

COMMENTARY

Contextual drivers of HIV risk among young African women

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Abstract

Introduction: Significant progress has been made in the African HIV pandemic; however, the pace of incidence decline has slowed or stalled in many East and Southern African countries, especially among young women. This stall is worrying because many countries have burgeoning youth populations. There is an important window of opportunity to halt the epidemic as well as the potential for millions more infections if primary prevention efforts are not strengthened.

Discussion: Many hyper-endemic settings have been exposed to numerous interventions; however, HIV incidence among young women has remained high. In this paper, we characterize the intervention context and examine how it can be strategically utilized to maximize HIV prevention interventions among young women. We begin by examining how contextual dynamics drive HIV risk. We illustrate how epidemiological contexts, gendered normative and economic contexts, and environmental contexts work synergistically to make young women especially vulnerable to HIV infection. We then examine how these contexts can undermine HIV prevention interventions. Finally, we discuss the importance of fully mapping out the intervention context to enhance the effectiveness of HIV prevention interventions.

Conclusions: Understanding an intervention context, and how its features work together to amplify young women's risk in hyper-endemic settings can contribute to sustained momentum in reducing HIV incidence among young women and help to limit the reach of the HIV pandemic into new generations of Africans.

Keywords: HIV prevention; adolescent girls; young women; Africa; hyper-endemics; interventions

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1 | INTRODUCTION

Despite significant progress over the last few decades, sub-Saharan Africa continues to bear the brunt of the HIV/AIDS pandemic, with two-thirds of the 1.8 million new HIV infections, and 70% (an estimated 660,000 deaths) of AIDS related mortality [1]. Adolescent girls and young women are disproportionately affected; an estimated 7000 are newly infected each week and 75% of new infections among 15- to 19-year olds are in girls [1]. In South Africa alone, there were an estimated 113,000 new infections among women aged 15 to 24 [2]. Furthermore, many high prevalence countries in East and Southern Africa have between a third to almost half of their populations under the age of 15 [3], and there is a slow down or stall in the pace of decline in new infections [4]. Stalling HIV epidemics combined with burgeoning youth populations present both a challenge and an important window of opportunity where the epidemic can be halted or yield to dramatic increases of those in need of life-long medication [5,6].

Recent years have brought a growing recognition of the spatial concentration of hyper-endemics (settings with persistently high HIV incidence, and/or HIV prevalence exceeding 15% of the adult population [7,8]), and the significance of social

context to focus HIV prevention interventions and improve HIV incidence control [9-15]. However, despite numerous interventions [16-20], incidence remains high. How might intervention outcomes be improved? In this paper, we build on previous research by characterizing the intervention context, and examining how it can be strategically utilized to maximize HIV prevention interventions among young women. We begin by describing how contextual dynamics drive HIV hyper-endemics, we then illustrate how they can undermine prevention interventions, and conclude by discussing how fully mapping an intervention context can contribute to more effective HIV prevention interventions among young women. While our conceptual framework is applicable to other settings, we draw on African examples to illustrate our points.

2 | DISCUSSION

2.1 | How social contexts drive HIV hyper-endemics

Many hyper-endemic settings share similar social contexts that interact synergistically to create a dangerous HIV risk environment for girls transitioning to adulthood. Figure 1 illustrates the different contexts which we discuss in turn.

