One step ahead: timing and sexual networks in population mobility and HIV prevention and care

Susan Cassels1, Carol S Camlin2,3 and Janet Seeley4

Keywords: time; networks; universal test and treat; bridging; sexual risk behaviour; HIV care cascade

INTRODUCTION

Population mobility comes in heterogeneous forms and is triggered by many drivers. The diverse contexts of mobility can significantly influence the effectiveness of HIV prevention and care, as the contributions to this volume highlight. Nevertheless, some fundamental concepts are common across various forms of mobility. Two such concepts are time and sexual networks: mobility occurs in a space-time continuum, and migrants are situated within social and sexual networks. In this viewpoint, we argue that a closer examination of how (1) time scales of mobility and (2) sexual network characteristics of migrants present challenges to effective HIV prevention can help to optimize interventions.

TIME

We must consider time as well as space when conceptualizing and examining how migration might affect HIV prevention and care, including Universal Test and Treat (UTT) interventions. Forms of population mobility, especially in sub-Saharan Africa, are complex and often characterized by multiple rounds of travel, seasonal migration [1] or movement events in time [2-5]. Circular migration, where migrants leave home to work (or for other reasons) but frequently return home before leaving again, is also common, especially in South Africa [6, 7]. Sexual risk behaviour of circular migrants vary over time as well: before migrating, while away and after returning home [8,9].

Basic concepts of epidemiology will predict an association between migration and the effect of an intervention if we assume a dose-response relationship: the more the exposure to an effective HIV intervention, the larger the response. Thus, the timing of migration and chances of exposure to interventions matter for effective outcomes. For example, during a community trial of UTT, a circular migrant will not be exposed to the same level of messaging and linkage to care efforts compared with non-migrants in their place of origin [10]. Additionally, treatment and prevention services may not reach migrants arriving in a new destination. Campaigns to increase HIV testing may miss new arrivals; they may not know where to get tested in an unfamiliar place, or may face political and structural barriers to care, such as those related to legal documentation status [11].

A recent longitudinal study in Uganda [12] found that HIV incidence decreased for permanent residents over time and scale-up of combination prevention efforts, but the same decline was not observed for migrants who had recently arrived. Similar evidence emerged in fishing villages in Uganda, where individuals who had been in the community for less than five years showed higher rates of seroconversion than longer term residents [13].

Migrants often exhibit riskier sexual behaviour while away from home compared with non-migrants [14-16], possibly due to an enabling environment. Moreover, behaviours of migrants vary with respect to timing of migration events as well, and seemingly converge to levels of risk behaviour of non-migrants over time [12]. Therefore, the timing of engagement into HIV care for migrants may be doubly important. Because of the non-linear nature of HIV transmission dynamics and potential for engagement in risky behaviour, a migrant disengaged from HIV care could contribute to a disproportionate amount of ongoing HIV transmission over space and time [17].

Time is also important when considering the particular stage of a person’s life in which migration takes place. Following a life-course approach [18], a younger woman may be confronted by challenges to prevention and care that are different from those of an older woman, or indeed a man of any age. A migrant’s life is situated within social relationships, and the social timing of mobility, such as moving when a single woman, a parent or a widow, impacts behaviour. For example, a single woman may face particular challenges because being seen as alone and available; travelling as a mother without her children, she may be anxious about their care and safety. If
she travels with children, she will need to find safe accommodation and time to care for them. Mobility is also situated in historical time: when someone moves, it exposes that person to constraints and opportunities that may differ from those of someone moving to the same place a decade earlier or later (this is termed, in demography, a “cohort effect”). Finally, there are variations in the extent people can influence the course of their life through the choices they make about mobility, sexual behaviour, prevention and care. If a young woman is struggling to find work in a place she has moved to, she may turn to transactional sex to gain access to food or shelter; this may make her vulnerable to sexually transmitted infections, violence and abuse. Human agency can be influenced by many factors: gender, age, socio-economic status, where one comes from and where one moves [19,20].

3 | SEXUAL NETWORKS

Sexual transmission of HIV occurs within structured sexual networks [21-23] and the characteristics of sexual networks can influence the effectiveness of UTT. For migrants, the period after migration is often associated with instability and detachment from family, friends and previous community, with fewer constraints from social norms governing sexual behaviours [24,25]. The structure and context of migrant sexual networks are critical for understanding risks of HIV transmission [26] and the effectiveness of prevention interventions: the location (place) and timing of sexual ties can interrupt or dilute the effectiveness of interventions such as UTT. Migrant networks can bridge otherwise separate places and contribute to ongoing HIV transmission by engaging in sex acts in different places or maintaining relationships with sexual partners who live in different places [27]. The reverse is also possible, but less examined: migration can bridge places with different UTT coverage and interrupt the effectiveness of interventions. For example, large flows of migrants arriving in a new destination could reduce the proportion of a population on antiretroviral therapy below a critical threshold so that HIV could continue to circulate. Therefore, public health surveillance needs to account for both permanent and temporary migration flows.

