MATH MODEL RESEARCH GROUP

DEPARTMENT OF MATHEMATICS

FEDERAL UNIVERSITY OF TECHNOLOGY (FUT), MINNA, NIGERIA

BOOK OF ABSTRACTS

for the

International Conference on MATHEMATICAL MODELLING, OPTIMIZATION AND ANALYSIS OF DISEASE DYNAMICS (ICMMOADD 2024)

HYBRID (VIRTUAL & PHYSICAL)

Theme:

CONTEMPORARY ISSUES ON THE CONTROLS OF DISEASES EPIDEMICS AND PANDEMIC

DATE: Thursday 22nd February, 2024 **TIME:** 10:00am Prompt

VENUE: Department of Mathematics, Federal University of Technology Minna, Nigeria

PROFESSOR N. I. AKINWANDE FNMS

Convener

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disease were carried out using a computational software called Maple. It was revealed that over time when all modalities are put into place the rate of recovery increases and as the rate of the pathogen virus death increases, the pathogen virus gradually fades from the environment.

Keywords: Coronavirus, basic reproduction number, stability, Jacobian matrix, pandemic

MSC 2000: 2B05

A37: Mathematical Model of Anthrax Disease Dynamics Incorporating Quarantine Class

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Abstract

Anthrax disease is a zoonotic bacterial infection occurring world affecting both human and animal populations. Consequences of infection can include respiratory failure, shock, inflammation of the brain membranes and death. That is, the Anthrax epidemic results in serious and fatal infections in both animals and humans globally. A mathematical model to study the transmission and control of Anthrax disease in farm animals and humans, incorporating the quarantine class was proposed. Both the reproduction number and the disease-free equilibrium (DFE) were calculated. For stability, the local stability of DFE was examined. Basic reproduction numbers were subjected to a sensitivity analysis concerning a few model parameters. The sensitive parameters with R_0 are graphically displayed. If $R_0<1$, then DFE's local stability is stable. According to the sensitivity analysis, the most sensitive parameter to increase the spread of the disease is the contact rate (α), while the most sensitive parameter to control the transmission of the disease is the quarantine rate (η).

Keywords: Anthrax disease, Quarantine, Bacillus anthracis, Diseases-Free Equilibrium, Reproduction number.