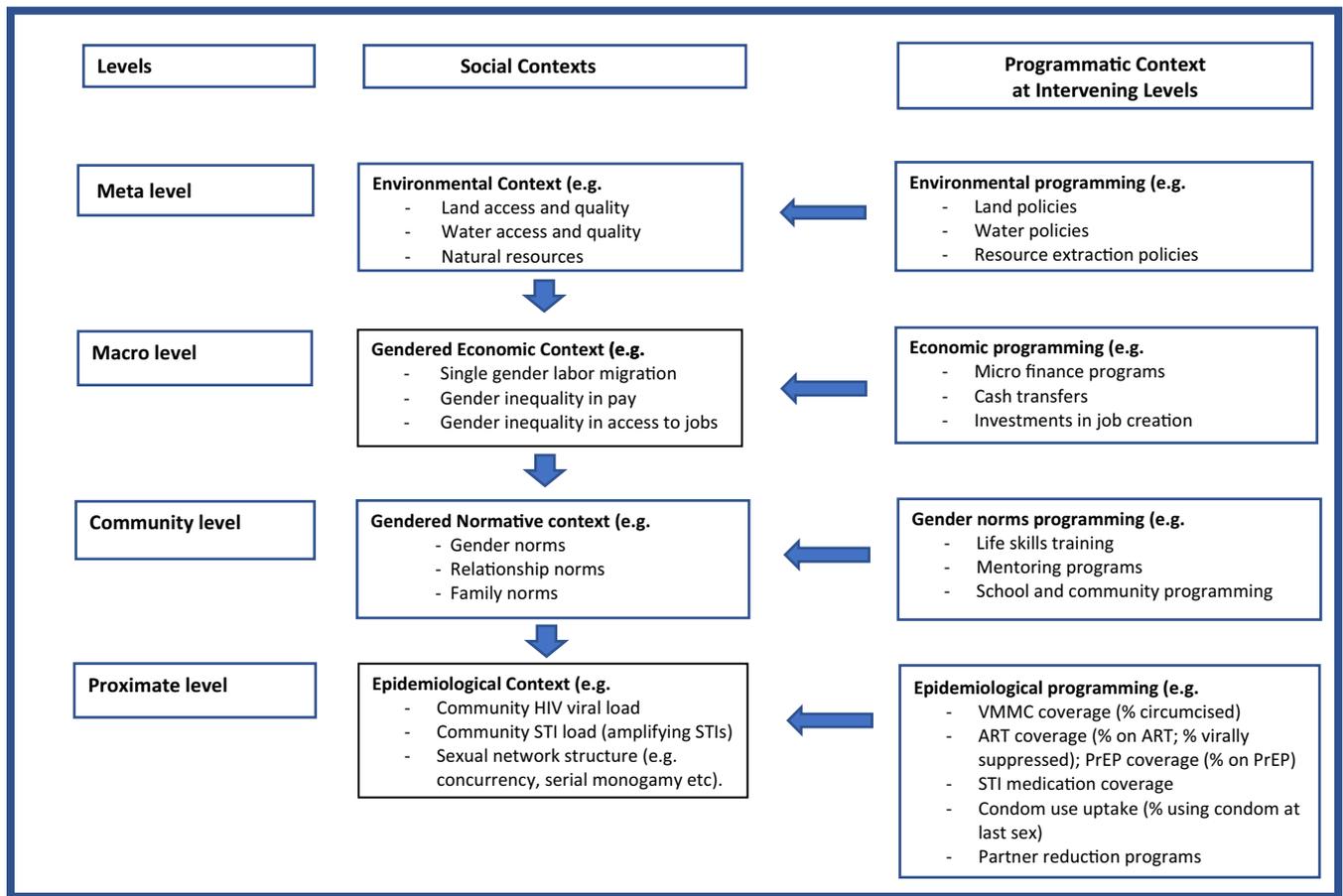


Figure 1. Intervention context

2.1.1 | The epidemiological context

Hyper-endemics are often characterized by interacting epidemiological factors that work together to make even a single sexual encounter risky for young women [21]. For example in Kenya, 65% of new infections are concentrated in nine of its 47 counties [22]. Young people (15 to 24) account for half (52%) of new infections in the country's highest incidence and prevalence counties which are Homa Bay (26% prevalence), Siaya (25% prevalence) and Kisumu (20% prevalence) [23], located in Nyanza province. Nyanza also has an amplifying sexually transmitted infection (STI) epidemic; 57% and 38% of women and men respectively have herpes simplex virus type 2 (HSV-2) [24]. STIs such as HSV-2 are associated with a significant increase in HIV acquisition risk [25-27]. Furthermore, the sexual network structure in Nyanza creates vulnerability with high levels of concurrency [28,29]. Despite a risky epidemiological context, uptake of programming targeted at this level (epidemiological programming) is low. In Homa Bay county, 44% of men were uncircumcised, and almost half of those with multiple partners reported not using a condom at last sex. HIV testing among key populations such female sex workers and men who have sex with men was low. While most (63%) adults living with HIV were on antiretroviral therapy (ART), viral suppression was 55% [23]. KwaZulu-Natal (KZN), South Africa has similar combinations of interacting

epidemiological factors and the HIV prevalence is 24%. About 51% of 25- to 29-year-old women, and 44% of 30- to 34-year-old men are living with HIV [30,31]. Like Nyanza, KZN also has an amplifying STI epidemic (syphilis, gonorrhoea, chlamydia, *Trichomonas vaginalis*). STI prevalence is 13%, and young women under age 25 are at significantly higher risk [32]. About 77% of men have not been circumcised [33], and while viral suppression among those on medication was high among teenagers (68%) and 20- to 24-year olds (87%), overall, ART use was less than 45% among those aged 15 to 34 [34].

In sum, in hyper-endemic settings like these, young women's sexual lives unfold in epidemiological contexts with high community viral loads of HIV and amplifying STIs. Furthermore, high prevalence means they are likely to encounter a partner with HIV, and their most likely sexual partners – men in their 20s and 30s – generally have low rates of circumcision, report relatively low rates of condom use, and among those living with HIV, have relatively low viral suppression. This combination of interacting epidemiological factors places young women at significant risk for HIV acquisition [21,35].

2.1.2 | The gendered normative context

When layered on to a dangerous epidemiological context, the gendered normative context works to further amplify young women's HIV risk. Social norms regulate sexual behaviour by

setting “group level expectations for appropriate behavior that result in negative sanctions for people who violate them.” [36, p. 1283, 13]. Gendered community norms set expectations around women’s autonomy, ideal or accepted sexual network structures (e.g. concurrency or serial monogamy), gender power and material exchanges within relationships [37-42]. Community members can be sanctioned through stigma and shaming (e.g. of women seen to have too many relationships or men who do not provide for their partners), leaving relationships, and gender-based violence [43-46]. Further, young women are not operating as individuals, but rather, are embedded within families/households and communities through which gendered norms and expectations may be primarily exerted [47,48].

