, India, took a different structural approach to reduce HIV risk among sex workers.[42–44] The Sonagachi project worked at a community level, providing sex workers with diagnostic and treatment services for sexually transmitted infections, as well as with opportunities to lead, design, and implement activities. The programme's success has been largely attributed to the creation of an enabling community environment that empowered the participants to make their own decisions, including those that protected them from HIV infection (panel 1).

There are also country examples of successful structural approaches. The most famous of these is Uganda, which reported falling HIV prevalence throughout the 1990s. Before recent debates about the role of ABC (abstinence, be faithful, condom) in Uganda[42,56–59] the most common explanation given to that country's success in reducing HIV prevalence was how, through a range of actions, the country created an open, enabling, environment for confronting the epidemic. Many different activities sprung up across the country, targeting specific messages and activities to specific groups, and facilitating overlapping and potentially synergistic activities, albeit within a larger government context, providing a multilayered foundation of information and political

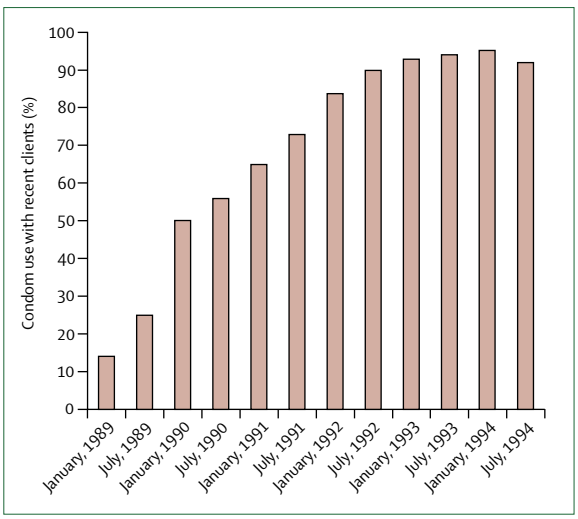

Figure 3: **Increase in condom use reported by sex workers in sentinel serosurveillance**
Reproduced with permission form UNAIDS.[40]

Panel 4: **Lowering the risk of HIV and other sexually transmitted infections among sex workers in the Dominican Republic**

A recent study[41] assessed the effectiveness of two environmental-structural programmes in reducing risks of HIV and sexually transmitted infections in women sex workers in the Dominican Republic. Two intervention models were implemented over 1 year: community solidarity in Santo Domingo and solidarity combined with government policy in Puerto Plata. Both populations were assessed via preintervention and postintervention cross-sectional behavioural surveys, testing for sexually transmitted infections, participant observations, and serial cross-sectional screenings for infection. Results revealing significant increases in condom use with new clients (from 75·3% to 93·8%, odds ratio [OR] 4·21, 95% CI 1·55–11·43) were documented in Santo Domingo. In Puerto Plata, significant increases in condom use with regular partners (from 13·0% to 28·8%, 2·97, 1·33–6·66) and reductions in prevalence of sexually transmitted infections (from 28·8% to 16·3%, 0·50, 0·32–0·78) were documented, as were significant increases in sex workers' verbal rejections of unsafe sex (50·0% to 79·4%, 3·86, 1·96–7·58) and participating sex establishments' ability to achieve the goal of no infections in routine monthly screenings of sex workers (OR 1·17, 1·12–1·22).

