ISSN 2454-8596
www.vidhyayanaejournal.org
An International Multidisciplinary Research e-Journal

A STUDY OF CRUDE BIRTH RATE OF VARIOUS STATES OF INDIA (2011-2016)

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ISSN 2454-8596
www.vidhyayanaejournal.org
VIDHYAYANA An International Multidisciplinary Research e-Journal

Abstract :

The birth rate is used to calculate population growth. The birth rate is an issue of concern and policy for national governments, some seek to increase the birth rate with financial incentives or provision of support services to new mother, conversely, other countries have policies to reduce the birth rate(for example, China's one-child policy which was effect from 19788 to 2015).

Policies to increase the crude birth rate are known as pro-nationalist policies and policies to reduce the crude birth rate are known as anti-nationalist policies. To study this changes of is calculated crude birth rate (CBR) of population(2011-2016) and rated for different states of India.

KEYWORDS:

- Crude birth rate
- Nationalist
- States

1.Introduction

Assuring public Health services is primary duty of every government and as such, the government has taken steps to maintain public health by opening health centers, hospitals, mobile hospitals, organizing mass awareness camps on health and so on.

As per the index established in 2016 by HAQ (Health care access and quality) out of total 195 countries India's rank is 145 in Health care access and quality.

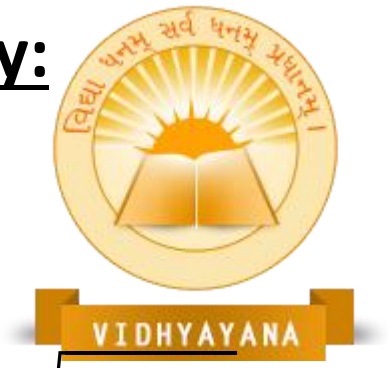
this is very less as compare to the other countries. Poverty is one of the reason for poor health. As well as education level and the level of facilities provided by government hospitals are responsible for high infant mortality rates.

Here, we will discuss crude birth rate rate (CBR).

2.Objective

- To identify which states people are having a good health.
- To identify the difference between rural and urban area people's health in Gujarat.

3.Methodology:



Mean = $\bar{X} = \frac{\sum x_i}{n}$

Standard Deviation = $\sqrt{\frac{\sum(X-\bar{X})^2}{n-1}}$

Coefficient of variance = $\frac{\sigma}{\bar{X}} \times 100$

Combined mean = $\frac{\sum n_i \bar{X}_i}{n}$

Combined Standard Deviation = $\sqrt{\frac{n1(d1^2+s1^2)+\cdots.}{n}}$

Z score = $\frac{\bar{X}-\mu}{\sigma}$

ISSN 2454-8596
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Crude birth rate (CBR)

Definition:

The crude birth rate is the total number of live births occurring among the population of a given geographical area during a given year, per 1000 mid-year total population of the given geographical area during the same year.

Formula to calculate:

$$CBR = \frac{No.of\ births}{Total\ population} \times 1000$$

DATA ANALYSIS :- 4.1 Data of Crude birth rate

STATES/UT	2011	2012	2013	2014	2015	2016
Andhra Pradesh	17.5	17.5	17.4	17.0	16.8	16.4
Arunachal Pradesh	19.8	19.4	19.3	19.2	18.8	18.9
Assam	22.8	22.5	22.4	22.4	22.0	21.7
Bihar	27.7	27.7	27.6	25.9	26.3	26.8
Chhattisgarh	24.9	24.5	24.4	23.4	23.2	22.8
Delhi	17.5	17.3	17.2	16.8	16.4	15.5
Goa	13.3	13.1	13.0	12.9	12.7	12.9
Gujarat	21.3	21.1	20.8	20.6	20.4	20.1
Haryana	21.8	21.6	21.3	21.2	20.9	20.7
Himachal Pradesh	16.5	16.2	16.0	16.4	16.3	16.0
Jammu & Kashmir	17.8	17.6	17.5	16.8	16.2	15.7
Jharkhand	24.6	24.7	24.6	23.8	23.5	22.9
Karnataka	18.8	18.5	18.3	18.1	17.9	17.6
Kerala	15.2	14.9	14.7	14.8	14.8	14.3
Madhya Pradesh	26.9	26.6	26.3	25.7	25.5	25.1