Hyper-endemic HIV risk environments share similar gendered normative contexts characterized by high levels of women’s autonomy in entering and exiting relationships, but unequal gender power norms within them that are exacerbated when they are transactional [37-40]. Transactional sexual relationships are common in many hyper-endemic settings [5,37-39,41]. A survey in Kisumu, Nyanza’s capital found that 72% of men gave almost 10% of their monthly income to girlfriends in the form of cash, meals, drinks, gifts, transportation and rent support [49] suggesting that men’s provision was a normative expectation. Men who can provide are often older, and age-disparate relationships are associated with HIV acquisition among young women due to limited relationship agency resulting in limited leverage to use or insist on prevention technologies such as condoms and HIV testing [5,37,50-52].

It is important to note that gender and relationship norms also amplify men’s HIV risk. Masculinity norms in many historically polygamous cultures are supportive of concurrency, and may also lead to men’s lower uptake of HIV testing and treatment [5,53-56]. In Uganda, for example, concurrent men found couple HIV testing challenging [55]. Gendered norms are also embedded in community institutions such as health facilities which are often women-focused and sometimes neglect men [57-59].

Overall, the gendered normative context encourages young women to pursue the riskiest partners in their community – men in their 20s and 30s who are able to provide, but who are also more likely to afford and have cultural support in seeking multiple partners, and who are less likely to be reached by epidemiological programming.

2.1.3 | Gendered economic contexts and environmental contexts

Many hyper-endemic settings also have similar economic configurations characterized by widespread inequality and poor employment opportunities [31,60,61]. This contributes to high circular male labour migration to cities, mines, farms, on the road and on water for more lucrative work; women, meanwhile, have relatively limited employment and wage income [5,62-67]. Labour migration has been linked to high rates of concurrency, with patterns of reunion and separation providing regular opportunities for HIV transmission, and serving as bridges between sexual networks in different locations [62,63,65-69]. Female sex work is often symbiotic with labour migration, and places many women at particularly high risk [66,70]. Young women with migrant partners such as fishermen or truck drivers are also especially vulnerable [65-67].

Gendered economies thus amplify the HIV risk environment for young women by creating economic circumstances that can increase their likelihood of being involved in transactional and/or concurrent partnerships with high risk men, as well as commercial sex relationships. This results in a sexual network structure that further exacerbates young women’s vulnerability.

Finally, it is important to note that the environmental context is often an underlying driver of gendered economic contexts. For example, unsustainable agricultural livelihoods may contribute to male out-migration; widows displaced from land may turn to sex work; new resource extraction may attract many more men to an area; and an imbalanced lake eco-system may exacerbate fishermen’s migratory patterns leading to extended sexual networks and increased vulnerability for women [5,65,70,71].

While many features of these social contexts are not unique to hyper-endemic settings, they are distinguished by how they synergistically work together to significantly amplify young women’s HIV vulnerability.

2.2 | How social contexts undermine HIV prevention interventions

There is now a widespread consensus that strategic combinations of multi-level HIV prevention approaches are the way forward, and many hyper endemic settings have been exposed to numerous interventions over the past few decades [13,14,72-79]. The most successful of these have been the widespread roll-out of ART which has led to large-scale reductions in HIV viral load and AIDS mortality, along with voluntary medical male circumcision (VMMC) [31,80-84]. In the following section we discuss how contexts can undermine otherwise efficacious interventions.

2.2.1 | How epidemiological contexts undermine interventions

Epidemiological contexts are often the Achilles heel of HIV prevention interventions. Major pre-exposure prophylaxis (PrEP) trials among young women in high incidence settings have had limited success [18-20]. This might be in part because other interacting factors operating in the epidemiological context were not concurrently engaged through epidemiological programming such as STI test and treat, VMMC, condom use campaigns, and male partner outreach for HIV testing and treatment. Epidemiological programming contributes to reducing the community STI and HIV viral load, thus creating an enabling environment [16] for PrEP to work. Singularly focusing on PrEP places undue weight on the intervention and young women’s high adherence to it to protect themselves from HIV. This “single bullet” approach makes intervention success even more challenging when considering the amplifying effect of gendered normative contexts.

2.2.2 | How gendered normative contexts undermine interventions

Many HIV prevention interventions do not adequately work to meaningfully alter the gendered normative context that will ultimately determine prevention uptake and its long-term sustainability [5,20,85,86]. Unequal gender power norms,

reinforced by age-disparate relationships limit young women's leverage and willingness to regularly use and negotiate prevention technologies such as condoms or PrEP [5,37,43,63,85-87]. This is exacerbated in long-term relationships where the potential for repeated exposure to HIV exists alongside love and trust. Indeed this might explain why couple PrEP interventions have been effective [88-90]. Intervention success may be continually undermined when it is not paired with programming to create enabling community norms governing prevention technologies in ways that engage both women and men. Relevant community institutions such as families and schools which may only support abstinence, and health facilities which might limit access for young unmarried women are also important to engage.

