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**Birth and Death Rate as a Component of Population Change: A Case Study
of Latur and Osmanabad District**

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Abstract:

The growth of population in a region is primarily a function of birth and death rate. The difference between those vital rates decides population growth either low or high. Birth rate is a ratio between total registered live births during a calendar year and the mid-year population. Fertility is one of the three components of population dynamics, holds very important place in population studies. Fertility level determines the age structure of population, which in truth governs the social, economic and demographic characteristics of population. The success of any population programmes depends upon a proper understanding of interplay between fertility and other variables of (Hussan, 2005, P. 194). The study of fertility is helpful to assess the unmet need for family planning and to understand the future course of fertility. However, birth rate is influenced by age at marriage, social attitude, economic condition, literacy rates and standard of living etc.

In 2001 for Latur and Osmanabad district as a whole the birth rate was 10.87 and 9.73 per 1000 population. The birth rate however in different tahsils of the study area, varied substantially from less than 2 to more than 25 births per 1000 population. When birth rates were separately calculated for urban and rural area, it was found higher for urban areas than for rural areas.

Keyword: Birth Rate, Death Rate, Infant Mortality Rate, Correlation

Introduction:

Analysis of population growth is incomplete without the analysis of death rate. It is important element in the process of population change. The decline of mortality has been more widespread than the decline in fertility, and it is increasing longevity of most of the world's inhabitants which is particularly responsible for the much feared "Population Explosion" (Clarke, 1961).

Mortality has been defined as permanent disappearance of all evidence of life at any time after birth has taken place (United Nation, 1953). The study of mortality is useful for analyzing current demographic conditions as well as for determining the prospects of potential changes in mortality. Statistics on death in the population cross-classified by age, sex and cause of death are of great value for the formulation, implementation and evaluation of public health programmes. Mortality rates are heavily related to biological, social, economic and cultural factors.

Study Region:

Latur district is situated in the South-East part of the Maharashtra and it lies between 17° 52' North latitude to 18° 50' North latitudes and 76° 12' East longitudes to 77° 18' East longitudes. The district of Osmanabad is the southern most districts in Aurangabad division of Maharashtra state situated between 17°37' to 18°42' North latitudes and 75°17' to 76°47' East longitudes. The total geographical area of Latur district is 7157 sq.kms. Out of the total geographical area of Maharashtra it covers 2.39 per cent. The district has an area of 7484 square kilo-meters. About 7271 square kilometers area (96.79%) is known as rural area where as only 241.4 square kilometers (3.21%) area

comes under urban categories. As far as area is concerned the district ranks 24th in the state of Maharashtra. East-West extent is 280 Km. and north-south extent is only 240 Kilometers.

Objectives:

1. To study the changes between birth rate
2. To study the changes between death rate
3. To correlate the birth rate and infant mortality rate

Database and Methodology:

The attempts have been made by the researcher to examine population structure during the 30 years spreading between 1991 to 2011, for which uniform data at circle level is available. The main body of data used in this study was collected from two sources viz. primary and secondary.

The present paper includes distribution, density, growth rate, sex ratio, literacy, migration, and occupational structure of population and population projection in the study region. It has been carried out over thirty years from 1991 to 2011. The processed data was presented in the form of maps, diagrams and tables. Population concentration is calculated in relation to percentage of population and area. The equation of present regression of y on x line IMR on BRI

Birth rate:

In 2001 for Latur and Osmanabad district as a whole the birth rate was 10.87 and 9.73 per 1000 population. The birth rate however in different tahsils of the study area, varied substantially from less than 2 to more than 25 births per 1000 population. When birth rates were separately calculated for urban and rural area, it was found higher for urban areas than for rural areas.

This is probably due to the age composition of urban areas as a result of rural-urban migration dominated by the people in the reproductive age group. Many times due to lack of medical facilities in rural areas, females at the time of delivery are sent to the maternity hospitals at urban parts.

