

HIV/AIDS MODELING OF SEXUAL AND GENDER-BASED VIOLENCE IN CONFLICT-AFFECTED POPULATIONS WITH THERAPEUTIC INTERVENTION: GLOBAL STABILITY AND SENSITIVITY ANALYSIS

ABDELKADIR MUZEY MOHAMMED*, HABTU ALEMAYEHU
ATSBAHA, YOHANNES YIRGA KEFELA, WOLDEGEBRIEL ASSEFA
WOLDEGERIMA AND KIROS TEDLA GEBREHIWOT

(Received 14 November 2025; Revised 1 February 2026)

Armed conflicts intensify HIV/AIDS transmission by increasing sexual and gender-based violence (SGBV) and disrupting healthcare systems, particularly in low-income regions such as Sub-Saharan Africa. These intersecting factors substantially accelerate the progression of existing infections and increase the incidence of new cases, yet the combined impact of conflict-related SGBV and biomedical interventions remains insufficiently quantified. To address this, we developed a deterministic compartmental model to investigate HIV transmission dynamics, explicitly incorporating rape-related infections, post-exposure prophylaxis (PEP), and antiretroviral therapy (ART), and evaluated their interactions across varying conflict intensity scenarios. The model assessed disease-free and endemic equilibria, computed the basic reproduction number ($\mathcal{R}_0$), and conducted global stability and sensitivity analyses. Numerical simulations examined the influence of SGBV prevalence, treatment coverage, and escalating conflict on HIV transmission. Results demonstrated that HIV transmission escalates sharply with increasing SGBV and conflict intensity. Timely initiation of PEP

*Corresponding Author

2020 Mathematics Subject Classification: 92D30, 92C60, 34D20, 37N25

Key words and phrases: HIV/AIDS modeling; sexual and gender-based violence; conflict-affected populations; global stability; sensitivity analysis; therapeutic interventions