2.2.3 | How gendered economic and environmental contexts undermine interventions

Many promising micro-finance or cash transfer interventions have been conducted with limited impact on HIV incidence with few exceptions [91-96]. Economic interventions can be undermined by synergies between the gendered normative and gendered economic context. Intervention design implicitly or explicitly substitutes male partner provision for intervention programme provision. This aligns with young women's limited economic opportunities and their limited ability to purchase desired goods for themselves. While interventions substitute material provision, however, they do not substitute what that provision also expresses – love and commitment [5,63,97-99]. This is likely exacerbated in hyper-endemic settings with large male migrant populations, where migrants express commitment through remittances or material provision. Furthermore, the short-term nature of interventions suggests that when they end, without associated efforts to stabilize young women's income, risk may be heightened with the renewed search for a partner. Finally, environmental interventions to improve land use or water quality, or to increase employment through opening up new resource extraction economies can undermine HIV prevention interventions if they serve to reinforce gendered economies which predominantly employ and differentially compensate men.

2.3 | Mapping and strategically utilizing the Intervention context

As Figure 1 illustrates, new interventions enter into a large ecology of pre-existing social and programmatic contexts that may enable, undermine or have a neutral effect on their ability to achieve their goals. The synergistic nature of contextual drivers of hyper-endemics highlights the importance of analysing and utilizing the intervention context to achieve incidence control.

An important first step is to map out the pre-existing intervention context in a given setting, and then locate the new intervention – and its intended mechanisms to reduce HIV incidence – within it. This will enable intervention designers to clearly see potential barriers and/or catalysts to their proposed intervention. Fully mapping the intervention context also enables designers to assess how much weight is being placed on the new intervention to achieve incidence control, and whether a longer duration or multi-level approach might

increase the chances of success [13]. Finally, mapping the intervention context prior to intervention initiation would enable more systematic post-intervention analyses of why similar interventions worked in some settings and not in others [13,15], and ultimately, guide decisions about whether and under what conditions an intervention should be scaled up.

Mapping the intervention context also enables a strategic utilization of pre-existing features of social and programmatic contexts to increase the chances of intervention success. For example, intervening at multiple levels may be beyond the funding scope of an intervention; however, as noted earlier, numerous interventions are often ongoing in hyper-endemic settings [100]. When mapped, programming synergies become visible; they may preclude the need for a combination approach within a given intervention, or enable strategic planning of the most effective combinations given what already exists. Combination prevention interventions such as DREAMS would require different kinds of coordination with pre-existing programming than those aimed at one level (e.g. VMMC or PrEP), but which might need new supportive programming at different levels. An important coordinating role could be played by governments and sub-regional local authorities who typically engage in multi-sectoral planning, as many interventions within an intervention context aimed at HIV prevention might align well with broader community development goals.

3 | CONCLUSIONS

Each year, millions of adolescent African girls begin their sexual debut in hyper-endemic settings where one-fifth to one-third will be HIV positive by the time they are in their late 20s and early 30s. This commentary has examined how contextual drivers might contribute to stalling epidemics, and how they might be deployed to maximize HIV prevention. Understanding how contexts synergistically work together in hyper-endemic settings, and fully mapping and strategically utilizing the intervention context could enable sustained momentum in reducing HIV incidence among young women, and limiting the reach of the HIV pandemic into new generations of Africans.

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COMPETING INTERESTS

The authors report no competing interests.

AUTHORS' CONTRIBUTIONS

S.M. wrote the first draft of the manuscript. J.W. contributed to writing the manuscript. Both authors approved the final draft.

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DISCLAIMER

The authors wrote the manuscript, and had final responsibility for paper design, analysis, writing and submission to the journal.