**Table No. 1.1 Latur and Osmanabad District : Birth Rate
(2001 & 2011)**

Taluka		2001	2011	Taluka		2001	2011
Latur	Total	18.59	25.75	Paranda	Total	7.21	16.52
	Rural	10.12	9.33		Rural	5.58	24.62
	Urban	8.47	11.41		Urban	12.28	16.35
Udgir	Total	24.70	21.29	Bhum	Total	6.90	13.56
	Rural	15.32	12.65		Rural	6.07	38.90
	Urban	9.38	8.64		Urban	11.62	5.10
Ahmadpur	Total	10.20	17.66	Washi	Total	11.53	12.54
	Rural	6.43	9.12		Rural	8.42	24.88
	Urban	3.77	8.54		Urban	0.00	0.00
Nilanga	Total	14.24	23.89	Kalamb	Total	8.00	16.58
	Rural	8.64	14.00		Rural	6.69	30.80
	Urban	5.60	9.89		Urban	17.45	6.80
Ausa	Total	11.89	19.96	Osmanabad	Total	10.33	25.60
	Rural	6.42	11.61		Rural	5.75	28.32
	Urban	5.47	9.21		Urban	26.14	8.19

Renapur	Total	3.64	18.43	Tuljapur	Total	9.62	18.62
	Rural	2.08	9.87		Rural	6.47	25.38
	Urban	1.56	8.56		Urban	21.12	6.54
Chakur	Total	5.70	19.48	Lohara	Total	9.14	17.54
	Rural	2.94	12.45		Rural	7.27	37.63
	Urban	2.76	7.03		Urban	0.00	0.00
Jalkot	Total	8.43	20.49	Omerga	Total	12.55	26.54
	Rural	4.69	16.45		Rural	8.25	39.68
	Urban	3.74	9.85		Urban	33.90	7.65
Deoni	Total	5.73	19.97	District	Total	9.73	29.87
	Rural	3.10	14.35		Rural	6.72	30.71
	Urban	2.63	5.62		Urban	7.65	25.50
Shirur A.	Total	5.65	19.36				
	Rural	3.95	13.76				
	Urban	1.70	9.54				
District	Total	10.87	19.34				
	Rural	6.29	12.74				
	Urban	4.58	10.53				

Source :Dy. Director of Health, Pune.

Hence more births are recorded in urban parts. In the rural parts, on the other hand, partly due to peculiar age composition established as a result of outmigration and partly due to lack of maternity homes and consequently lower recording of births, the birth rate is lower. The impact of out migration on rural birth rate is visible in three talukas namely Latur, Udgir and Tuljapur of the study area.

According to figures of 2001, highest rural birth rate was registered in Udgirtahsil (15.32) and Washitahsil (8.42) whereas lowest was in Renapur tahsil with 2.08 and Parandatahsil with 5.58 births per 1000 population. High urban birth rate was found in Udgir (9.38) and Omergatahsil with 33.90 births per 1000 population.

As per 2011 vital data, birth rate of the study area is increased to 19.34 and 29.87 per 1000 population. Rural birth rate increased to 12.74 and 30.71 whereas urban birth rate increased to 10.53 and 25.50 births per 1000 population. There were wide variations in birth rate at taluka level as well as between rural and urban parts. Highest rural birth rate above the average of the study area was found in Jalkot, (16.45), Deoni (14.35), Nilanga (14.00), ShirurAnantpal (13.76) in Latur District and in Osmanabad district, Bhum (38.90) and Omergatahsil with 39.68 births per 1000 population. Urban birth rates above the average were registered in Latur tahsil 11.41 only. Average birth rate of the study area was ranging between 25.75 in Latur tahsil to 17.66 births per 1000 population in Ahmedpur tahsil whereas in Osmanabad district average birth rate was ranging between 26.54 in Omergatahsil to 12.54 births per 1000 population in Washitahsil.

Death rate:

Death rates differ from each other at rural and urban parts of the study region. Generally urban parts get low mortality rates due to adequate medical facilities; in the urban parts of the study region death rate is found to be higher than its counterpart due to the following facts:

- (i) It is more prone to the spread of infectious diseases due to over congestion of population.

- (ii) The urban society cannot provide maternal care as rural society can.
- (iii) General environment of the countryside is more conducive to good health than urban parts.
- (iv) Rural folk live a more homogenous from the point of view of conditions of general sanitation and hygiene resulting high or low mortality patterns.