The timing and sequence of migrant’s sexual partnerships is also an important factor in anticipating and mitigating the effects of mobility on HIV prevention and care. Typically, individuals choose sexual partnerships with people who are similar to them (e.g. age, race/ethnicity) [28]. Sexual partners of mobile individuals may also be migrants or people living outside their home community ( assortative mixing by migration status ) [14,27]. Therefore, a migrant’s partners may lack exposure to the same level of HIV treatment and prevention, and thus have higher rates of HIV infection. The spatial and temporal structure of sexual networks may result in a lower impact (e.g. population-level incidence) given the same amount of effort/intervention.

4 | ONE STEP AHEAD

As evidenced by the articles in this supplement, population mobility is complex. Nevertheless, there exist some fundamental concepts that we can rely on to understand when and why mobility presents challenges for HIV prevention and care, and how to improve interventions. Since timing of mobility can influence the effectiveness of HIV prevention efforts, the roll-out of interventions needs to account for time and potential missing populations. For example, seasonal patterns of mobility can be used to strategize and optimize interventions. For example, in Niger, seasonal migration patterns were estimated with satellite imagery in order to predict the most effective time for a measles vaccination campaign [29]. Second, spatial and temporal characteristics of migrant sexual networks may reduce intervention effectiveness, but a network perspective can be leveraged to improve or broaden interventions as well. For instance, mobile individuals can distribute HIV self-tests or deliver antiretroviral drugs to partners, possibly obtaining a broader coverage of testing or treatment as prevention than otherwise possible with individual interventions. Knowledge of the mobility of specific populations in specific settings can be used to inform, fine-tune, and thus amplify the potential effectiveness of differentiated care models as well as HIV prevention interventions. Such interventions are urgently needed to enable migrants to maintain their health and that of their sexual partners [30].

AUTHORS’ AFFILIATIONS

1Department of Geography, University of California, Santa Barbara, CA, USA; 2Department of Obstetrics, Gynecology and Reproductive Sciences, University of California, San Francisco, CA, USA; 3Department of Medicine, University of California, San Francisco, CA, USA; 4Department of Global Health and Development, London School of Hygiene and Tropical Medicine, London, UK. 