REFERENCES

1. UNAIDS. 2018: fact sheet July 2018 [cited 2018 Sep 25]. Available at: http://www.unaids.org/sites/default/files/media_asset/UNAIDS_FactSheet_en.pdf
2. Shisana O, Rehle T, Simbayi LC, Zuma K, Jooste S, Zungu N, et al. South African national HIV prevalence, incidence and behaviour survey, 2012. Cape Town: HSRC Press; 2014.
3. PRB. World population data sheet. Population Reference Bureau. 2018.
4. UNAIDS. All in to end the adolescent AIDS epidemic: a progress report. 2016 [cited 2018 Sep 25]. Available at: <http://www.unaids.org/en/resources/documents/2016/ALLIN2016ProgressReport>
5. Mojola SA. Love, money, and HIV: becoming a modern African woman in the age of AIDS. Oakland, CA: University of California Press; 2014.
6. Saul J, Bachman G, Allen S, Toiv NF, Cooney C. The DREAMS core package of interventions: a comprehensive approach to preventing HIV among adolescent girls and young women. PLoS ONE. 2018;13(12):e0208167.
7. Principles of epidemiology in public health practice, third edition. An introduction to applied epidemiology and biostatistics. [cited 2019 Mar 18]. Available at: <https://www.cdc.gov/opphss/csels/dsepd/ss1978/lesson1/section11.html>
8. Joint United Nations Programme on HIV/AIDS (UNAIDS) and World Health Organization. Practical Guidelines for Intensifying HIV Prevention; Towards Universal Access. Geneva, Switzerland: UNAIDS; 2007. ISBN 978 92 9173 557 0 (NLM classification: WC 5032).
9. Cuadros DF, Branscum AJ, Mukandavire Z. Temporal stability of HIV prevalence in high-burden areas regardless of declines in national HIV prevalence in Malawi and Zimbabwe. AIDS. 2018;32(10):1381–3.
10. McGillen JB, Anderson SJ, Dybul MR, Hallett TB. Optimum resource allocation to reduce HIV incidence across sub-Saharan Africa: a mathematical modelling study. Lancet HIV. 2016;3(9):e441–8.
11. Meyer-Rath G, McGillen JB, Cuadros DF, Hallett TB, Bhatt S, Wabiri N, et al. Targeting the right interventions to the right people and places: the role of geospatial analysis in HIV program planning. AIDS. 2018;32(8):957.
12. Wand H, Ramjee G. Targeting the hotspots: investigating spatial and demographic variations in HIV infection in small communities in South Africa. J Int AIDS Soc. 2010;13(1):41.
13. Auerbach JD, Parkhurst JO, Caceres CF. Addressing social drivers of HIV/AIDS for long-term response: conceptual and methodological considerations. Glob Public Health. 2011;6 Suppl 3:S293–309.
14. Blankenship KM, Friedman SR, Dworkin S, Mantell JE. Structural interventions: concepts, challenges and opportunities for research. J Urban Health. 2006;83(1):59–72.
15. Gupta GR, Parkhurst JO, Ogden JA, Aggleton P, Mahal A. Structural approaches to HIV prevention. Lancet. 2008;372(9640):764–75.
16. Hardee K, Gay J, Croce-Galis M, Peltz A. Strengthening the enabling environment for women and girls: what is the evidence in social and structural approaches in the HIV response? J Int AIDS Soc. 2014;17:18619.
17. Jewkes R, Nduna M, Levin J, Jama N, Dunkle K, Puren A, et al. Impact of Stepping Stones on incidence of HIV and HSV-2 and sexual behaviour in rural South Africa: cluster randomised controlled trial. BMJ. 2008;337:a506.
18. Van Damme L, Corneli A, Ahmed K, Agot K, Lombaard J, Kapiga S, et al. Preexposure prophylaxis for HIV infection among African women. N Engl J Med. 2012;367(5):411–22.
19. Murraro JM, Ramjee G, Richardson BA, Gomez K, Mgodini N, Nair G, et al. Tenofovir-based preexposure prophylaxis for HIV infection among African women. N Engl J Med. 2015;372(6):509–18.
20. Celum CL, Delany-Moretlwe S, McConnell M, Van Rooyen H, Bekker LG, Kurth A, et al. Rethinking HIV prevention to prepare for oral PrEP implementation for young African women. J Int AIDS Soc. 2015;18:20227.
21. Dellar RC, Dlamini S, Karim QA. Adolescent girls and young women: key populations for HIV epidemic control. J Int AIDS Soc. 2015;18:19408.
22. NASCOP, NACC. Kenya HIV prevention revolution road map: countdown to 2030. Nairobi: Government of Kenya; 2014. 13 p.
23. NASCOP. Kenya HIV county profiles. Nairobi, Kenya: National AIDS and STI Control Programme. 2016.
24. Mugo N, Dadabhai SS, Bunnell R, Williamson J, Bennett E, Baya I, et al. Prevalence of Herpes simplex virus type 2 infection, Human immunodeficiency virus/Herpes simplex virus type 2 coinfection, and associated risk factors in a national, population-based survey in Kenya. Sex Transm Dis. 2011;38(11):1059–66.
