

OPTIMAL STRATEGIES FOR CONTROLLING THE HIV/AIDS EPIDEMIC IN THE PHILIPPINES

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Human Immunodeficiency Virus (HIV) weakens a person's immune system, which may eventually lead to Acquired Immunodeficiency Syndrome (AIDS) — a condition that is characterized by severe illnesses. The number of HIV infections has more than doubled in the Philippines within the last decade and no cure for the disease has been discovered. The goal of this study is two-fold. First is to develop and analyze a deterministic compartmental model of the HIV epidemic fitted to Philippine data. Secondly, the study aims to identify optimal implementation of precaution, HIV screening, Anti-Retroviral Treatment (ART), and Pre-Exposure Prophylaxis (PrEP) to minimize the number of infected individuals and implementation costs. We used fitted parameter values to compute the basic reproduction number and endemic equilibrium, establishing that the HIV/AIDS is endemic to the Philippines. Under the framework of optimal control theory, we find that full implementation of precaution and ART, decreasing usage of HIV screening, and minimal usage of PrEP are optimal against the epidemic. Cost effectiveness of scenarios wherein only a subset of the controls are available are computed, showing that full implementation of precautionary measures is the most cost effective program. Alternatively, if full implementation of precaution is impossible, we demonstrate that utilization of HIV screening and PrEP should immediately be increased for optimal reduction of infections.