Estimated HIV risk around funeral practices and mitigation strategies in western Kenya: A mathematical modeling study

HIV risk and role of biomedical, bio-behavioral, and structural interventions
for adolescents and young adults participating in traditional funeral practices in western Kenya

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2024 IDM Annual Symposium

NIH National Institute of Mental Health

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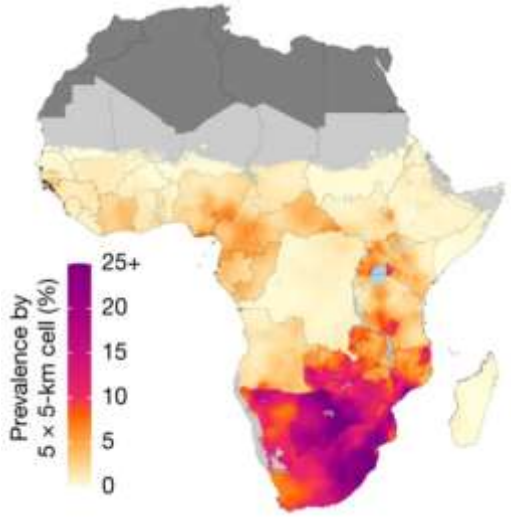
Background: HIV Prevalence in Africa

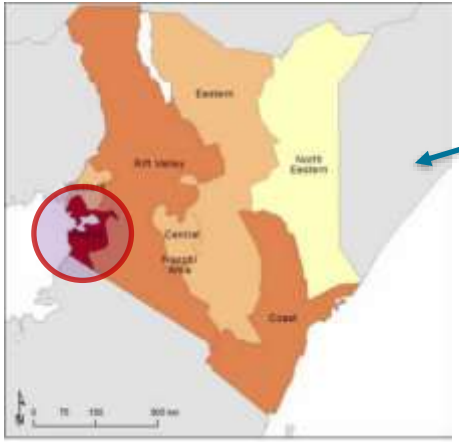
- There are many areas of high HIV incidence and prevalence (hotspots) in sub-Saharan Africa (SSA)

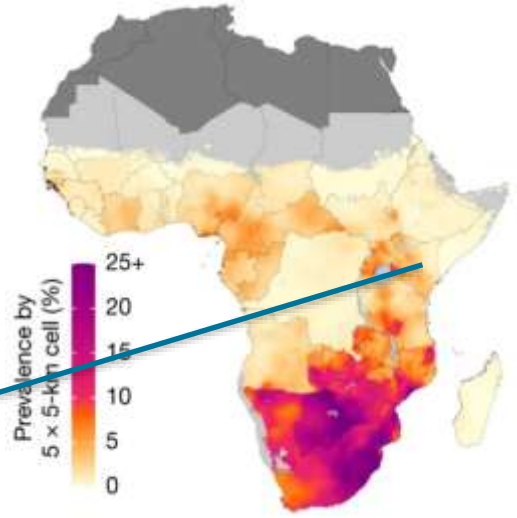


Spatial pattern of HIV prevalence in SSA

Background: HIV Prevalence in Africa

- There are many areas of high HIV incidence and prevalence (hotspots) in sub-Saharan Africa (SSA)
- Nyanza region in Kenya is significantly affected by HIV/AIDs, with rates up to 15% - 28%.





Spatial pattern of HIV prevalence in SSA

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Background: Disco Matanga

- Disco funeral or Disco Matanga is a collective term used to describe dancing parties that accompany funeral festivities in many part of Kenya
- Disco funerals can be defined as parties held by the relatives and neighbours of a recently deceased person as a way of honouring the deceased, pass time during night vigil and also raise funds for the funeral
- A disco matanga is a cultural funeral practice of Nyanza and Western regions of Kenya, and parts of the Kenyan coast

Risk Factors leading to increased HIV transmission in Disco funerals

- Paying debts - Sex in exchange for money (N*jue et al., 2009*)
- Multiple Partners: multiple partners, and mostly without protecting themselves (*Njue et al., 2009*)
- Drugs and alcohol - consumption of alcohol, miraa, marijuana, and “home brew” contribute to risky behaviors. (*Njue et al., 2009*)
- Duration of the disco Matanga - The party, with music and dancing, starts around 10 to 11 pm and can last for days (Zol*nikov, 2014*). Disco Leveraged on the Leisure Activities
  - No available entertainment in this region/ Cheaper way – since drugs are cheap and affordable (*Zolnikov, 2014*)
  - Condomless sex, number of partners, intimate partner violence, sex + alcohol

