EMPOWERING MARGINALIZED COMMUNITIES THROUGH TECHNOLOGY: A DEEP LEARNING APPROACH TO ASSESSING THE IMPACT OF DIGITAL HEALTH INTERVENTIONS ON HIV PREVALENCE AMONG TRANSGENDER SEX WORKERS IN DENPASAR, BALI

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Background:
In Denpasar, Bali, transgender women in sex work face high HIV risk due to stigma, discrimination, and limited healthcare access. This study explores the use of digital health interventions (DHIs), like mobile apps and online platforms, to support this group. By employing predictive analytics, it assesses DHIs' impact on reducing HIV prevalence among these transgender sex workers, exploring the nexus of technology, public health, and marginalized communities.

Methods:
This study utilized a longitudinal dataset collected from 300 transgender women engaged in sex work in Denpasar, documenting HIV status, DHI usage patterns, socio-demographic information, sexual health behaviors, and access to healthcare services over a two-year period. A recurrent neural network (RNN) with long short-term memory (LSTM) units was developed to analyze temporal patterns and predict HIV prevalence changes in relation to DHI engagement. The dataset was segmented into six-month intervals for model training (60%), validation (20%), and testing (20%). Key performance indicators included model accuracy, sensitivity, specificity, and the AUC-ROC. The study also employed causal inference methods to isolate the effect of DHIs from confounding variables.

Results:
The LSTM model showed exceptional predictive capability, with an AUC-ROC of 0.97. Preliminary analysis revealed a significant correlation between regular DHI usage and a lower incidence of new HIV infections among participants, with an odds ratio of 0.5 (95% CI: 0.4-0.6). Specifically, transgender women who actively used DHIs exhibited a 40% reduction in new HIV cases compared to non-users. The model also identified critical engagement factors influencing DHI effectiveness, including frequency of app usage, engagement with HIV education content, and interactive communication with healthcare providers.

Conclusion:
This study demonstrates digital health interventions' potential to reduce HIV among transgender sex workers in Denpasar, Bali. Using deep learning, it shows technology can lower HIV in marginalized groups, offering strategies for effective public health interventions.

Disclosure of Interest Statement:
None.