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Maharashtra	16.7	16.6	16.5	16.5	16.3	15.9
Manipur	14.4	14.6	14.7	14.6	14.4	12.9
Meghalaya	24.1	24.1	23.9	24.1	23.7	23.7
Mizoram	16.6	16.3	16.1	16.4	16.2	15.5
Nagaland	16.1	15.6	15.4	15.3	14.8	14.0
Odisha	20.1	19.9	19.6	19.4	19.2	18.6
Punjab	16.2	15.9	15.7	15.5	15.2	14.9
Rajasthan	26.2	25.9	25.6	25.0	24.8	24.3
Sikkim	17.6	17.2	17.1	17.1	17.0	16.6
Tamil Nadu	15.9	15.7	15.6	15.4	15.2	15.0
Tripura	14.3	13.9	13.7	14.9	14.7	13.7
Uttar Pradesh	27.8	27.4	27.2	27.0	26.7	26.2
Uttarakhand	18.9	18.5	18.2	18.2	17.8	16.6
West Bengal	16.3	16.1	16.0	15.6	15.5	15.4
Andaman & Nicobar	15.1	15.0	14.6	14.7	12.0	11.7
Chandigarh	15.0	14.8	14.7	14.3	13.7	13.9
D&N Haveli	26.1	25.6	25.5	25.6	25.5	24.5
Daman & Diu	18.4	18.1	17.9	17.3	17.1	24.0
Lakshadweep	14.7	14.8	14.8	14.0	14.7	18.9
Puducherry	16.1	15.8	15.7	14.6	13.8	13.9

4.2Analysis of Crude birth rate

STATES/UT	MEAN	S.D	d^2	S.D^2
Andhra Pradesh	17.1	0.449026451	2.534713644	0.201625
Arunachal Pradesh	19.2	0.377932473	0.297637536	0.142833
Assam	22.3	0.390271447	13.04042187	0.152312
Bihar	27.0	0.78132728	68.94887563	0.610472
Chhattisgarh	23.9	0.840827481	26.76415338	0.706991
Delhi	16.8	0.739143715	3.650342783	0.546333
Goa	13.0	0.196726414	32.61362463	0.038701
Gujarat	20.7	0.451401615	4.100814048	0.203763
Haryana	21.3	0.420107078	6.541545307	0.17649
Himachal Pradesh	16.2	0.202723182	6.03280926	0.041097
Jammu & Kashmir	16.9	0.845617145	3.11175389	0.715068
Jharkhand	24.0	0.735980072	28.34039965	0.541667
Karnataka	18.2	0.424694451	0.246886686	0.180365
Kerala	14.8	0.2831234	15.36485078	0.080159
Madhya Pradesh	26.0	0.69832589	53.68501229	0.487659
Maharashtra	16.4	0.274090272	5.236013271	0.075125
Manipur	14.3	0.675411451	19.64180141	0.456181

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Meghalaya	23.9	0.202680008	27.60395299	0.041079
Mizoram	16.2	0.382720268	6.245166712	0.146475
Nagaland	15.2	0.722335704	12.25563302	0.521769
Odisha	19.5	0.535713813	0.599066983	0.286989
Punjab	15.6	0.470311318	9.792756307	0.221193
Rajasthan	25.3	0.727963338	43.70040349	0.529931
Sikkim	17.1	0.319221943	2.542491589	0.101903
Tamil Nadu	15.5	0.326912728	10.44412664	0.106872
Tripura	14.2	0.518922815	20.08376611	0.269281
Uttar Pradesh	27.1	0.566137319	69.98495938	0.320511
Uttarakhand	18.0	0.792017214	0.434945395	0.627291
West Bengal	15.8	0.374125239	8.245568614	0.13997
Andaman & Nicobar Islands	13.8	1.555845433	23.5111771	2.420655
Chandigarh	14.4	0.526672487	18.42705265	0.277384
D&N Haveli	25.5	0.519512802	45.87639195	0.269894
Daman & Diu	18.8	2.58902008	0.015429203	6.703025
Lakshadweep	15.3	1.782382049	11.41990072	3.176886
Puducherry	15.0	1.012639549	13.75919227	1.025439