Risk Factors leading to increased HIV transmission in Disco funerals

- Transactional Sex - Men pay for girls dance which later decide on transactional sex (*Zolnikov, 2014*)
- Risky Disco Matanga Environment - Location is deep in the woods, intense atmosphere at the funerals, reinforced by the music and songs have strong sexual messages, explicit lyrics, and suggestive dancing (*Zolnikov, 2014*)
- Choiceless-Choices – girls forced into sex, Gang rape occur during and after disco funerals (*Njue et al., 2009*)

Methodology: EMOD Adaptation

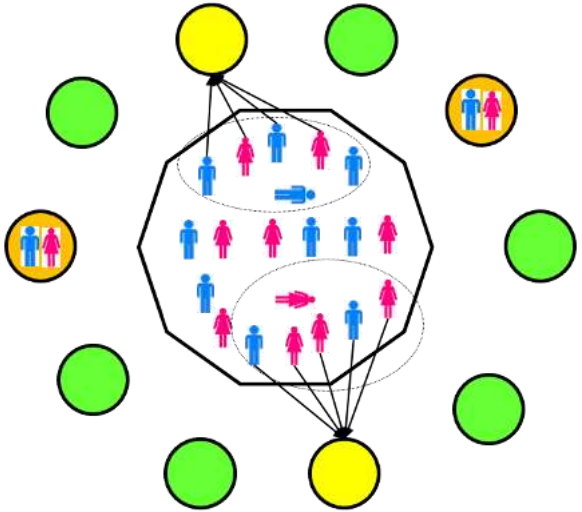
- EMOD-HIV, a previously validated network-based model of HIV in the Nyanza region of Kenya, to incorporate disco matanga assumptions informed by literature review

- Occurrence of disco matanga was modeled to occur following any death in the population

- To model the estimated contribution of disco matanga to the spread of HIV/AIDS, we adapted EMOD-HIV by adding a new social network component representing sexual interactions at disco matanga
- We leveraged a capability of the EMOD software known as “migration” in which individuals are temporarily moved to a specific social network group, known in the software as a “node” because it can be distributed across multiple computational nodes if desired

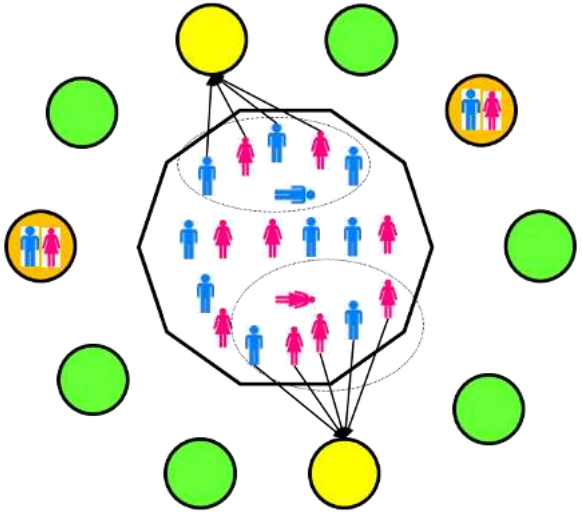
Methodology: EMOD Adaptation

- In our implementation of disco matanga, individuals are “migrated” to a disco matanga node immediately the event of death of a different individual in the simulation
- The central area (“node”) contains the population that is not currently attending disco matanga.
- Nodes (circles) which are vacant until used for a disco matanga (green circles).
- Deaths in the population (horizontal figures) trigger individuals to migrate to disco matanga “nodes” (yellow circles).