**Table No.1.2: Latur and Osmanabad District : Death Rate
(2001 & 2011)**

Taluka		2001	2011	Taluka		2001	2011
Latur	Total	26.67	16.54	Paranda	Total	8.92	3.42
	Rural	11.21	8.07		Rural	9.01	2.96
	Urban	15.46	7.21		Urban	4.25	4.70
Udgir	Total	11.30	7.05	Bhum	Total	9.32	3.80
	Rural	12.56	5.5		Rural	8.50	3.30
	Urban	5.68	5.21		Urban	5.65	4.65
Ahmadpur	Total	10.46	8.24	Washi	Total	11.82	3.03
	Rural	9.45	4.65		Rural	14.25	3.54
	Urban	5.61	2.65		Urban	0.00	0.00
Nilanga	Total	12.01	10.58	Kalamb	Total	8.92	6.94
	Rural	10.50	8.87		Rural	10.45	6.26
	Urban	6.00	4.66		Urban	5.26	5.65
Ausa	Total	15.70	10.68	Osmanabad	Total	10.05	11.32
	Rural	14.04	10.75		Rural	11.25	7.29
	Urban	12.65	8.74		Urban	8.68	4.00
Renapur	Total	8.56	7.98	Tuljapur	Total	7.25	9.11
	Rural	4.55	3.68		Rural	8.65	7.17
	Urban	4.25	3.55		Urban	3.56	1.94
Chakur	Total	10.61	9.87	Lohara	Total	13.92	3.48
	Rural	8.97	7.58		Rural	12.54	3.54
	Urban	4.68	3.54		Urban	0.00	0.00
Jalkot	Total	12.89	10.45	Omerga	Total	14.98	8.41
	Rural	11.59	10.65		Rural	15.11	6.67
	Urban	10.21	4.84		Urban	5.65	1.74
Deoni	Total	15.35	14.65	District	Total	19.60	10.33
	Rural	12.59	10.95		Rural	12.23	10.72
	Urban	4.85	3.25		Urban	9.37	5.84
Shirur A.	Total	11.68	10.54				
	Rural	16.52	12.65				
	Urban	12.65	5.6				
District	Total	22.34	16.65				
	Rural	13.39	11.24				
	Urban	12.35	6.6				

Source :Dy. Director of Health, Pune

Latur and Osmanabad District Difference Between Birth Rate and Death Rate:

It is important to analyze the difference between two vital rates to understand the nature of population growth. This element is very important to confine the stage of demographic transition in any area. Population whether optimum, over or under can be known with the help of difference between these rates.

According to 2011 census, birth rate for the study region as a whole was 19.34 in Latur district and 29.87 in Osmanabad district births, whereas death rate was 16.65 deaths in Latur district and 10.33 in Osmanabad district, therefore the rate of natural population growth was 2.69 and 19.54 percent per 1000 population in Osmanabad district. At taluka level highest difference between vital rates is found in Udgirtahsil(14.24) of Latur district and Omergatahsil (18.13) of Osmanabad district whereas lowest was in Deonitahsil with 5.32 percent per 1000 population and in Osmanabad district, Washi and Tuljapurtahsils with 9.51 percent per 1000 population.

There are rural urban differentials in vital rates of the study region. This difference in Latur district is 1.50 percent only and in Osmanabad district is 19.99 percent for rural area and 3.93 percent and 1.81 percent only in Osmanabad district for urban area. Highest difference between vital rates was registered in rural parts of Udgir (7.15) and Bhum (35.60) and in Loharatahsil with 34.09 percent per 1000 population. Urban part of Ahmedpurtahsil has get highest difference between vital rates with 5.89 percent and followed by Paranda (11.65) in Osmanabad district. It is notable that in urban part of Parandatahsil death (4.70) exceeds on birth rate (16.35), therefore natural growth of population is 11.65 per 1000 population for this tahsil.