Panel 5: Structural approaches to HIV prevention in Australia

Australia's success in managing epidemics of HIV in men who have sex with men and injecting drug users was the consequence not of a single intervention, but of a broad-based structural response. This included supportive national and state level policy, encouragement and funding for the active involvement of affected communities, and the establishment of dedicated research centres to inform the response. There continues to be a collective ownership of the epidemic, a willingness to speak openly about risk and to reduce harm, and partnership among researchers, policy makers, and community groups.[63]

Together, these actions have helped to stabilise HIV incidence over the past 15 years, but significant challenges remain. Between 1993 and 2006, 12 313 new cases of HIV were reported in Australia. From 1993 to 1999, the annual number of diagnoses declined by 32%, while from 2000 to 2006, the annual number of diagnoses increased by 31%. Although the number of HIV cases has increased in the past 7 years, the number diagnosed in New South Wales, long the epicentre of the epidemic in Australia, fell from 56% to 40%. The proportion of diagnoses associated with male homosexual sex decreased from 77% in 1993 to 66% in 2006.[64]

These HIV incidences are corroborated by behavioural surveillance data showing a decrease in unprotected anal intercourse among men who have sex with men in New South Wales, but a corresponding increase in the same unsafe sexual practice among such men in Victoria and Queensland.[65] Recent research has shown once more the importance of structural factors, such as an active commitment to and adequate resourcing of HIV prevention by all stakeholders in the HIV partnership.[66] In New South Wales, where there have been decreases in unprotected anal intercourse, there have been corresponding decreases in reported rates of infection in men who have sex with men.[67]

support for individual risk reduction.[60–62] Within a few years of the national response in Uganda, there were hundreds of activities.[60] Although definitively attributing causality to any one programme or strategy is difficult,[51] the example of Uganda illustrates that national-level social mobilisation and policy efforts to involve local agencies and enable tailored structural approaches to HIV prevention are possible. Indeed, establishing an enabling environment often naturally leads to combination prevention efforts, as the needs of multiple groups can be addressed simultaneously, and in different ways, by concerned agencies.

Another example of a country effectively adopting a broad-based structural response is provided by Australia's success in managing epidemics of HIV among men who have sex with men and injecting drug users (panel 5).[63–67] The interventions included supportive national and state-level policy; encouragement and funding for the active involvement of affected communities; and establishment of specific research centres to inform the response. There was and continues to be broad ownership of the epidemic in this setting, a willingness to speak openly about risk and to reduce harm, and partnership between researchers, policy makers, and community groups.[63] This approach not only contained the Australian epidemic among the target groups but has also turned back a recent increase in new infections among men who have sex with men in New South Wales.[67]

Challenges in assessment of effectiveness

Most assessment studies related to structural approaches in fact examine single structural interventions, rather than the overall approach involved in identifying and tailoring activities to local needs. They tend to base their conclusions on comparisons of preintervention and postintervention cross-sectional data on behavioural indicators, such as reported condom use, use of clean needles, incidence of sexual violence, or use of services for sexually transmitted diseases. Others have also compared outcomes with a control group and a few have used HIV incidence as an indicator of effectiveness.

One of the few examples of a rigorous academic assessment of a set of structural interventions (which included HIV incidence as an indicator of success) is the IMAGE project study in South Africa. The results of the study (panel 2) emphasise the promise of structural approaches and point to some key challenges in the assessment of their effectiveness in reducing HIV incidence.

A first challenge in the assessment of the effectiveness of structural approaches comes from the fact that many focus on distal drivers of HIV risk and vulnerability. When focusing on a distal factor, there might be multiple causal pathways by which this factor affects a given HIV prevention outcome, and that the mechanism by which it influences the outcome may be different in different contexts. For example, a recent paper has pointed to the link between food insecurity and HIV risk.[68] Yet any wide-scale structural measure to address HIV by increasing food availability will not necessarily result in reductions in HIV infection in all settings. A programme of this sort might result in reduced risky behaviour, but only in those communities in which food insecurity manifests itself in situations of HIV risk (eg, where transactional sex offers a way to obtain food). A similar challenge is also apparent in the assessment done in the IMAGE study, which had to contend with various causal pathways between the distal structural factors on which the intervention acted (household economic wellbeing, social capital, and intimate-partner violence) and the outcome of concern (HIV incidence).