Methodology: EMOD Adaptation

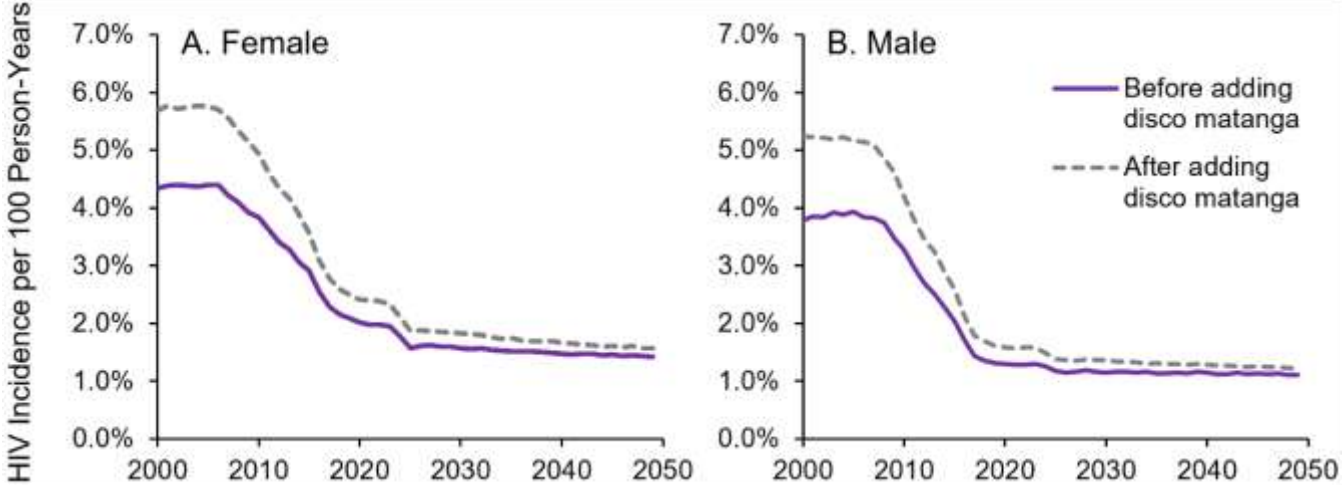
- Individuals actively attending disco matanga (orange circles) do not consummate their usual relationships, but may participate in sexual contacts with other attendees.
- Upon conclusion of a disco matanga, individuals return to the central “node” and resume their usual relationships, and the node becomes vacant for re-use in a future disco matanga (green circles).



InterventionsLKJHGFNV

- We compared past HIV incidence (1980–2024) with and without incorporating disco matanga, and future HIV incidence (2025–2050) with different interventions for disco matanga attendees:
  - (1) biomedical (HIV prophylaxis),
  - (2) bio-behavioral (reduction in condomless sex partners),
  - (3) structural (female empowerment to avoid unwanted sex).

Results



HIV incidence in (A) female and (B) male adults ages 15-49, before and after incorporating disco matanga into EMOD-HIV. Incidence is shown for all adults in the population, ages 15+, regardless of current disco matanga attendance.

