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Statistical analysis of birth rate in India

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ABSTRACT

The aim of the analysis is to find the trends in birth rate (per 1000) in India. The statistical tools utilised are regression analysis, trend line and 5 yearly moving average. Data from the past 29 years was used to study the trends and predict the next 3 years. Using the data conclusions were drawn on the effectiveness of government policies related to family planning.

Keywords— Birth rate, Trendline, Moving average

1. INTRODUCTION

Birth rate refers to the number of live births per 1000 per year. India being an overpopulated country needed the same to be controlled and thus, government policies were implemented. In the report we find out the trends in birth rate and analyse whether government policies have been effective.

2. DATA

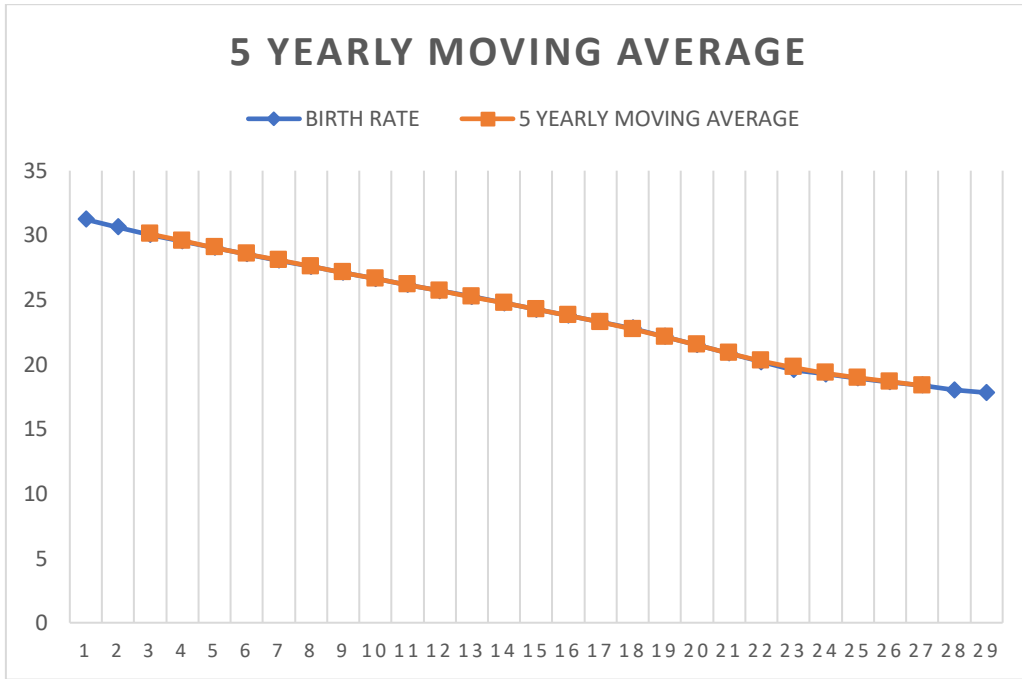
Table 1: Data

Year	Birth rate	5 yearly moving average	X=Year-Average year	Trend line
1991	31.22		-14	31.0176138
1992	30.62		-13	30.5278483
1993	30.03	30.09	-12	30.0380828
1994	29.53	29.55	-11	29.5483172
1995	29.04	29.04	-10	29.0585517
1996	28.55	28.55	-9	28.5687862
1997	28.06	28.06	-8	28.0790207
1998	27.57	27.58	-7	27.5892552
1999	27.1	27.11	-6	27.0994897
2000	26.64	26.64	-5	26.6097241
2001	26.17	26.17	-4	26.1199586
2002	25.7	25.70	-3	25.6301931
2003	25.24	25.22	-2	25.1404276
2004	24.75	24.75	-1	24.6506621
2005	24.26	24.26	0	24.1608966
2006	23.78	23.78	1	23.671131
2007	23.29	23.26	2	23.1813655
2008	22.8	22.71	3	22.6916
2009	22.16	22.12	4	22.2018345
2010	21.51	21.50	5	21.712069
2011	20.85	20.86	6	21.2223034
2012	20.2	20.27	7	20.7325379
2013	19.56	19.76	8	20.2427724
2014	19.25	19.32	9	19.7530069
2015	18.94	18.95	10	19.2632414
2016	18.636	18.65	11	18.7734759
2017	18.38	18.56	12	18.2837103

