ABSTRACT

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Title of the Thesis: Effect of Awareness Programs on Some Non Contagious Diseases: Model Based Study

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Non contagious disease (NCD) is a non-infectious health condition that does not spread from person to person. NCDs are the result of an influence of genetic, physiological, behavioral and environmental variables. The majority of people are unaware of NCDs and the risk factors associated with them. NCDs are a serious public health concern worldwide, causing asymptomatic damage until the disease progresses to an advanced stage. It is crucial to know how much global and local awareness influences disease dynamics, and which type of awareness is more significant. The primary goal of this thesis is to develop and evaluate mathematical models on the impact of awareness for various NCDs derived from population interactions.

In Chapter 2, we propose deterministic and stochastic mathematical models on the impact of awareness of diabetes. Observations from the systems suggest that an awareness campaign has a significant impact in reducing diabetes. Also in Chapter 3, we conducted a detailed mathematical analysis of the influence of media-based public awareness campaigns and treatment on the complication of T2 diabetes. The main goal of this chapter is to evaluate the role of awareness and treatment of complications of T2 diabetes in struggling against the disease and find out the related cost-effective strategies. Further in Chapter 4, the mathematical model derives a nonlinear interaction between the number of diabetes patients and the cumulative density of diabetes awareness programs. We use the homotopy analysis method (HAM) to solve the nonlinear model as it is a very efficient method to solve any nonlinear differential equations with any parameter values. The objective of this chapter is to investigate the impact of diabetes awareness in the population through a fractional-order model. In Chapter 5, we consider deterministic and stochastic mathematical models to explore the dynamics of cancer patients under awareness. The objective of this chapter is to study the dynamics of cancer patients in the population under the impact of awareness driven by media. In chapter 6, we study the dynamics of a mathematical model of thalassemia patients with and without control profiles. A cost-effectiveness analysis is performed using numerical simulations to determine the most cost-effective control method among all possibilities. This chapter indicates that public awareness of thalassemia, carrier screening, prenatal identification of carrier couples, and avoidance of thalassemia carrier marriages may reduce thalassemia patients in the community.

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