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APPLICATION OF OPTIMAL CONTROL STRATEGIES TO DRUG-CRIME MODELING

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Abstract: The drug-crime nexus represents a persistent challenge with profound societal implications. This publication explores an innovative approach by applying optimal control strategies and cost-effectiveness analysis to model and address this complex issue. This research presented a six-dimensional compartments model for the co-dynamics of drug and its related crime. This model is governed by a system of first order nonlinear differential equation. Furthermore, two time-dependent controls were incorporated into the non-autonomous model with the aim of minimizing the population of drug addicts and drug criminals at a low cost. The solution of the optimal control model shows that the implementation of any of the controls is efficient in achieving the objective functional when compared with the absence of controls. Both the ICER and ACER methods shows that the implementation of only empowerment and enlightenment control U1 is the most cost effective strategy. Our findings demonstrate that optimal control strategies, when appropriately tailored to the specific context, can yield significant reductions in drug-related crime, making efficient use of limited resources.

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