

Exploring the Impact of Vaccine Confidence on the Transmission of Infectious Disease

Abstract

Vaccines can protect against infectious diseases and ensure significant health and economic benefits. Vaccines are one of the safest and most effective medical interventions in history. Health professionals and policymakers are facing challenges in vaccine coverage. Vaccine hesitancy is reluctance or refusal to vaccinate despite the availability of vaccines, threatens to reverse progress made in tackling vaccine-preventable diseases. Vaccine hesitancy is a global challenge, and it varies greatly with context i.e., place, time, and vaccines. The Internet has rapidly become a widely used source of information for health-related issues and remedies. YouTube and Twitter users have increased, where personal opinions that affect individual medical decisions are predominately reaffirmed by others. Vaccination programs aim to achieve coverage above the Herd Immunity Threshold and outbreaks are unlikely to occur. Vaccine skepticism obstructs progress in achieving the HIT. Anti-vaccine videos have greater visibility in the audience. This research joins an advanced Rumor (Misinformation) model with the Infectious Disease model to show the impact of vaccine confidence on the transmission of infectious disease. The rumor model's Vaccine Hesitancy Proportion rate circulates output as an input in the system, which cannot change the basic rumor reproductive number $Ro-r$ but extend the spread of rumor (misinformation). In the infectious disease model vaccination reduces the risk of infection but doesn't confer a total immunity. Vaccine Waning Proportion fraction increases the risk of reinfection and stretches the spread of infectious disease. The analytical results strongly confirm the impact of vaccine confidence on the transmission of rumor (misinformation) and infectious disease. This novel approach shows a strong relationship between the dominant feedback structure and behavior. The model's simulation results indicate that increase vaccine confidence is conducive to better control.

Keywords: Social Media, Rumor, Misinformation, Vaccine Hesitancy, Vaccine Confidence, Infectious Disease Dynamics, Ro , HIT, Vaccine Waning.