

SUBTHEME FOUR: - HEALTH MANAGEMENT AND SOCIAL RESPONSIBILITY

OPTIMAL CONTROL OF CHOLERA INCORPORATING THE DYNAMICS OF THE INDUCED ACHLORHYDRIA CONDITION WITH COST EFFECT STRATEGIES

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ABSTRACT

A nonlinear dynamical system is proposed and qualitatively analyzed to study the dynamics of cholera disease in a population. The basic model is extended to include; reduce infection rate (u_1), increase rate of seeking treatment(u_2), decrease development of achlorhydria condition(u_3), increase recovery rate from achlorhydria condition (u_4), increase recovery rate (improve efficacy of the drugs)(u_5). This leads to an optimal control problem which is qualitatively analyzed using Pontryagin's maximum principle. Numerical simulation of the resulting optimal control problem is carried out to gain quantitative insights into the implications of the model and pertinent results are displayed graphically. The simulation reveals that a multifaceted approach to the fight against the disease is more effective than single control strategies.

Keywords: *Cholera, Optimal Control, Pontryagin's Maximum Principle, Numerical Simulation, Multifaceted Approach*