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# Allocating optimum number of police patrols in a public safety emergency response system based on stochastic simulation

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Even though public safety gradual improvements have been reported in the last two years, there still are alarming crime statistics in multiple regions in Mexico. Multiple factors seem to be influencing this social condition including the high value drug market in the USA, drugs and arms trafficking to and from the USA, low apprehension and conviction, corruption, unemployment and extremely low salaries. Our research is focused on assisting current operations of a Public Safety Emergency Response System (ERS) in a large city in Mexico to achieve the international ideal response time of three minutes maximum, and contribute in the crime prevention, control, as well as in the apprehension of presumable delinquents. The city is composed by eight police districts and this research integrates an additional district to four previously evaluated to characterize its demand for service and its performance within the ERS as a function of response time. The estimated population of the city was larger than 1.3 million inhabitants and it is established in a surface larger than 300 $Km^2$. The city's ERS provided data from 552 continuous hours where demand for service and response times were obtained from. Every police district is composed by four quadrants and every quadrant has four patrolling zones. Actual operating strategy requires one patrol for each patrolling zone of the 16 that integrate a police district. However, this allocation strategy is often not met due to limited resources. Our approach first characterized the demand for service and processes linked to the attention of the call and patrol utilization. Next, we built a stochastic simulation model to reproduce current operating conditions to validate its behavior. Ultimately, we identified the optimum number of police patrols required to be allocated as back up inventory in each police quadrant within a district, so that their response time complies with the reference international target of three minutes maximum. The first modeled scenario includes best conditions of current strategy where every patrolling zone has a patrol. The second scenario models a proposed strategy that considers achievable improved service times to reach the international reference response time of three minutes.

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