Developing Mathematical Models to Evaluate the Effectiveness of School Nutrition Programs to Reduce Childhood Obesity

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Childhood obesity in the U.S. has tripled in since the 1970s and identifying intervention models that are capable, of altering the dynamics of obesity at scales that make a difference remains a challenge. The CDC estimated that nearly 1 in 5 young individuals between the ages of 6 and 19 years in the U.S. were considered obese in 2015-16. Hence, the fact that obesity remains an issue highlights a lack of effective policies aimed at addressing the epidemic of obesity. Mathematical models are developed and used to evaluate the roles of socialization (peer influence modeled as contagion) and school environment (school menus) on the diet dynamics of children. Findings suggest that healthy eating might be reinforced through culturally-sensitive school menus and may prove capable of modifying obesity enhancing diet dynamics; altering the diets of a significant (critical) proportion of youngsters. A framework is introduced to explore the value of behavior-based interventions and policies that are tailored for the culture of targeted communities. These models demonstrate that when dealing with diet-dynamics systems, thinking additively is not enough as it cannot account for the power of nonlinear effects.