Death rate for Latur district in 2001 was 16.65 deaths per 1000 population and Osmanabad district was 10.33 deaths per 1000 population. There are little variations in the death rate at taluka level. Death rate above the average was registered in Osmanabadtahsil (11.32). Lowest death rate of Latur district below 10 deaths per 1000 population was observed in Chakur (9.87), Ahmedpur (8.24), Renapur (7.98) and Udgir (7.05) and Below 4 deaths per 1000 population was noticed in Bhum (3.80), Lohara (3.48), Paranda (3.42) and Washi (3.03). Remaining tahsils was ranging between 4-11 deaths per 1000 population. In 2011, average death rate of the study area decreased to 2.69 deaths per 1000 population.

There are rural-urban differentials in death rate of the study area. In 2001, rural death rate of the study region was 13.39 and 12.23 whereas declined to 2.15 and 1.51 deaths in 2011. In 2001, highest rural death rate was found in ShirurAnantpaltahsil (16.52) and Omergatahsil (15.11) whereas urban death rate was observed in Laturtahsil (15.46) and Osmanabadtahsil (8.68).

In 2011, rural death rate at taluka level was ranging between 12.65 deaths in ShirurAnantpaltahsil to 3.68 deaths in Renapurtahsil of Latur district and 7.29 deaths in Osmanabadtahsil to 2.96 deaths in Parandatahsil of Osmanabad district. Rural death rate above the average of the study area was found in ShirurAnantpaltahsil. Highest urban death rate was observed in Ausatahsil (8.74) of Latur district and Kalamb (5.65) of Osmanabad district whereas lowest was in Ahmadpurtahsil with 2.65 deaths per 1000 population and Omergatahsil with 1.74 deaths per 1000 population. Urban death rate above the average of the study area was observed in Latur, AUSA and Kalambtahsils.

Table No. 1.3: Latur and Osmanabad District: Difference between Vital Rate (2011)

Taluka		Birth	Death	Difference	Taluka		Birth	Death	Difference
Latur	Total	25.75	16.54	9.21	Paranda	Total	16.52	3.42	13.10
	Rural	9.33	8.07	1.26		Rural	24.62	2.96	21.66
	Urban	11.41	7.21	4.20		Urban	16.35	4.7	11.65
Udgir	Total	21.29	7.05	14.24	Bhum	Total	13.56	3.8	9.76
	Rural	12.65	5.5	7.15		Rural	38.90	3.3	35.60
	Urban	8.64	5.21	3.43		Urban	5.10	4.65	0.45
Ahmadpur	Total	17.66	8.24	9.42	Washi	Total	12.54	3.03	9.51
	Rural	9.12	4.65	4.47		Rural	24.88	3.54	21.34
	Urban	8.54	2.65	5.89		Urban	0.00	0	0.00
Nilanga	Total	23.89	10.58	13.31	Kalamb	Total	16.58	6.94	9.64
	Rural	14.00	8.87	5.13		Rural	30.80	6.26	24.54
	Urban	9.89	4.66	5.23		Urban	6.80	5.65	1.15
Ausa	Total	19.96	10.68	9.28	Osmanabad	Total	25.60	11.32	14.28
	Rural	11.61	10.75	0.86		Rural	28.32	7.29	21.03
	Urban	9.21	8.74	0.47		Urban	8.19	4	4.19
Renapur	Total	18.43	7.98	10.45	Tuljapur	Total	18.62	9.11	9.51
	Rural	9.87	3.68	6.19		Rural	25.38	7.17	18.21
	Urban	8.56	3.55	5.01		Urban	6.54	1.94	4.60
Chakur	Total	19.48	9.87	9.61	Lohara	Total	17.54	3.48	14.06
	Rural	12.45	7.58	4.87		Rural	37.63	3.54	34.09
	Urban	7.03	3.54	3.49		Urban	0.00	0	0.00
Jalkot	Total	20.49	10.45	10.04	Omerga	Total	26.54	8.41	18.13
	Rural	16.45	10.65	5.80		Rural	39.68	6.67	33.01
	Urban	9.85	4.84	5.01		Urban	7.65	1.74	5.91
Deoni	Total	19.97	14.65	5.32	District	Total	29.87	10.33	19.54
	Rural	14.35	10.95	3.40		Rural	30.71	10.72	19.99
	Urban	5.62	3.25	2.37		Urban	7.65	5.84	1.81
Shirur A.	Total	19.36	10.54	8.82					
	Rural	13.76	12.65	1.11					
	Urban	9.54	5.6	3.94					
District	Total	19.34	16.65	2.69					
	Rural	12.74	11.24	1.50					
	Urban	10.53	6.6	3.93					

Source :Dy. Director of Health, Pune.

