Time Series Modeling of Blood in Demand for Kurunegala District, Sri Lanka

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In general, blood comes into four main Groups; O, A, B, and AB. The most common and highly demanded blood is Group O. Blood can also be subdivided into its main components; red cells, white cells, platelets, and plasma. Unfortunately, red cells only have a shelf-life of 35 or 42 days, while platelet shelf life is even less, only five days. Blood cells are essential components of the human body. Blood cannot be manufactured mechanically and can only be obtained by donation. Human blood pressure and heart rate will stay close to normal as one human loss up to 30% of blood. If they lose more than 40% of blood they will die. It's important to get to a hospital to start receiving blood transfusion to prevent this. Blood transfusion is generally required in surgeries, childbirths, organ transplants, and for patients who are receiving treatments for diseases such as cancers and anaemia. Therefore, it is essential to study the blood in demand for the near future. According to Sri Lanka, the National Blood Transfusion Service (NBTS) is the sole supplier of blood and blood products to all state hospitals and it has ninety-six blood Banks Island-wide. This study investigates to develop a suitable time series model for the monthly blood demand for Kurunegala district. The data was obtained from the NBTS Sri Lanka, which consists of the monthly demand for red blood cells from January 2011 to November 2017. The modeling has been done using the Box-Jenkin's Auto-Regressive Integrated Moving Average (ARIMA) procedure. Moreover, to identify the best fitting model, Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC) and Mean Square Error (MSE) were used. Through the analysis, it was identified that ARIMA (0, 1, 1) is the most appropriate model for the monthly blood in demand for the Kurunegala district.

Key words: Blood in demand, Blood groups, Red cells, ARIMA