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Modeling Waiting and Service Time for Patients: A Case Study of Matawale Health Centre, Zomba, Malawi

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Abstract : Spending more time on long queues for a basic service remains a common challenge to most developing countries, including Malawi. For health sector in particular, Out-Patient Department (OPD) experiences long queues. This puts the lives of patients at risk. However, using queuing analysis to under the nature of the problems and efficiency of service systems, such problems can be abated. Based on a kind of service, literature proposes different possible queuing models. However, unlike using generalized assumed models proposed by literature, use of real time case study data can help in deeper understanding the particular problem model and how such a model can vary from one day to the other and also from each case to another. As such, this study uses data obtained from one urban HC for BP, Pediatric and General OPD cases to investigate an average queuing time for patients within the system. It seeks to highlight the proper queuing model by investigating the kind of distributions functions over patient's arrival time, inter-arrival time, waiting time and service time. Comparable with the standard set values by WHO, the study found that patients at this HC spend more waiting times than service times. On model investigation, different days presented different models ranging from an assumed M/M/1, M/M/2 to M/Er/2. As such, through sensitivity analysis, in general, a commonly assumed M/M/1 model failed to fit the data but rather an M/Er/2 demonstrated to fit well. An M/Er/3 model seemed to be good in terms of measuring resource utilization, proposing a need to increase medical personnel at this HC. However, an M/Er/4 showed to cause more idleness of human resources.

Keywords : health care, out-patient department, queuing model, sensitivity analysis
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