Calculation for Z score

STATES/UT	2011	2012	2013	2014	2015	2016
Andhra Pradesh	-0.28822	-0.2694	-0.30296	-0.396669641	-0.44353	-0.53724
Arunachal Pradesh	0.270616	0.170712	0.133297	0.118760653	0.025046	0.048475
Assam	0.958002	0.902069	0.868477	0.868477443	0.774763	0.704477
Bihar	2.111271	2.104401	2.086767	1.688480182	1.782195	1.899338
Chhattisgarh	1.44791	1.369042	1.334544	1.10276394	1.055907	0.962192
Delhi	-0.28352	-0.33116	-0.3422	-0.44352694	-0.53724	-0.7481
Goa	-1.26967	-1.31031	-1.32925	-1.357244278	-1.4041	-1.35724
Gujarat	0.62228	0.554463	0.493619	0.446761748	0.399904	0.329618
Haryana	0.739527	0.670468	0.610762	0.587333647	0.517048	0.47019
Himachal Pradesh	-0.51319	-0.58458	-0.62605	-0.537241539	-0.56067	-0.63096
Jammu & Kashmir	-0.20603	-0.25521	-0.2896	-0.44352694	-0.5841	-0.70124
Jharkhand	1.383908	1.407336	1.383908	1.196478539	1.126193	0.985621
Karnataka	0.023188	-0.0487	-0.0921	-0.138954494	-0.18581	-0.2561
Kerala	-0.82415	-0.89702	-0.93553	-0.912099934	-0.9121	-1.02924
Madhya Pradesh	1.92502	1.855057	1.782195	1.641622883	1.594766	1.501051
Maharashtra	-0.47693	-0.49701	-0.51381	-0.513812889	-0.56067	-0.65438
Manipur	-1.00295	-0.96142	-0.94362	-0.958957233	-1.00581	-1.35724
Meghalaya	1.267224	1.275338	1.230147	1.266764488	1.17305	1.17305
Mizoram	-0.48327	-0.55864	-0.60158	-0.537241539	-0.5841	-0.7481
Nagaland	-0.6059	-0.72703	-0.78163	-0.794956686	-0.9121	-1.09953

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Odisha	0.329262	0.283714	0.212475	0.165617952	0.118761	-0.02181
Punjab	-0.58265	-0.65992	-0.70124	-0.748099386	-0.81839	-0.88867
Rajasthan	1.767146	1.685336	1.618194	1.477622335	1.430765	1.313622
Sikkim	-0.26176	-0.33848	-0.38092	-0.373240991	-0.39667	-0.49038
Tamil Nadu	-0.65702	-0.70607	-0.72467	-0.771528036	-0.81839	-0.86524
Tripura	-1.01793	-1.11422	-1.17355	-0.888671284	-0.93553	-1.16982
Uttar Pradesh	2.13633	2.049572	1.993053	1.946195329	1.875909	1.758766
Uttarakhand	0.051967	-0.05305	-0.11085	-0.115525844	-0.20924	-0.49038
West Bengal	-0.55263	-0.60865	-0.63096	-0.724670736	-0.7481	-0.77153
Andaman & Nicobar Islands	-0.85047	-0.87307	-0.95054	-0.935528584	-1.5681	-1.63839
Chandigarh	-0.85604	-0.91305	-0.94319	-1.029243183	-1.16982	-1.12296
D&N Haveli	1.728606	1.627682	1.591505	1.618194233	1.594766	1.360479
Daman & Diu	-0.05784	-0.13088	-0.18038	-0.326383692	-0.37324	1.243336
Lakshadweep	-0.93228	-0.91325	-0.91829	-1.099529132	-0.93553	0.048475
Puducherry	-0.61791	-0.66931	-0.69877	-0.958957233	-1.14639	-1.12296