The second challenge is that coming up with a simple answer of effectiveness is complicated by the fact that many structural approaches, including the Sonagachi project and the IMAGE project, involve social and

political mobilisation of groups resulting in multiple and dynamic responses and activities. Mobilised groups may take on activities of their own outside of the intervention envisaged by HIV programme managers, which hampers the assessment of the stipulated activities. Instead, the lesson to learn from the effectiveness of such efforts is that significant reductions in HIV risk and vulnerability can occur when groups are enabled and empowered to come up with their own solutions.

A third and related challenge is that the results from the assessments of structural approaches are not easily transferable when the activities involved are designed for specific local contexts. Few HIV projects document the myriad social, economic, political, and environmental conditions in which they are implemented—a process that benefits greatly from social-science expertise. Thus, the results of two or more replications of the same structural intervention are hard to compare. Without such information, the effects of a structural approach involving policies, programmes, or community processes in one setting cannot be expected to occur in another setting. Indeed, one of the most important justifications for an increased use of structural approaches is to avoid past failures in oversimplified, individually oriented behavioural interventions across diverse populations. This is why it is important to resist the temptation to try to devise a standard list of structural interventions that can be implemented in the same way everywhere.

Improving assessment of structural approaches

Assessments of structural approaches are likely to be expensive because the range of variables to track is large and the effects are typically small. For these reasons sample sizes needed to show any effects have to be large, which adds to the cost of such studies. Despite the expense, investments should be made in at least a few well designed and pivotal studies that can assess the effectiveness of structural approaches in preventing HIV infection. Furthermore, debate and discussion is needed on an appropriate standard of evidence to measure the effectiveness of structural approaches and on ways to improve the evidence and assessment techniques available to guide good practice.

Many HIV prevention programmes that are attempting to address key structural factors to reduce HIV risk and vulnerability in novel, context-specific ways are unfortunately not assessed rigorously. These programmes are typically done by non-researchers, be they non-governmental organisations, community groups, government agencies, or others. More importantly, they are not researchers with the necessary social-science training to measure social, economic, political, and cultural factors. As a result, measurements of baseline conditions and outcomes are commonly absent or, when present, limited to counting of inputs and outputs, such as the numbers reached, or participants' awareness of issues, rather than behavioural or biological outcomes. Information on individual, family, community, organisational, and national factors central to the causal pathway is also often lacking. Innovative context-responsive programmes are commonly best designed and implemented by non-research agencies who are well acquainted with local needs and realities. Appropriate assessments of such programmes, however, must involve researchers who are knowledgeable about measurement and analysis of structural factors.

Many assessments of structural approaches are limited to measuring the structural variable on which they directly intervene (such as social norms that condone intimate-partner violence or rates of use of microcredit programmes), rather than the HIV-related behaviour the programme was hoping to affect, such as refusal of unprotected sex.[69] For example, a report from the UK's Department for International Development's *Safe Passages to Adulthood*[70] programme describes 15 model programmes to reduce HIV/AIDS stigma and discrimination. For a description of best-practice experience, what is noteworthy is that only one project mentions achieving outcomes related to HIV risk (an increase in self-reported condom use); the rest mention only reductions in stigmatising attitudes or discriminatory behaviours.[71] Thus, although these studies have identified programme models that reduce HIV/AIDS-related

Panel 6: Structural approaches and the Millennium Development Goals (MDGs)

The eight MDGs address many dimensions of extreme poverty and inequity—hunger, illiteracy, ill health, lack of adequate shelter, and gender inequality—while promoting basic human rights and environmental sustainability. Goal 6 specifically calls for combating HIV/AIDS, malaria, and other infectious diseases. Achievement of each goal is dependent on progress made in the others.

The MDGs, thus, offer a framework for promoting structural approaches in HIV prevention. Structural approaches should not, however, be equated with the broader development agenda. Those are broader efforts, of which HIV prevention efforts can only hope to be a small part. For HIV prevention, simply recommendations to end poverty or reduce gender inequality are unhelpful.