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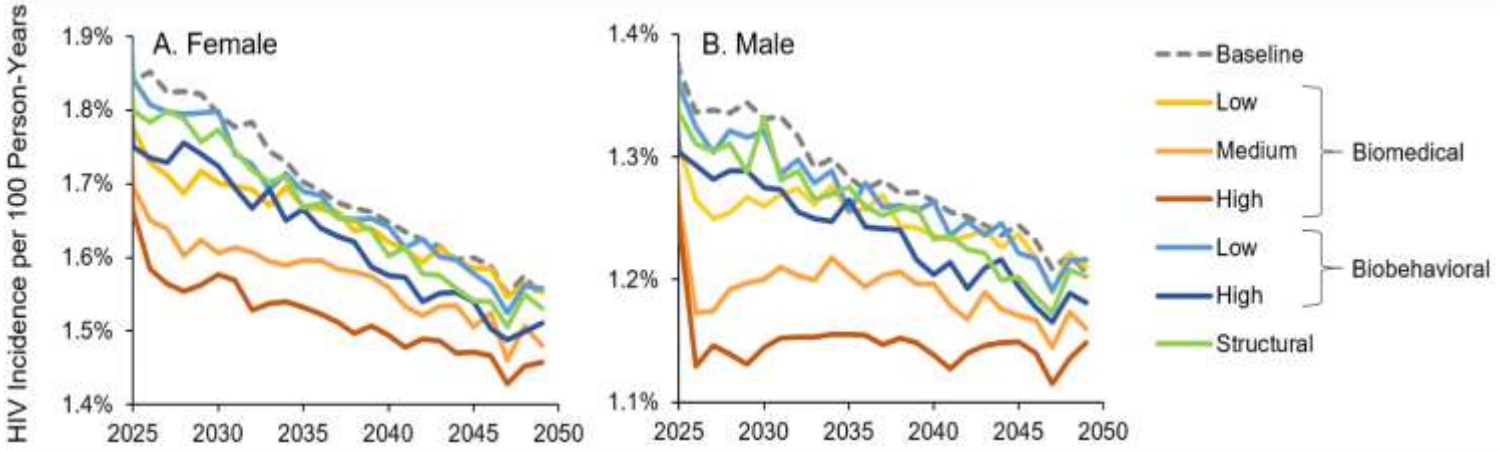
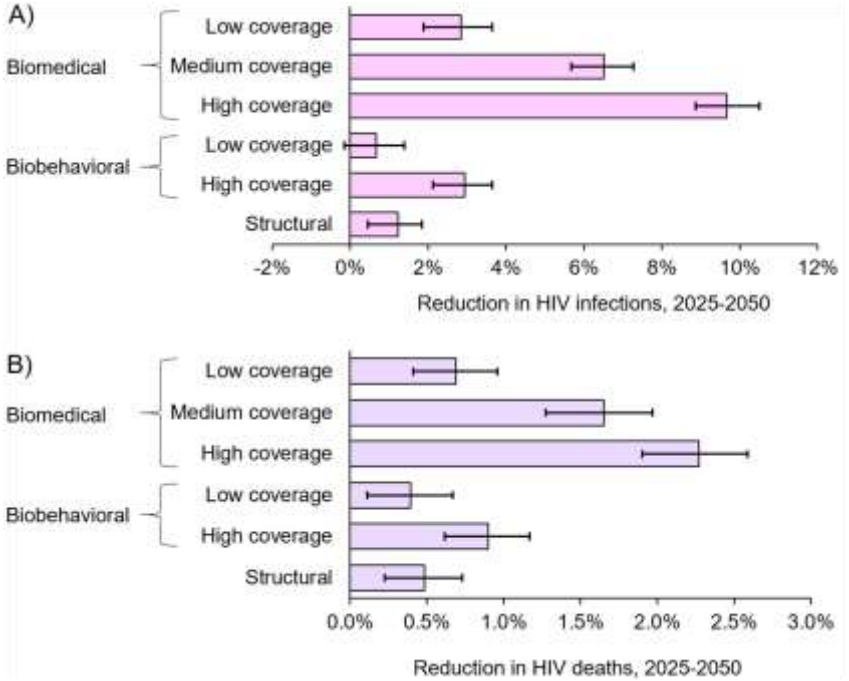
Results



Effect of biomedical, biobehavioral, and structural interventions on HIV incidence in western Kenya. HIV incidence per 100 person-years in women (A) and men (B) ages 15+ is shown for a baseline intervention with *disco matanga* and no interventions (gray dashed line) and for biomedical, biobehavioral, and structural interventions designed to reduce HIV incidence.

Results- Impact of interventions

Impact of biomedical, biobehavioral, and structural interventions on HIV infections and deaths in western Kenya over the period 2025-2050. Impacts shown are a percent reduction in (A) cumulative HIV infections and (B) cumulative HIV-caused deaths over the period 2025-2050 relative to a scenario with no interventions.



Results: Impact of the Interventions

- Over 1980–2024, disco matanga contributed 7.8% (95% CI: 5.5%–9.3%) of all HIV infections, an effect that peaked at 9.9% (95% CI: 6.4%–12.0%) in the year 2004, coinciding with a peak in all-cause mortality due to HIV/AIDS

- Biomedical prevention at disco matanga could avert up to 9.7% (95% CI: 8.9%–10.5%) of adult HIV infections and 2.3% (95% CI: 1.9%–2.6%) of deaths;

- Bio-behavioral 2.9% (95% CI: 2.1%–3.6%) of infections and 0.9% (95% CI: 0.6%–1.2%) of deaths; and structural 1.2% (95% CI: 0.5%–1.8%) of infections and 0.5% (95% CI: 0.2%–0.7%) of deaths (Figures 2, 3). Results were highly sensitive to intervention uptake.

Conclusions

- We conducted the first modeling study simulating the interactions between disco matanga, HIV/AIDS, and potential intervention strategies.
- We found that biomedical, biobehavioral, or structural interventions targeting disco matanga could substantially lower HIV transmission and mortality in the Nyanza region.
- Research is needed to assess the feasibility and acceptability of HIV interventions that are customized to local cultural practices.

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Thank you!

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