

A Study on Location Decision Problem of Mobile Vaccination Centers

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Abstract

Vaccines such as hepatitis, chicken pox, tuberculosis, measles, mumps, etc. applied to newborn babies are necessary to ensure infant immunity and to strengthen public health in the long run. The COVID-19 epidemic, which has been experienced in the past two years, has once again reminded humanity importance of the vaccination. Vaccination process protects communities from possible virus and possible effects, at the same time makes such diseases preventable. Another important issue related to vaccination process is the establishment of herd immunity by reaching a large part of the population. Additionally, in cases of pandemics and similar situations, the crowded population waiting for vaccination services in places such as hospitals and family health centers is at risk of contamination. As a solution to these problems, in this study, it is aimed to establish mobile vaccination centers to create herd immunity and to ensure the easy accessibility of these healthcare services. Deciding where mobile vaccination centers will be located for accessibility is the most important and critical point. Hence, it is aimed to place mobile vaccination centers and to locate these centers by covering maximum people with minimum cost. The mathematical model of the decision problem was established with capacitated maximum coverage location model and solved with genetic algorithm. A case study will be conducted in one of the most densely populated districts of Istanbul.

Keywords

Health Management, Location Decision Problem, Mobile Vaccination Centers, Capacitated Maximum Coverage Location Problem, Genetic Algorithm

Biographies

Azime Beyza Arı is a senior industrial engineering at Istanbul Medipol University. She works on deciding the location of mobile vaccination centers, which is her graduation project. Her some works includes decision support systems, operations research, and health technology assessment. In her internships, she worked on health technology assessment and multiple criteria decision making in a global company.

Selin Kara is a senior industrial engineering student studying at the Faculty of Engineering and Natural Sciences at Istanbul Medipol University. She works on deciding the location of mobile vaccination centers, which is the subject of her Bachelor thesis. Previously, she did an internship in the production planning department of a company in the metal injection molding industry. She is currently gaining experience as a customer and process development intern in an initiative that provides waste management services to companies.

Melis Almula Karadayı is an Assistant Professor in the Industrial Engineering Department at Istanbul Medipol University. She holds M.Sc and Ph.D. degree in Industrial Engineering from Galatasaray University, Istanbul, Turkey. Her areas of interest include healthcare management, waste management, multiple criteria decision making, data envelopment analysis, fuzzy optimization, and applications of mathematical programming and fuzzy set theory.

Prof. Hakan Tozan is currently working as a Professor and the Head of the Department of Industrial Engineering in the School of Engineering and Natural Sciences of Istanbul Medipol University. He is also the founder and director of the Healthcare Systems Engineering program and Healthcare Modeling and Simulation Research Group in the same institution. His research interests include decision analysis, operations research, healthcare systems optimization, and health technology assessment.