25. Freeman EE, Weiss HA, Glynn JR, Cross PL, Whitworth JA, Hayes RJ. Herpes simplex virus 2 infection increases HIV acquisition in men and women: systematic review and meta-analysis of longitudinal studies. AIDS. 2006;20(1):73–83.
26. Fleming DT, Wasserheit JN. From epidemiological synergy to public health policy and practice: the contribution of other sexually transmitted diseases to sexual transmission of HIV infection. Sex Transm Infect. 1999;75(1):3–17.
27. Røttingen JA, Cameron DW, Garnett GP. A systematic review of the epidemiologic interactions between classic sexually transmitted diseases and HIV: how much really is known? Sex Transm Dis. 2001;28(10):579–97.
28. Westercamp N, Mattson CL, Bailey RC. Measuring prevalence and correlates of concurrent sexual partnerships among young sexually active men in Kisumu, Kenya. AIDS Behav. 2013;17(9):3124–32.
29. Morris M, Kretzschmar M. Concurrent partnerships and the spread of HIV. AIDS. 1997;11(5):641–648. Morris paper on concurrency.
30. Welz T, Hosegood V, Jaffar S, Bätzing-Feigenbaum J, Herbst K, Newell ML. Continued very high prevalence of HIV infection in rural KwaZulu-Natal, South Africa: a population-based longitudinal study. AIDS. 2007;21(11):1467–72.
31. Tanser F, Bärnighausen T, Grapsa E, Zaidi J, Newell ML. High coverage of ART associated with decline in risk of HIV acquisition in rural KwaZulu-Natal, South Africa. Science. 2013;339(6122):966–71.
32. Naidoo S, Wand H, Abbai NS, Ramjee G. High prevalence and incidence of sexually transmitted infections among women living in KwaZulu-Natal, South Africa. AIDS Res Ther. 2014;11(1):31.
33. Zungu NP, Simbayi LC, Mabaso M, Evans M, Zuma K, Ncitakalo N, et al. HIV risk perception and behavior among medically and traditionally circumcised males in South Africa. BMC Public Health. 2016;16(1):357.
34. Hueriga H, Shiferie F, Grebe E, Giuliani R, Farhat JB, Van-Cutsem G, et al. A comparison of self-report and antiretroviral detection to inform estimates of antiretroviral therapy coverage, viral load suppression and HIV incidence in KwaZulu-Natal, South Africa. BMC Infect Dis. 2017;17(1):653.
35. Karim QA, Baxter C, Bix D. Prevention of HIV in adolescent girls and young women: key to an AIDS-free generation. J Acquir Immune Defic Syndr. 2017;75:S17–26.
36. Mollborn S, Sennott C. Bundles of norms about teen sex and pregnancy. Qual Health Res. 2015;25(9):1283–99.
37. Luke N. Age and economic asymmetries in the sexual relationships of adolescent girls in sub-Saharan Africa. Stud Fam Plann. 2003;34(2):67–86.
38. Wamoyi J, Fenwick A, Urassa M, Zaba B, Stones W. 'Women's Bodies are Shops': beliefs about transactional sex and implications for understanding gender power and HIV prevention in Tanzania. Arch Sex Behav. 2011;40(1):5–15.
39. Stoebenau K, Heise L, Wamoyi J, Bobrova N. Revisiting the understanding of "transactional sex" in sub-Saharan Africa: a review and synthesis of the literature. Soc Sci Med. 2016;168:186–97.
40. Pulerwitz J, Mathur S, Woznica D. How empowered are girls/young women in their sexual relationships? Relationship power, HIV risk, and partner violence in Kenya. PLoS ONE. 2018;13(7):e0199733.
41. Hunter N. The materiality of everyday sex: thinking beyond 'prostitution'. Afr Stud. 2002;61(1):99–120.
42. Bhana D, Pattman R. Girls want money, boys want virgins: the materiality of love amongst South African township youth in the context of HIV and AIDS. Cult Health Sex. 2011;13(8):961–72.
43. Fielding-Miller R, Dunkle K, Jama-Shai N, Windle M, Hadley C, Cooper HLF. The feminine ideal and transactional sex: navigating respectability and risk in Swaziland. Soc Sci Med. 2016;158:24–33.
44. Schatz E. 'Take your Mat and Go!': rural Malawian women's strategies in the HIV/AIDS era. Cult Health Sex. 2005;7(5):479–92.
45. Reniers G. Marital strategies for regulating exposure to HIV. Demography. 2008;45(2):417–38.
46. Zembe YZ, Townsend L, Thorson A, Silberschmidt M, Ekstrom AM. Intimate partner violence, relationship power inequity and the role of sexual and social risk factors in the production of violence among young women who have multiple sexual partners in a peri-urban setting in South Africa. PLoS ONE. 2015;10(11):e0139430.

