ESTIMATION AND PREDICTION OF POPULATION USING MATHEMATICAL MODELS IN TANZANIA

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ABSTRACT

The study discusses the structure of the field of mathematical modeling and substantiates the key premises that demographic studies is one of the most powerful and important disciplines in analyzing and predicting population growth for future purposes. Additionally is the most important discipline to be analyzed and estimated for the sake of quantifying uncertainties upon decision making. As an application, this study demonstrates the use of least squares method (LSM) on model fitting, population parameters estimation and trend prediction of population in future, for the sake of resource allocation to the next generation. We use the mathematical procedures to estimate and predict the population of the United Republic of Tanzania basing on the prior information we have from previous census and Nation report. Among the two models used we determined that logistic model is more efficient due to its small relative error (0.72%) compared to exponential model (1.62%) giving plausible parameters that indicated precise prediction.

EQUATIONS AND FIGURES

\[
\frac{dP}{dt} = \beta P \\
\frac{dP}{dt} = rP \left(1 - \frac{P}{K}\right), r, K > 0 \\
\left(\sum_{i=0}^{n-1} t_i^2\right) \gamma + \left(\sum_{i=0}^{n-1} t_i\right) \alpha = \sum_{i=0}^{n-1} y_i t_i \\
\left(\sum_{i=0}^{n-1} t_i\right) \gamma + \left(\sum_{i=0}^{n-1} 1\right) \alpha = \sum_{i=0}^{n-1} y_i
\]

(1) (2) (3)
REFERENCES