Convert into score value on a ten point

STATES/UT	2011	2012	2013	2014	2015	2016
Andhra Pradesh	4	4	4	4	4	3
Arunachal Pradesh	7	6	6	6	6	6
Assam	9	9	9	9	8	8
Bihar	10	10	10	10	10	10
Chhattisgarh	10	10	10	9	9	9
Delhi	4	4	4	4	3	3
Goa	2	1	1	1	1	1
Gujarat	8	8	7	7	7	7
Haryana	8	8	8	8	7	7
Himachal Pradesh	4	3	3	3	3	3
Jammu & Kashmir	5	4	4	4	3	3
Jharkhand	10	10	10	9	9	9
Karnataka	6	5	5	5	5	4
Kerala	3	2	2	2	2	5
Madhya Pradesh	10	10	10	10	10	10
Maharashtra	4	4	4	4	3	3
Manipur	2	2	2	2	2	1
Meghalaya	9	9	9	9	9	9
Mizoram	4	3	3	3	3	3
Nagaland	3	3	3	3	2	2
Odisha	7	7	6	6	6	5

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Punjab	3	3	3	3	3	2
Rajasthan	10	10	10	10	10	10
Sikkim	4	4	4	4	4	4
Tamil Nadu	3	3	3	3	3	2
Tripura	2	2	2	2	2	5
Uttar Pradesh	10	10	10	10	10	10
Uttarakhand	6	5	5	5	5	4
West Bengal	3	3	3	3	3	3
Andaman & Nicobar Islands	2	2	2	2	1	1
Chandigarh	2	2	2	2	2	2
D&N Haveli	10	10	10	10	10	10
Daman & Diu	5	5	5	4	4	9
Lakshadweep	2	2	2	2	2	4
Puducherry	3	3	3	2	2	2

Convert score value into scale value

STATES/UT	MEAN	S.D	d^2	S.D^2	SCALE VALUE	C.V
Andhra Pradesh	3.833333333	0.408248	1.920204	0.166667	1	10.64996
Arunachal Pradesh	6.166666667	0.408248	0.897982	0.166667	2	6.620243
Assam	8.666666667	0.516398	11.88608	0.266667	3	5.958436
Bihar	10	0	22.85751	0	3	0
Chhattisgarh	9.5	0.547723	18.32655	0.3	3	5.765501
Delhi	3.666666667	0.516398	2.409887	0.266667	1	14.08358
Goa	1.166666667	0.408248	16.42179	0.166667	1	34.99271
Gujarat	7.333333333	0.516398	4.470204	0.266667	3	7.041788
Haryana	7.666666667	0.516398	5.990839	0.266667	3	6.735623
Himachal Pradesh	3.166666667	0.408248	4.212268	0.166667	1	12.89205
Jammu & Kashmir	3.833333333	0.752773	1.920204	0.566667	1	19.63755
Jharkhand	9.5	0.547723	18.32655	0.3	3	5.765501
Karnataka	5	0.632456	0.047982	0.4	2	12.64911
Kerala	2.666666667	1.21106	6.514649	1.466667	1	45.41476
Madhya Pradesh	10	0	22.85751	0	3	0
Maharashtra	3.666666667	0.516398	2.409887	0.266667	1	14.08358
Manipur	1.833333333	0.408248	11.46306	0.166667	1	22.26809
Meghalaya	9	0	14.2956	0	3	0
Mizoram	3.166666667	0.408248	4.212268	0.166667	1	12.89205
Nagaland	2.666666667	0.516398	6.514649	0.266667	1	19.36492
Odisha	6.166666667	0.752773	0.897982	0.566667	2	12.20712
Punjab	2.833333333	0.408248	5.691633	0.166667	1	14.40876
Rajasthan	10	0	22.85751	0	3	0

