1154-92-1792 **Damilola O Olabode*** (damilola.olabode@wsu.edu) and **Xueying Wang**. *Stochastic models for the emergence of HIV-1 drug resistance.* Preliminary report.

Drug-resistant HIV1 has caused growing concern in public health. Although combination antiretroviral therapy can contribute massively to the suppression of viral loads in patients with HIV-1. Continuing viral replication during therapy leads to the accumulation of drug-resistance mutations, resulting in increased viral load and a greater risk of disease progression. In this work, we investigate the dynamics of the emergence of HIV-1 drug resistance using stochastic models. A continuous-time Markov chain model and a stochastic differential equation model are formulated based on an ODE model for the within-host dynamics of two HIV-1 strains that include both forward and backward mutations. An estimate for the probability of disease extinction during the early stage of the drug resistance is computed by approximating the Markov chain with a multitype branching process. Accordingly, analytic estimates are validated with numerical simulations. Unlike the deterministic dynamics where the basic reproduction number serves as a sharp threshold parameter, the stochastic model indicates that there is always a positive probability of disease extinction in patients. Numerical examples illustrate the differences between the stochastic and the deterministic model. (Received September 16, 2019)