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Apart from the traditional role of preventing progression from HIV to AIDS antiretroviral drugs have an additional clinical benefit of substantially reducing infectiousness thus making them potentially an important strategy in the fight against AIDS. Recent advances in drug therapy have seen the use of antiretroviral medications as a prophylaxis. Administered either as post-exposure prophylaxis after high-risk exposure or as pre-exposure prophylaxis in those with ongoing HIV exposure. In this study, we constructed a compartmental heterosexual transmission model based on the dynamics of HIV in heterosexual population in Sub-Saharan. The model classifies the male and female populations by risk (low, medium and high) according to their sexual preferences. Data from South Africa was used to parameterize the model. For a finite amount of drugs we implemented a numerical optimization algorithm to find optimal allocation of the drugs amongst risk groups that minimizes objective functions such as Total Number of Deaths and Total Number of Infections. Preliminary results suggest that, the priority should be given to the high-risk females during drug allocations to minimize the number of deaths or infection per year. (Received February 11, 2014)