Thus, MDG indicators serve as only one source of information to help guide those taking a structural approach to HIV prevention. In and of themselves they cannot serve as indicators of the success of a structural approach. They can only be used as broad indicators of progress if the structural factors they measure were identified as being significant factors underlying HIV transmission for a particular population.

Adopting structural approaches in HIV prevention, as described in this paper, however, can create the conditions needed to achieve the MDGs.

Panel 7: **Indicators relevant to structural approaches**

Measurement of progress in implementation of structural approaches is hard to achieve with an off-the-shelf set of predetermined indicators.

However, some measures such as the existence of enabling legal frameworks or government commitment to human rights can be helpful indications of a structural approach. Within the UN General Assembly Special Session on HIV/AIDS reporting framework, the national composite policy index captures some of these elements by assessing national commitment to human rights and civil society involvement through the use of questionnaires completed by both the government and society. The 53 items include several issues ranging from policy barriers to the existence of budget lines for programmes serving the needs of women.[76]

Domestic and international AIDS spending by categories and financing sources can also provide important insights. However, while this might provide information on the amount of funds spent on HIV prevention, it rarely provides any indication of how much of that was appropriate to local community needs.

More needs to be done to monitor the extent to which national responses undertake structural approaches. The following types of information are relevant to such a process:

- Proportion of prevention fund targeted to local needs, based on contextualised needs assessment
- Total amount targeted to local needs, based on contextualised needs assessment
- Proportion of prevention funds spent on enabling local responses
- Total amount spent on enabling local responses
- Number of local organisations engaging in HIV prevention activities for a local target group

These indicators may not be simple to measure and will require agreed upon definitions or criteria; but progress in HIV prevention cannot be achieved without engaging with difficult issues and moving beyond simple approaches or a reliance on simple indicators.

stigma and discrimination, they were not designed and funded to determine whether reducing stigma and discrimination reduces HIV risk or rates of infection.

At the opposite extreme are programme assessments that rigorously measure key health outcomes of an activity or intervention, but do not provide and test any theory or model that maps out the mechanism by which the actions taken achieve these outcomes in a given context. Some assessments are based on the assumption that the context should be controlled for or taken out of the equation, leading to measurement of outcomes only. This approach does not acknowledge that different social conditions at the outset represent features of the outcome that the intervention seeks to achieve. Rather than controlling for context differences, assessments should document the differences and explore the mechanisms by which an intervention works for a particular group, and how those mechanisms may be different across contexts. Heald,[72] for example, describes how Botswana's early condom promotion and HIV education based on programmes in Europe and North America failed because they did not take account of local understandings of morality and illness.

Improving assessments of structural approaches also means recognising the limitations of randomised controlled trials for investigating complex structural factors. These trials are the gold standard of evidence for some public-health issues, but are most appropriate where the intervention being tested is proximate to the risk behaviour that it is seeking to change. Such approaches are also useful when the range of possible influences are well understood and measured and when the outcome can be expected to change significantly by altering a single other measurable variable. Randomised controlled trials are therefore not always the best way to assess the effectiveness of complex structural approaches.[73]

Alternative approaches to engage with complex issues include those from the social sciences, such as realistic evaluation, an approach that calls for rephrasing the question of what works to what works for whom, in what situations. Realistic evaluation requires routine process assessment of interventions.[74,75] The mechanisms by which an action of intervention works must be studied while the action is done. Similarly, the intervention group must be analysed to identify which particular individuals or subgroups were affected and how they differed from others.

Process evaluation of this kind is also crucial for the assessment of distal structural actions. When a distal social, economic, political, or cultural feature is addressed, this will typically be because of a postulated (and, ideally, well described) causal pathway by which that feature creates HIV risk or vulnerability. Assessment of structural change, then, must also measure elements along the causal pathway to validate the original causal pathway hypothesis, and also assess which changes resulted in changes in HIV risk and vulnerability. Simply measuring at the beginning and end of the causal chain (measuring the distal structural action, and the ultimate proximal behaviour) does not provide information about the mechanism of effect to support quality assurance during implementation or generalisation or adaptation to other settings.