Infant Mortality Rate:

The study of infant mortality rate has great significance in population geography. Trends in infant mortality are closely related to trends in fertility and general mortality. The phenomenon has risen on important issue regarding the utility of infant mortality rate as an indicator of socio-economic

development. Infant deaths is closely associated with endogenous factors such as age of mother, the birth order, the period of spacing between births, pre maturity and weight at birth. Exogenous causes such as epidemics, poor hygiene and lack of proper nutrition affects on infant mortality rate.

In the study region Latur district 30.21 infant deaths and Osmanabad district 39.60 infant deaths was found in 2001 and it has variations at rural-urban level. At rural part of the study region it founds 19.03 in Latur district and 37.43 in Osmanabad district whereas at urban parts it found 15.11 deaths in Latur district and 33.15 deaths in Osmanabad district. At taluka level infant mortality rate was ranging between 45.99 in Udgirtahsil to 22.07 deaths in Renapurtahsil and 39.09 deaths in Omergatahsil to 20.46 deaths in Bhumtahsil. Higher infant mortality rates were observed at rural parts comparing to urban parts. Urban infant mortality rate was ranging between 19.88 in Laturtahsil to 8.25 in Deonitahsil of Latur district and 41.55 in Omergatahsil to 16.72 in Bhumtahsil whereas rural was between 27.97 in Udgirtahsil to 11.95 in Renapurtahsil. (Table No. 1.4)

According to 2011 census infant mortality rate of the study region declined to 8.47 deaths in Latur district and 20.14 deaths in Osmanabad district. At the time, rural infant mortality rate was 6.45 and 23.99 whereas urban infant mortality rate was 5.95 and 17.85 deaths. It is notable that urban infant mortality rates infant deaths were observed in Renapurtahsil (14.79) and Omergatahsil (26.25). Urban infant mortality rate was lower in Udgirtahsil (1.74) of Latur district and Paranda (4.07) tahsil.

Correlation Between Birth Rate and Infant Mortality Rate :

The equation of present regression of y on x line IMR on BRI is $yp\ 21.74 + (-) 0.56\ x$ and Osmanabad district $yp\ -6.48+0.85\ x$.

With reference to this equation for any value of x they could be identify. Then by taking any 3 values of X there corresponding yp value 3 more points.

Table No. 1.4: Latur and Osmanabad District: Infant Mortality Rate

Taluka		2001	2011	Taluka		2001	2011
Latur	Total	44.34	7.16	Paranda	Total	23.73	9.31
	Rural	19.45	1.79		Rural	30.20	19.04
	Urban	19.88	2.94		Urban	28.63	4.07
Udgir	Total	45.99	3.41	Bhum	Total	20.46	6.66
	Rural	27.97	2.67		Rural	44.97	32.83
	Urban	18.02	1.74		Urban	16.72	6.52
Ahmadpur	Total	27.86	7.46	Washi	Total	24.07	1.01
	Rural	15.55	2.69		Rural	33.30	16.46
	Urban	12.31	4.77		Urban	0.00	0.00
Nilanga	Total	38.13	9.65	Kalamb	Total	24.58	8.58
	Rural	22.64	5.36		Rural	37.49	24.11
	Urban	15.49	4.29		Urban	24.25	10.65
Ausa	Total	31.85	8.07	Osmanabad	Total	35.93	15.27
	Rural	18.03	5.19		Rural	34.07	22.57
	Urban	14.68	3.74		Urban	34.33	17.95
Renapur	Total	22.07	14.79	Tuljapur	Total	28.24	9.00
	Rural	11.95	7.79		Rural	31.85	18.91
	Urban	10.12	7.00		Urban	27.66	14.58

Chakur	Total	25.18	13.78	Lohara	Total	26.68	8.40
	Rural	15.39	9.51		Rural	44.90	30.36
	Urban	9.79	4.27		Urban	0.00	0.00
Jalkot	Total	28.92	12.06	Omurga	Total	39.09	13.99
	Rural	21.14	11.76		Rural	47.93	31.43
	Urban	13.59	6.11		Urban	41.55	26.25
Deoni	Total	25.70	14.24	District	Total	39.60	20.14
	Rural	17.45	11.25		Rural	37.43	23.99
	Urban	8.25	2.99		Urban	33.15	17.85
Shirur A.	Total	25.01	13.71				
	Rural	17.71	9.81				
	Urban	11.24	7.84				
District	Total	30.21	8.47				
	Rural	19.03	6.45				
	Urban	15.11	5.95				

Source :Dy. Director of Health, Pune.

