Mathematical Models of Infectious Diseases and Social Issues

When deadly illness spreads through a population at a rapid pace, time may be of the essence in order to save lives. Using mathematics as a language to interpret assumptions concerning the biological and population mechanics, one can make predictions by analyzing actual epidemiological data using mathematical tests and results. Mathematical models can help us understand the right disease status and predict the effects of the disease on populations, which can help limit the spread and devastation of the illness.

Mathematical Models of Infectious Diseases and Social Issues is a collection of innovative research that examines the dynamics of diseases and their effect on populations. Featuring coverage of a broad range of topics including deterministic models, environmental pollution, and social issues, this book is ideally designed for diagnosticians, clinicians, healthcare providers, pharmacists, government health officials, policymakers, academicians, researchers, and students.

Topics Covered

- Air Pollution
- Co-Infections
- Deterministic Models
- Disease Dynamics
- Disease Prediction
- Environmental Pollution
- HIV-HCV-HBV
- Population Mechanics
- Social Issues
- Vector-Borne Diseases
- Water-Borne Diseases

IGI Global
DISSEMINATOR of KNOWLEDGE

701 E. Chocolate Avenue
Hershey, PA 17033, USA
www.igi-global.com

ISBN 978-1-7998-3741-1
90000
9 781799 837411

Chapter 8
Fractional-Order Model to Visualize the Effect of Plastic Pollution on Rain

Ekta Navinchandra Jayswal
Gujarat University, India

Purvi Pandya
Gujarat University, India

ABSTRACT

In this era, one of the biggest issues faced by humans is due to plastic pollution as it dwells in environment and depletes the ecosystem. This affects the climate and disturbs the chain of rain, which is the common source of obtaining water body. Also, this resulting pollution causes the toxicity in rain. Accordingly, the mathematical model is framed by considering fractional order derivative. Pollution free and endemic equilibrium points are worked out for integer order system of non-linear differential equations. Local stability of equilibrium points brings attention on dynamical behavior of model with sufficient condition. With the help of basic reproduction number, bifurcation is analyzed, which shows the chaotic nature of this model. Providing Caputo derivative of fractional order, a numerical simulation has been done by taking different values of order for the system.

DOI: 10.4018/978-1-7998-3741-1.ch008