2018	18.02		13	17.7939448
2019	17.81		14	17.3041793
2020	FORECAST		15	16.8144138
2021			16	16.3246483
2022			17	15.8348828

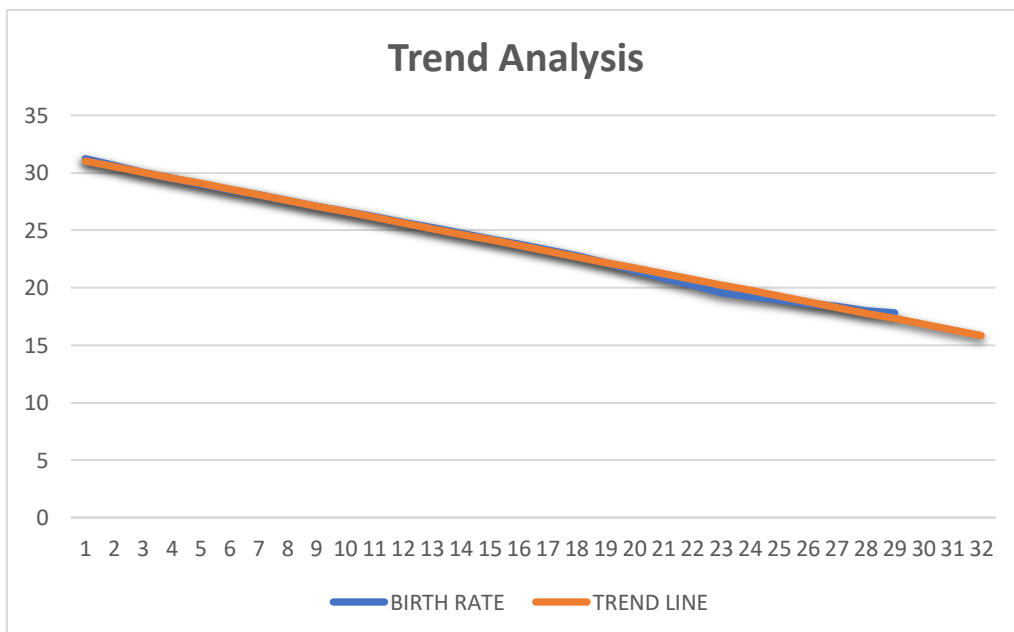
3. ANALYSIS

3.1 Moving Averages



The graph indicates the averages of 5 years against the actual yearly Birth Rate. 1 indicates the 1st year of comparison that is 1991 while 29 indicates the final year that is 2019. We can clearly see a steady decline in the yearly birth rate and thus, we can expect it to continue falling. Government policies related to family planning have thus, been effective so far in India. We initially saw a quick decline in birth rate the rate while falling has slowly decreased.

3.2 Trend Lines



A trend line is drawn to predict the future values. Using the birth rates I plotted a trend line and used it to forecast the birth rate of the next 3 years that is 2020, 2021, 2022. The forecasted values are 16.8144138, 16.3246483, 15.8348828 for 2020, 2021 and 2022 respectively. We can see that birth rate is expected to fall to 15.834 by 2022. This is clear indicator that the family planning policies implemented have worked and are helping the societies at large. There has been communication of the ideas in not only the urban but also the rural areas.

SUMMARY OUTPUT

<i>Regression Statistics</i>	
Multiple R	0.998389167
R Square	0.996780928
Adjusted R Square	0.996661703
Standard Error	0.244733053
Observations	29

ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	500.7466178	500.7466178	8360.509969	3.44552E-35
Residual	27	1.617145214	0.059894267		
Total	28	502.363763			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	24.12641379	0.045445787	530.883397	8.51392E-56	24.03316674	24.21966085
X Variable 1	-0.496662069	0.00543181	-91.43582432	3.44552E-35	-0.507807223	-0.48551691

4. CONCLUSION

From the data collected and statistical tools used we can conclude that while the birth rate is falling, it is falling at a decreasing rate. This shows that family planning policies have been effective over the years and communication of the idea has been done well by the governments in India.