Could be plotted on the scatter gram and straight line could be fitted to pass through the 3 points. It shows that there is a -ve relationship between these two variable more specifically it shows that for one unit of increase of birth rate Latur district is a -0.56 decrease in IMR i.e. with increase in birth rate there is a decrease in infant mortality rate and Osmanabad district is a 0.85 increase in IMR i.e. with decrease in birth rate there is increase in infant mortality rate.

Table No. 1.5: Correlation between Birth Rate and I.M.R. 2011

Taluka	Birth X	IM R Y	X ²	XY	Yp	Taluka	Birt h X	IM R Y	X ²	XY	Yp
Latur	25.75	7.16	663.06	184.37	545.38	Paranda	16.52	9.31	272.91	153.80	121.09
Udgir	21.29	3.41	453.26	72.60	450.92	Bhum	13.56	6.66	183.87	90.31	99.39
Ahmadpur	17.66	7.46	311.88	131.74	374.04	Washi	12.54	1.01	157.25	12.67	91.92
Nilanga	23.89	9.65	570.73	230.54	505.99	Kalamb	16.58	8.58	274.90	142.26	121.53
Ausa	19.96	8.07	398.40	161.08	422.75	Osmanabad	25.60	15.27	655.36	390.91	187.65
Renapur	18.43	14.79	339.66	272.58	390.35	Tuljapur	18.62	9.00	346.70	167.58	136.48
Chakur	19.48	13.78	379.47	268.43	412.59	Lohara	17.54	8.40	307.65	147.34	128.57
Jalkot	20.49	12.06	419.84	247.11	433.98	Omurga	26.54	13.99	704.37	371.29	194.54
Deoni	19.97	14.24	398.80	284.37	422.96	District	29.87	20.14	892.22	601.58	218.95

Shirur	19.36	13.7	374.8	265.4	410.0		ΣX	ΣY	ΣX^2	ΣXY	
A.		1	1	3	4		=	=	=	=	
							177.	92.3	3795.	2077.	
							37	6	24	74	
District	19.34	8.47	374.0	163.8	409.6						
			4	1	2						
	$\Sigma X=$	ΣY	ΣX^2	ΣXY							
	225.6	=	=	=							
	2	112.	4683.	2282.							
		8	96	06							

Source :Compiled by the researcher.

Some point lie above regression line indicate that IMR in maximum place is more than what is expected, the other point which line below the regression below indicate that the IMR is dependent upon the birth rate. However, in this case since most of the points are close to regression line. One may conclude that IMR is dependent that birth rate on great extent.

Conclusions:

At taluka level there is rural-urban different in growth rate of population in the study area. With the analysis of rural-urban population data during the period of 1991-2011, it is clearly seen that urban population growth is always higher than rural population growth rates it is mainly due to 1. Sizeable rural-urban migration 2. High infant and child mortality at rural parts and due to no availability of health care centers 3. Rural present women relieved in the urban hospitals therefore birth registration of a baby performed in an urban part consequently it helps to high growth rates of population at urban parts. According to 2011 census, urban population growth rate was 27.57 and 20.72 percent. Whereas rural population of the study area declined to 15.09 and 10.00 percent at each taluka of the study area there is negative growth of population but urban parts registered positive growth.

In 2001 for Latur and Osmanabad district as a whole the birth rate was 10.87 and 9.73 per 1000 population. The birth rate however in different tahsils of the study area, varied substantially from less than 2 to more than 25 births per 1000 population. When birth rates were separately calculated for urban and rural area, it was found higher for urban areas than for rural areas.

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