47. Wamoyi J, Wight D, Remes P. The structural influence of family and parenting on young people's sexual and reproductive health in rural northern Tanzania. *Cult Health Sex.* **2015**;17(6):718–32.
48. Okigbo CC, Kabiru CW, Mumah JN, Mojola SA, Beguy D. Influence of parental factors on adolescents' transition to first sexual intercourse in Nairobi, Kenya: a longitudinal study. *Reprod Health.* **2015**;12(1):73.
49. Luke N. Exchange and condom use in informal sexual relationships in urban Kenya. *Econ Dev Cult Change.* **2006**;54(2):319–48.
50. De Oliveira T, Kharsany AB, Gräff T, Cawood C, Khanyile D, Grobler A, et al. Transmission networks and risk of HIV infection in KwaZulu-Natal, South Africa: a community-wide phylogenetic study. *Lancet HIV.* **2017**;4(1):e41–50.
51. Schaefer R, Gregson S, Eaton JW, Mugurungi O, Rhead R, Takaruzza A, et al. Age-disparate relationships and HIV incidence in adolescent girls and young women: evidence from Zimbabwe. *AIDS.* **2017**;31(10):1461.
52. Gregson S, Mugurungi O, Eaton J, Takaruzza A, Rhead R, Maswera R, et al. Documenting and explaining the HIV decline in east Zimbabwe: the Manicaland General Population Cohort. *BMJ Open.* **2017**;7(10):e015898.
53. Tomori C, Francisco LV, Kennedy CE, Kajula-Maonga L, Likindikoki S, Babalola SO, et al. The changing cultural and economic dynamics of polygyny and concurrent sexual partnerships in Iringa, Tanzania. *Glob Public Health.* **2013**;8(7):857–70.
54. Hunter M. Masculinities, multiple-sexual-partners, and AIDS: the making and unmaking of Isoka in KwaZulu-Natal. *Transformation.* **2004**;54(1):123–53.
55. Siu GE, Wight D, Seeley JA. Masculinity, social context and HIV testing: an ethnographic study of men in Busia district, rural eastern Uganda. *BMC Public Health.* **2014**;14(1):33.
56. Skovdal M, Campbell C, Madanhire C, Mupambireyi Z, Nyamukapa C, Gregson S. Masculinity as a barrier to men's use of HIV services in Zimbabwe. *Global Health.* **2011**;7(1):13.
57. Cornell M, McIntyre J, Myer L. Men and antiretroviral therapy in Africa: our blind spot. *Trop Med Int Health.* **2011**;16(7):828–9.
58. Shand T, Thomson-de Boer H, van den Berg W, Peacock D, Pascoe L. The HIV blind spot: men and HIV testing, treatment and care in sub-Saharan Africa. *IDS Bulletin.* **2014**;45(1):53–60.
59. Dovel K, Yeatman S, Watkins S, Poulin M. Men's heightened risk of AIDS-related death: the legacy of gendered HIV testing and treatment strategies. *AIDS.* **2015**;29(10):1233.
60. Magadi MA. The disproportionate high risk of HIV infection among the urban poor in sub-Saharan Africa. *AIDS Behav.* **2013**;17(5):1645–54.
61. Fox AM. The HIV-poverty thesis re-examined: poverty, wealth or inequality as a social determinant of HIV infection in sub-Saharan Africa? *J Biosoc Sci.* **2012**;44(4):459–80.
62. 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(15):2245–52.
63. Hunter M. *Love in the time of AIDS: inequality, gender, and rights in South Africa.* Bloomington, Indiana: Indiana University Press; **2010**.
64. Boerma JT, Gregson S, Nyamukapa C, Urassa M. Understanding the uneven spread of HIV within Africa: comparative study of biologic, behavioral, and contextual factors in rural populations in Tanzania and Zimbabwe. *Sex Transm Dis.* **2003**;30(10):779–87.
65. Mojola SA. Fishing in dangerous waters: ecology, gender and economy in HIV risk. *Soc Sci Med.* **2011**;72(2):149–56.
66. Kohli A, Kerrigan D, Brahmhatt H, Likindikoki S, Beckham J, Mwampashi A, et al. Social and structural factors related to HIV risk among truck drivers passing through the Iringa region of Tanzania. *AIDS Care.* **2017**;29(8):957–60.
67. Kwena ZA, Bukusi E, Omondi E, Ng'ayo M, Holmes KK. Transactional sex in the fishing communities along Lake Victoria, Kenya: a catalyst for the spread of HIV. *Afr J AIDS Res.* **2012**;11(1):9–15.
68. Morris M, Podhisita C, Wawer MJ, Handcock MS. Bridge populations in the spread of HIV/AIDS in Thailand. *AIDS.* **1996**;10(11):1265–71.
69. Mojola SA, Williams J, Angotti N, Gómez-Olivé FX. HIV after 40 in rural South Africa: a life course approach to HIV vulnerability among middle aged and older adults. *Soc Sci Med.* **2015**;143:204–12.
70. Elmes J, Skovdal M, Nhongo K, Ward H, Campbell C, Hallett TB, et al. A reconfiguration of the sex trade: how social and structural changes in eastern Zimbabwe left women involved in sex work and transactional sex more vulnerable. *PLoS ONE.* **2017**;12(2):e0171916.
71. Dworkin SL, Grabe S, Lu T, Hatcher A, Kwena Z, Bukusi E, et al. Property rights violations as a structural driver of women's HIV risks: a qualitative study in Nyanza and Western Provinces, Kenya. *Arch Sex Behav.* **2013**;42(5):703–13.
72. Padian NS, McCoy SI, Karim SS, Hasen N, Kim J, Bartos M, et al. HIV prevention transformed: the new prevention research agenda. *Lancet.* **2011**;378(9787):269–78.
73. Brown G, Reeders D, Dowsett GW, Ellard J, Carman M, Hendry N, et al. Investigating combination HIV prevention: isolated interventions or complex system. *J Int AIDS Soc.* **2015**;18(1):20499.
