Mathematical modeling in epidemiology provides understanding of the underlying mechanisms that influence the process of spread of disease; it suggests prevention- and control- strategy to health policy makers. In fact, models often identify behaviors that are unclear in experimental data since data are non-reproducible, limited and subject to errors in measurement. In order to demonstrate the contribution of mathematics to epidemiology, the talk starts with a brief review on different types of mathematical models used for analysis of spread of diseases in both individual and population levels, followed by two case studies: the deterministic compartmental model to investigate the treatment policy for Fluroquinolone drug resistance of Gonorrhea and the probabilistic model to do risk analysis assessment for blood-borne transmission of pandemic influenza. Finally, an application of qualitative possibility theory to study the maturation process of Dendritic cells will be discussed.