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PROJECT TITLE

Impact of Social factors which promote sexual activity among females on the transmission of HIV/AIDS in Midlands Province.

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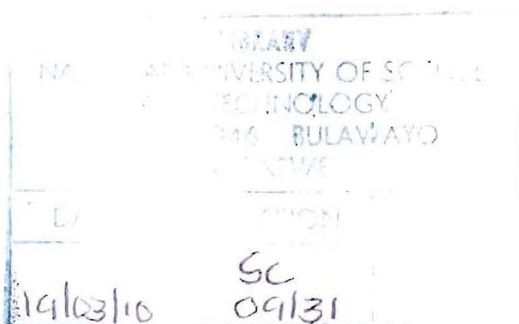
STUDENT NUMBER: N005 651D

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DEPARTMENT: APPLIED MATHEMATICS

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Abstract

We formulate an HIV transmission model, which explores the impact of social factors on the transmission of HIV/AIDS. A study conducted by the Biomedical Research & Training Institute in Gweru was used for statistical values. The aim was to better understand the risk situation on females that contributes to HIV transmission and paralyzes its prevention. Differential susceptibility and infectivity models are formulated for the disease transmission in this project. The susceptibles are divided into two groups based on their susceptibility (parent/guardian ever talked with the female individual about sex) and the infectives are divided into two groups according to their infectivities (high or low partnership acquisition). Firstly a statistical analysis of the behavioral survey is carried out and the results interpreted. Of note in these results is that those females who had never had their parent/guardian communicating to them about sex had increased chances of indulging into sex and multiple partnering proved by a p-value (0.027) to be significant association between parent/guardian to female individual communication about sex and increasing chances of multiple sexual relationships for an individual. Secondly a basic HIV model is presented and analyzed that is calculation of the threshold quantity R_0 and stability analysis carried out. A social factor modified model with differential susceptibility and infectivity is presented and similarly analyzed. Results from statistical analysis are used as parameters for the modified model. Numerical simulations revealed that the faster the people are recruited into either of the classes, the heavier the disease progresses. An increase especially to b_2 recruitment by lack of parent/guardian communication about sex to an individual predisposes individuals to the epidemic but also the role played by individuals recruited although their parents/guardians communicated about sex to them cannot be ignored. Therefore if HIV would be controlled there needs to be advocating for parent/guardian communication about sex with the female individuals and also those who had been communicated with by their parent/guardian about sex should not have a high partnership acquisition rate since they are also involved in the reduction of reproduction number. Control efforts should be inclusive of both groups