ISSN 2454-8596
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Sikkim	4	0	1.486077	0	2	0
Tamil Nadu	2.833333333	0.408248	5.691633	0.166667	1	14.40876
Tripura	2.5	1.224745	7.39322	1.5	1	48.98979
Uttar Pradesh	10	0	22.85751	0	3	0
Uttarakhand	5	0.632456	0.047982	0.4	2	12.64911
West Bengal	3	0	4.924172	0	1	0
Andaman & Nicobar Islands	1.666666667	0.516398	12.61941	0.266667	1	30.98387
Chandigarh	2	0	10.36227	0	1	0
D&N Haveli	10	0	22.85751	0	3	0
Daman & Diu	5.333333333	1.861899	0.013061	3.466667	2	34.9106
Lakshadweep	2.333333333	0.816497	8.327347	0.666667	1	34.99271
Puducherry	2.5	0.547723	7.39322	0.3	1	21.9089

Classification of states & UT by scale value

High		Medium		Low	
STATES	**SCALE VALUE**	**STATES**	**SCALE VALUE**	**STATES**	**SCALE VALUE**
Assam	3	Arunachal Pradesh	2	Andhra Pradesh	1
Bihar	3	Karnataka	2	Delhi	1
Chhattisgarh	3	Odisha	2	Goa	1
Gujarat	3	Sikkim	2	Himachal Pradesh	1
Haryana	3	Uttarakhand	2	Jammu & Kashmir	1
Jharkhand	3	Daman & Diu	2	Kerala	1
Madhya Pradesh	3			Maharashtra	1
Meghalaya	3			Manipur	1
Rajasthan	3			Mizoram	1
Uttar Pradesh	3			Nagaland	1
D&N Haveli	3			Punjab	1
				Tamil Nadu	1
				Tripura	1
				West Bengal	1
				Andaman & Nicobar Islands	1
				Chandigarh	1
				Lakshadweep	1

Score value	Scale value	Score value	Scale value
$\leq (\bar{X} - 0.425\sigma)$	1	≤3.924945252	1

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$(\bar{X}- 0.425\sigma)$ to $(\bar{X}+ 0.425\sigma)$	2	3.924945252 to 6.513149986	2
$\geq (\bar{X}+ 0.425\sigma)$	3	≥6.513149986	3

Total scores of all the 35 States are recalculated a three point scale using the standard normal distribution is constructed as above.

Ranking of states & UT

Low		Medium		High	
State	Rank	State	Rank	State	Rank
West Bengal	1	Sikkim	14	Bihar	19
Chandigarh	1	Arunachal Pradesh	15	Madhya Pradesh	19
Andhra Pradesh	2	Odisha	16	Meghalaya	19
Himachal Pradesh	3	Karnataka	17	Rajasthan	19
Mizoram	3	Uttarakhand	17	Uttar Pradesh	19
Delhi	4	Daman & Diu	18	D&N Haveli	19
Maharashtra	4			Chhattisgarh	20
Punjab	5			Jharkhand	20
Tamil Nadu	5			Assam	21
Nagaland	6			Haryana	22
Jammu & Kashmir	7			Gujarat	23
Puducherry	8				
Manipur	9				
Andaman & Nicobar Islands	10				
Goa	11				
Lakshadweep	11				
Kerala	12				
Tripura	13				

5.Conclusion:

Here, we classified all the state of India in various groups like high, medium and low. Also we find the rank of state by its scale value and using coefficient of variance tools. First three ranks of Crude birth rate are as follow.

1. West Bengal, Chandigarh
2. Andhra Pradesh
3. Himachal Pradesh, Mizoram

6. Reference:

- Data collected from NITI AAYOG government Site: www.niti.gov.in
  Link: http://niti.gov.in/state-statistics
- Each formula is produced by the center for health statistics, statistical analysis division.
- Details of various parameters index is taken from www.indexmandi.com