74. Hargreaves JR, Delany-Moretlwe S, Hallett TB, Johnson S, Kapiga S, Bhat-tacharjee P, et al. The HIV prevention cascade: integrating theories of epidemiological, behavioural, and social science into programme design and monitoring. *Lancet HIV.* **2016**;3(7):e318–22.
75. Dehne KL, Dallabetta G, Wilson D, Garnett GP, Laga M, Benomar E, et al. HIV prevention 2020: a framework for delivery and a call for action. *Lancet HIV.* **2016**;3(7):e323–32.
76. Coates TJ, Richter L, Caceres C. Behavioural strategies to reduce HIV transmission: how to make them work better. *Lancet.* **2008**;372(9639):669–84.
77. Gibbs A, Willan S, Misselhorn A, Mangoma J. Combined structural interventions for gender equality and livelihood security: a critical review of the evidence from southern and eastern Africa and the implications for young people. *J Int AIDS Soc.* **2012**;15:1–10.
78. Ross DA. Behavioural interventions to reduce HIV risk: what works?. *AIDS.* **2010**;24 Suppl 4:S4–14.
79. Harrison A, Colvin CJ, Kuo C, Swartz A, Lurie M. Sustained high HIV incidence in young women in Southern Africa: social, behavioral, and structural factors and emerging intervention approaches. *Curr HIV/AIDS Rep.* **2015**;12(2):207–15.
80. Gargano JW, Laserson K, Muttai H, Odhiambo F, Orimba V, Adamu-Zeh M, et al. The adult population impact of HIV care and antiretroviral therapy in a resource poor setting, 2003–2008. *AIDS.* **2012**;26(12):1545–54.
81. Grabowski MK, Serwadda DM, Gray RH, Nakigozi G, Kigozi G, Kagaayi J, et al. HIV prevention efforts and incidence of HIV in Uganda. *N Engl J Med.* **2017**;377(22):2154–66.
82. Gray RH, Kigozi G, Serwadda D, Makumbi F, Watya S, Nalugoda F, et al. Male circumcision for HIV prevention in men in Rakai, Uganda: a randomised trial. *Lancet.* **2007**;369(9562):657–66.
83. Auvert B, Taljaard D, Lagarde E, Sobngwi-Tambekou J, Sitta R, Puren A. Randomized, controlled intervention trial of male circumcision for reduction of HIV infection risk: the ANRS 1265 Trial. *PLoS Med.* **2005**;2(11):e298.
84. Bailey RC, Moses S, Parker CB, Agot K, Maclean I, Krieger JN, et al. Male circumcision for HIV prevention in young men in Kisumu, Kenya: a randomised controlled trial. *Lancet.* **2007**;369(9562):643–56.
85. Mugo NR, Ngunjiri K, Kiragu M, Irungu E, Kilonzo N. PrEP for Africa: what we have learnt and what is needed to move to program implementation. *Curr Opin HIV AIDS.* **2016**;11(1):80.
86. Atujuna M, Newman PA, Wallace M, Eluhu M, Rubincam C, Brown B, et al. Contexts of vulnerability and the acceptability of new biomedical HIV prevention technologies among key populations in South Africa: a qualitative study. *PLoS ONE.* **2018**;13(2):e0191251.
87. Jama Shai N, Jewkes R, Levin J, Dunkle K, Nduna M. Factors associated with consistent condom use among rural young women in South Africa. *AIDS Care.* **2010**;22(11):1379–85.
88. Cohen MS, Chen YQ, McCauley M, Gamble T, Hosseinipour MC, Kumarasamy N, et al. Prevention of HIV-1 infection with early antiretroviral therapy. *N Engl J Med.* **2011**;365(6):493–505.
89. Baeten JM, Donnell D, Ndase P, Mugo NR, Campbell JD, Wangisi J, et al. Antiretroviral prophylaxis for HIV prevention in heterosexual men and women. *N Engl J Med.* **2012**;367(5):399–410.
90. Ware NC, Wyatt MA, Haberer JE, Baeten JM, Kintu A, Psaros C. What's love got to do with it? Explaining adherence to oral antiretroviral pre-exposure prophylaxis (PrEP) for HIV serodiscordant couples. *J Acquir Immune Defic Syndr.* **2012**;59(5):463–8.
91. 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(9551):1973–83.
92. Dworkin SL, Blankenship K. Microfinance and HIV/AIDS prevention: assessing its promise and limitations. *AIDS Behav.* **2009**;13(3):462–9.
93. Baird SJ, Garfein RS, McIntosh CT, Özler B. Effect of a cash transfer programme for schooling on prevalence of HIV and Herpes simplex type 2 in Malawi: a cluster randomised trial. *Lancet.* **2012**;379(9823):1320–9.
94. Handa S, Halpern CT, Pettifor A, Thirumurthy H. The government of Kenya's cash transfer program reduces the risk of sexual debut among young people age 15–25. *PLoS ONE.* **2014**;9(1):e85473.
95. Pettifor A, MacPhail C, Hughes JP, Selin A, Wang J, Gómez-Olivé FX, et al. The effect of a conditional cash transfer on HIV incidence in young women in rural South Africa (HPTN 068): a phase 3, randomised controlled trial. *Lancet Global Health.* **2016**;4(12):e978–88.

96. Cui RR, Lee R, Thirumurthy H, Muessig KE, Tucker JD. Microenterprise development interventions for sexual risk reduction: a systematic review. *AIDS Behav.* **2013**;17(9):2864–77.
97. Poulin M. Sex, money, and premarital partnerships in southern Malawi. *Soc Sci Med.* **2007**;65(11):2383–93.
98. Mojola SA. Multiple transitions and HIV risk among orphaned Kenyan schoolgirls. *Stud Fam Plann.* **2011**;42(1):29–40.
99. Mojola SA. Material girls and material love: consuming femininity and the contradictions of post-girl power among Kenyan schoolgirls. *Continuum.* **2015**;29(2):218–29.
100. Wamoyi J, Mshana G, Mongi A, Neke N, Kapiga S, Changalucha J. A review of interventions addressing structural drivers of adolescents' sexual and reproductive health vulnerability in sub-Saharan Africa: implications for sexual health programming. *Reprod Health.* **2014**;11(1):88.