DEMOGRAPHY OF TAMILNADU FROM 2015 TO 2025 - AN ANALYSIS USING FINITE DIFFERENCES

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ABSTRACT

The main objective of the study is to predict out the population growth of Tamil Nadu, India from 2015-2025 using Finite Differences. The scope of the research is used to control the population explosion, so that the environment would be a healthy environment for living. It is widely used in the field of statistical study of human population called Demography.

Keywords: Finite differences, population, demography.
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1. INTRODUCTION

Numerical Analysis is the study of numerical approximation for the problems of mathematical analysis through algorithms. A finite difference is a mathematical expression of the form f(x+b) – f(x+a). The approximation of derivatives by finite differences plays a vital role in the finite difference methods for the numerical solution of differential equations, especially boundary value problem. In [1], the author studied the population growth and its implications for global security and various authors followed many methods in the field of demography, this method is one of the applications of Numerical Analysis.

2. METHOD AND PROCEDURE

The study was conducted in the population of Tamil Nadu, India in the current year 2019 and to predict out the growth of the same on 2025. The data is collected through various sources and from the website of Tamil Nadu. Then it was analysed with the help of difference operators and graphs among the population. The values of the below mentioned tables are obtained from the following formula [2], $\Delta^2 u_0 = 0$.

That is, $(E-1)^2 u_0 = 0$.

$$\Longrightarrow (E^2-2E+1)\,u_0 = 0.$$

$$\Longrightarrow E^2u_0-2Eu_0+u_0 = 0.$$

$$\Longrightarrow u_2-2u_1+u_0 = 0.$$

Where, u_0 is the initial value, u_1 is the first value, u_2 is the second value and so on.

3. POPULATION OF PERSONS IN TAMIL NADU FROM 2001-2010

The following table 1 gives the population growth of Tamil Nadu from 2001 to 2010. The third column of the table shows the data taken from the website and the fourth column shows the values obtained by using Finite Differences formula.

YEAR	REGION	POPULATION IN CRORES (PERSONS)	
		From Website	From Finite Differences
2001	TAMIL NADU	624	624
2002	TAMIL NADU	629	629
2003	TAMIL NADU	635	634
2004	TAMIL NADU	640	639
2005	TAMIL NADU	646	644
2006	TAMIL NADU	651	649
2007	TAMIL NADU	656	654
2008	TAMIL NADU	661	659
2009	TAMIL NADU	665	664
2010	TAMIL NADU	670	669

TABLE 1

We can easily identify that the difference between the exact data which is displayed in the website is almost equal to the values obtained from the Finite Differences formula. Hence, we can predict the population explosion for the forthcoming years using the formula above said.

4. PROJECTED POPULATION OF TAMIL NADU IN 2025

The table 2 is obtained by giving the initial values $u_0 = 694$ and $u_1=699$, and later the values are calculated by using the formula $u_2 - 2u_1 + u_0 = 0$. The table indicates that the population of persons, both females and males is strictly increasing in the consecutive years, and there is an annual growth of population in the certain years. Also, it predicts the population growth of Tamil Nadu for the year 2025 will be expected to reach 744 Crores approximately.

YEAR	REGION	POPULATION IN CRORES(PERSONS)
2015	TAMIL NADU	694
2016	TAMIL NADU	699
2017	TAMIL NADU	704
2018	TAMIL NADU	709
2019	TAMIL NADU	714
2020	TAMIL NADU	719
2021	TAMIL NADU	724
2022	TAMIL NADU	729
2023	TAMIL NADU	734
2024	TAMIL NADU	739
2025	TAMIL NADU	744

TABLE 2

The below visualisation shows the growth rate of population over time. It shows that the population will be reached a peak value of 719 Crores approximately for the year 2020 and will increase further years.

GRAPH 1

5. PROJECTED POPULATION OF FEMALES IN TAMIL NADU

We analysed the growth of female population of Tamil Nadu from 2015 to 2025 using the same formula $u_2 - 2u_1 + u_0 = 0$ and specified the values in the following table. It indicates that the population of females is also strictly increasing in the consecutive years and there is an annual growth of population in the certain years.

YEAR	REGION	POPULATION IN CRORES(FEMALES)
2015	TAMIL NADU	343
2016	TAMIL NADU	345
2017	TAMIL NADU	347
2018	TAMIL NADU	349
2019	TAMIL NADU	351
2020	TAMIL NADU	353
2021	TAMIL NADU	355
2022	TAMIL NADU	357
2023	TAMIL NADU	359
2024	TAMIL NADU	361
2025	TAMIL NADU	363

TABLE 2

The below graph shows the population growth rate of females in Tamil Nadu. It shows the positive population growth over the years and will reach the peak of 363 at 2025.

GRAPH 2

6. PROJECTED POPULATION OF MALES IN TAMIL NADU

In our study using finite differences formula, the population of males is strictly increasing in the consecutive years, and there is an annual growth of population in the certain years. Also, it can easily seen that the female population is less than the male population for every years.

YEAR	REGION	POPULATION IN CRORES(MALES)
2015	TAMIL NADU	346
2016	TAMIL NADU	348
2017	TAMIL NADU	350
2018	TAMIL NADU	352
2019	TAMIL NADU	354
2020	TAMIL NADU	356
2021	TAMIL NADU	358
2022	TAMIL NADU	360
2023	TAMIL NADU	362
2024	TAMIL NADU	364
2025	TAMIL NADU	366

TABLE 3

The chart below shows the population growth rate of males. By the year 2025 from 2015 it generates the growth value of 366.

GRAPH 3

7. RECOMMENDATIONS

From the above tables and graphs, it is found that the population of Tamil Nadu, India is constantly increasing from 2015- 2025. Hence it is predicted that, by the year of 2025, the population growth from 2015 is +0.5 and the population is 744 Crores approximately. To control the growth of population, the government should give awareness programmes for people and to motivate Family planning methods.

8. CONCLUSION

The outcome of the study shows that the population growth is increasing and it shows the alarming ring for the people to know about the population. Also, demographers would found depth knowledge from this research and find that, the study of population growth using finite differences is quite interesting and useful in the field of Demography.

9. REFERENCES

[1] Robert J.Walker, 'Population Growth and its implications for global security", American journal of Economics and Sociology. Vol. 75 (4), pp: 980-1004,2016.

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