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**GLOBAL DYNAMICS OF AN SIQR EPIDEMIC MODEL WITH  
SPECIFIC NON-LINEAR INCIDENCE RATE INVOLVING  
VACCINATION AND ELIMINATION HYBRID STRATEGIES**

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**Abstract:** In this paper, we built up an epidemic model with vaccination, elimination, quarantine hybrid management strategies and a specific non-linear incidence rate feature (Susceptible, Infected, Quarantined and Recovered). There is a discussion of different points of equilibrium and their stability. In addition, some numerical simulations are also illustrated in our analytical results. Finally, there is a brief discussion about the position of all control strategies.

**Keywords and Phrases:** SIQR epidemic, vaccination, elimination, quarantine, stability, COVIDE-19.

**2020 Mathematics Subject Classification:** 34D20, 34D23, 92B05, 92D30.

## **1. Introduction**

Epidemic models have become important tools in examining the dissemination and control of infectious diseases. Modeling in the field of the study of disease transmission has had its foundations in the mid 20th century. People have developed various epidemiological models (SIR, SIER, SIERS, SIQR, SEIV etc., where S, I, E, R, Q, V denotes susceptible, infectious, exposed, recovered (removed),