REFERENCES

1. Pison G, Le Guenno B, Lagarde E, Enel C, Seck C. Seasonal migration: a risk factor for HIV infection in rural Senegal. J Acquir Immune Defic Syndr. 1993; 6(2):196–200.
2. Hoddinott G, Myburgh H, de Villiers L, Nkubani R, Mantantana J, Thomas A, et al. Households, fluidity, and HIV service delivery in Zambia and South Africa – an exploratory analysis of longitudinal qualitative data from the HPTN 071 (PopART) trial. J Int AIDS Soc. 2018;21(S4):e25135.
3. Shabalala FS, Vernooy E, Pell C, Simelane N, Masilela N, Spiegelman D, et al. Understanding reasons for discontinued antiretroviral treatment among clients in test and treat: a qualitative study in Swaziland. J Int AIDS Soc. 2018; 21(S4):e25120.
4. Phillips TK, Clouse K, Zerbe A, Orrell C, Abrams EJ, Myer L. Linkage to care, mobility and retention of HIV-positive postpartum women in antiretroviral therapy services in South Africa. J Int AIDS Soc. 2018;21(S4):e25114.
5. Clouse K, Fox MP, Mongwenyana C, Motlhatlhedi M, Buthelezi S, Bokaba D, et al. "I will leave the baby with my mother": Long-distance travel and follow-up care among HIV-positive pregnant and postpartum women in South Africa. J Int AIDS Soc. 2018;21(S4):e25121.
6. Clark SJ, Collinson MA, Kahn K, Drullinger K, Tollman SM. Returning home to die: circular labour migration and mortality in South Africa. Scand J Public Health Suppl. 2007;69:35–44.
7. Collinson M, Tollman S, Kahn K, Clark S, Garenne M. Highly prevalent circular migration: households, mobility and economic status in rural South Africa. In: Africa On the Move: African Migration and Urbanisation in Comparative Perspective. Tienda M, Findley S, Tollman S, Preston-Whyte E (eds). Johannesburg: Wits University Press; 2006: pp. 194–216.
8. Cassels S, Jenness SM, Khanna AS. Conceptual framework and research methods for migration and HIV transmission dynamics. AIDS Behav. 2014;18(12):2302–13.
9. Camlin CS, Akullian A, Neilands TB, Getahun M, Euyal P, Maeri I, et al. Population mobility associated with higher risk sexual behaviour in eastern African communities participating in a Universal Testing and Treatment trial. J Int AIDS Soc. 2018;21(S4):e25115.
10. Larmarange J, Diarlo MH, McGrath N, Iwuji C, Plazy M, Thébault R, et al. The impact of population dynamics on the population HIV care cascade: results from the ANRS 12249 Treatment as Prevention trial in rural KwaZulu-Natal (South Africa). J Int AIDS Soc. 2018;21(S4):e25128.
11. Burns FM, Imrie JY, Nazroo J, Johnson AM, Fenton KA. Why the (y) wait? Key informant understandings of factors contributing to late presentation and poor utilization of HIV health and social care services by African migrants in Britain. AIDS Care. 2007;19(1):102–8.
12. Olawore O, Tobian AAR, Kagaayi J, Bazaale JM, Nantume B, Kigozi G, et al. Migration and risk of HIV acquisition in Rakai, Uganda: a population-based cohort study. Lancet HIV. 2018;5(4):e181–9.
13. Seeley J, Nakiyengu-Miro J, Kamali A, Mpendo J, Asiki G, Abaasa A, et al. High HIV incidence and socio-behavioral risk patterns in fishing communities on the shores of Lake Victoria, Uganda. Sex Transm Dis. 2012;39(6):433–9.
14. McGrath N, Eaton JW, Newell ML, Hosegood V, Migration, sexual behaviour, and HIV risk: a general population cohort in rural South Africa. Lancet HIV. 2015;2(6):e252–9.
15. Camlin CS, Kwena ZA, Dworkin SL, Cohen CR, Bukusi EA. “She mixes her business”: HIV transmission and acquisition risks among female migrants in western Kenya. Soc Sci Med. 2014;102:146–56.
16. Davies AA, Basten A, Frattini C. Migration: a social determinant of the health of migrants. Eurohealth. 2009;16(1):10–2.
17. Coffee MP, Garnett GP, Mlilo M, Voeten HA, Chandiwana S, Gregson S. Patterns of movement and risk of HIV infection in rural Zimbabwe. J Infect Dis. 2005;191(Suppl 1):S159–67.
18. Elder GH. Time, human agency, and social change: Perspectives on the life course. Social Psychol Q. 1994;57(1):4–15.
19. Giele JZ, Elder GH. Methods of life course research: Qualitative and quantitative approaches. Thousand Oaks: Sage; 1998.
20. Seeley J. HIV and East Africa: Thirty years in the shadow of an epidemic. Basingstoke: Routledge; 2015.
21. Helleringer S, Kohler H-P. Sexual network structure and the spread of HIV in Africa: evidence from Likoma Island, Malawi. AIDS. 2007;21(17):2323–32.
22. Epstein H, Morris M. Concurrent partnerships and HIV: an inconvenient truth. J Int AIDS Soc. 2011;14:13.
23. Morris M, Kretzschmar M. A microsimulation study of the effect of concurrent partnerships on the spread of HIV in Uganda. Math Population Stud. 2000;8(2):109–33.
24. Lippman SA, Pulveritz J, Chinaglia M, Hubbard A, Reingold A, Díaz J. Mobility and its liminal context: exploring sexual partnering among truck drivers crossing the Southern Brazilian border. Soc Sci Med. 2007;65(12):2464–73.
25. Pascoe SJ, Langhaug LF, Mavhu W, Hargreaves J, Jaffar S, Hayes R, et al. Poverty, food insufficiency and HIV infection and sexual behaviour among young rural Zimbabwean women. PLoS ONE. 2015;10(1):e0115290.
26. Platt L, Grenfell P, Fletcher A, Sorhaindo A, Jolley E, Rhodes T, et al. Systematic review examining differences in HIV, sexually transmitted infections and health-related harms between migrant and non-migrant female sex workers. Sex Transm Infect. 2012;89(3):311–319.
27. Cassels S, Jenness SM, Biney AA, Dodo FN-A. Geographic mobility and potential bridging for sexually transmitted infections in Agbogbloshie, Ghana. Soc Sci Med. 2017;184:27–39.
28. Hamilton DT, Morris M. The racial disparities in STI in the US: Concurrency, STI prevalence, and heterogeneity in partner selection. Epidemics. 2015;11:56–61.
29. Bharti N, Djibo A, Tatem AJ, Grenfell BT, Ferrari MJ. Measuring populations to improve vaccination coverage. Sci Rep. 2016;6:34541.
30. Vearey J. Moving forward: why responding to migration, mobility and HIV in South[ern] Africa is a public health priority. J Int AIDS Soc. 2018; 21(54):e25137.