In addition to the need to apply some existing social-science methods, additional assessment techniques are needed. Indeed, boosting of the evidence base of the effectiveness of structural approaches will require a deliberate effort by the international community to invest greater resources in large-scale social science studies, much as has been done in the case of clinical trials for new biomedical technologies.

At a minimum, assessments of HIV prevention efforts need to be guided by a clear and well researched causal model or framework, and include a combination of qualitative and quantitative methods and analysis, as well as explorations of process, so that investigators can measure the change and understand how that change was achieved for individuals showing positive results. In addition, ethnographic and other related methods can be used to assess which features of the social context mattered, and for what reasons.

New international research initiatives might serve as appropriate mechanisms to raise the profile of and to prioritise the assessment of structural approaches in HIV prevention. The International Initiative for Impact Evaluation seeks to increase the production and use of evidence from rigorous impact assessments to improve social and economic development programmes in low-income and middle-income countries. Integration of the assessments into comprehensive prevention programmes that are being scaled up at the national level and use of community randomisation with comparison groups that receive the model interventions later (lagged start designs) or receive a different set of interventions are other practical ways to ensure that the appropriate evidence is gathered and that existing opportunities for learning and assessment are not missed.

Finally, efforts must be made to prioritise partnerships between researchers and people implementing structural approaches. Without this, many opportunities to learn important lessons about interventions will be lost. The persistent problems of a lack of baseline information, an absence of a control or comparison group, and inadequate measures of HIV risk and vulnerability will continue to hamper learning about the effectiveness of initiatives actively trying to affect HIV outcomes by addressing structural factors.

Conclusion

Sustained progress in HIV prevention requires structural approaches rather than continuing to address individual-level factors. Structural factors can be influenced but until they are, individuals in many settings will find it difficult to reduce their risk and vulnerability.

Moving forward will entail better assessment of structural approaches and interventions, and a better understanding of how these can be implemented. There is enormous scope for building an evidence base, but doing so will require a series of changes. Agencies implementing programmes with little time for rigorous measurement should be assisted to assess meaningful outcomes. Scientific groups focusing narrowly on proximate determinants must engage with broader social-science methods to elucidate and assess more distal layers of influence and context. Planners and programme managers who believe structural factors are too vague or impossible to change should be shown that a broad constituency of social, health, and development agencies are working for these changes, documenting their efforts against indicators that have been identified and adopted by the global community in the UN MDGs (panel 6). Indicators suited more specifically to structural changes associated with the HIV epidemic include those that seek to measure the existence of enabling legal frameworks, government commitment to human rights, or indicators of HIV/AIDS spending by categories and financing sources (panel 7).[76] Thus, planners and managers can be shown that by identifying levels of possible action and target points along causal chains, a structural approach can be implemented at several levels. Building the evidence base for this kind of work is essential to achieve the step-change needed in HIV prevention globally.

For **the International Initiative for Impact Evaluation** see http://www.3ieimpact.org/

Ultimately, though, for structural approaches to be included in mainstream prevention health agencies must recognise that context really does matter and that a combination of successful approaches in one place might not be transferable to another. Success in mainstreaming structural approaches into HIV prevention will revolve around the extent to which prevention does not simply respond to pressure for lists of interventions or overly simplistic magic bullets and individual approaches. Structural approaches represent a largely untapped, yet crucial, part of combination HIV prevention advocated for in this series. Serious attention must be given to defining and building capacity to make that happen.

Contributors

GRG led the design, analysis, drafting, and critical revision of this article, and coordinated other authors' inputs. JOP, JAO, and PA made substantial contributions to the design, analysis, and content of the article. JAO also helped coordinate authors' inputs. All authors helped in drafting and critical revision of the article and provided final approval for publication.

Conflict of interest statement

We declare that we have no conflict of interest.

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