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

A STUDY OF CRUDE DEATH 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 :

CDR looks at death from all causes in a given time interval, for a given population.

According to the WHO, the ten leading causes of death, globally in 2016, for both sexes and all ages, were represented as below (CDR per 1,00,000 population)

1) Ischaemic heart disease – 126
2) Stroke – 77
3) Chronic obstructive pulmonary disease – 41
4) Lower respiratory infections – 40
5) Alzheimer's disease and other dementias – 27
6) Trachea, bronchus, lung cancers – 23
7) Diabetes mellitus – 21
8) Road injury – 19
9) Diarrheal diseases – 19
10) Tuberculosis – 17

As of 2020, for instance, the CIA estimates that the CDR globally will be 7.7 deaths per 1,000 persons in populations.

According to Jean Ziegler (the UN special rapport ear on the right to food for 2000 to march 2008), mortality due to malnutrition accounted for 58% of the total mortality in 2006:- "In the world approximately 62 million people, all causes of death combined, die each year. In 2006, more than 36 million died of hunger or diseases due to deficiencies in micronutrients."

KEYWORDS:

- Crude death rate
- Mortality

ISSN 2454-8596
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- diseases

1.Introduction

People who have a lower standard of living are also more likely to face issues such as a lack of hygiene and sanitation, the increase of exposure to and the spread of disease, and a lack of access to proper medical care and facilities.

Poor heath can in turn contribute to low and reduced income, which can create a loop known as the health-poverty trap. Indian economist and philosopher Amartya Sen has stated that mortality rates can serve as an indicator of economic success and failure.

Historically, mortality rates have been adversely affected by short term price increases. Studies have shown that mortality rates increase at a rate concurrent with increases in food prices.

It is now found that national income, which is directly tied to standard of living within a country, is the largest factor in mortality rates being higher in low-income countries.

2.Objective :

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

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

Crude Death rate (CDR)

Defination:

The crude death rate is the number of deaths 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.

ISSN 2454-8596
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Formula to calculate:

$$CDR = \frac{NO.\ of\ deaths}{Total\ population} \times 1000$$

4. DATA ANALYSIS :- 4.1 Data of Crude death rate

STATES/UT	2011	2012	2013	2014	2015	2016
Andhra Pradesh	7.5	7.4	7.3	7.3	7.1	6.8
Arunachal Pradesh	5.8	5.8	5.8	6.6	6.0	6.2
Assam	8.0	7.9	7.8	7.2	7.1	6.7
Bihar	6.7	6.6	6.6	6.2	6.2	6.0
Chhattisgarh	7.9	7.9	7.9	7.7	7.5	7.4
Delhi	4.3	4.2	4.1	3.8	3.6	4.0
Goa	6.7	6.6	6.6	6.6	6.4	6.7
Gujarat	6.7	6.6	6.5	6.2	6.1	6.1
Haryana	6.5	6.4	6.3	6.1	6.1	5.9
Himachal Pradesh	6.7	6.7	6.7	6.7	6.6	6.8
Jammu & Kashmir	5.5	5.4	5.3	5.1	4.9	5.0
Jharkhand	6.8	6.8	6.8	5.9	5.8	5.5
Karnataka	7.1	7.1	7.0	6.8	6.6	6.7
Kerala	7.0	6.9	6.9	6.6	6.6	7.6
Madhya Pradesh	8.2	8.1	8.0	7.8	7.5	7.1
Maharashtra	6.3	6.3	6.2	6.0	5.8	5.9
Manipur	4.1	4.0	4.0	4.3	4.0	4.5
Meghalaya	7.8	7.6	7.6	7.5	7.4	6.6
Mizoram	4.4	4.4	4.3	4.3	4.2	4.2
Nagaland	3.3	3.2	3.1	3.1	3.0	4.5
Odisha	8.5	8.5	8.4	7.9	7.6	7.8
Punjab	6.8	6.8	6.7	6.4	6.2	6.0
Rajasthan	6.7	6.6	6.5	6.4	6.3	6.1
Sikkim	5.6	5.4	5.2	5.1	5.0	4.7
Tamil Nadu	7.4	7.4	7.3	7.0	6.7	6.4
Tripura	5.0	4.8	4.7	4.7	5.2	5.5
Uttar Pradesh	7.9	7.7	7.7	7.4	7.2	6.9

Uttarakhand	6.2	6.1	6.1	6.0	6.4	6.7
West Bengal	6.2	6.3	6.4	6.1	5.9	5.8
Andaman & Nicobar Islands	4.6	4.6	4.6	4.6	5.0	5.2
Chandigarh	4.1	4.0	4.0	4.0	4.4	4.5
D&N Haveli	4.6	4.5	4.4	4.2	3.9	4.0
Daman & Diu	4.9	4.8	4.9	4.6	4.7	4.6
Lakshadweep	6.4	6.4	6.3	6.1	6.2	6.0
Puducherry	7.2	7.1	7.0	6.6	6.8	7.2

4.2 Analysis of Crude death rate

STATES/UT	MEAN	S.D	d^2	S.D^2
Andhra Pradesh	7.2	0.252438246	1.369076	0.063725
Arunachal Pradesh	6.0	0.310189402	0.000421	0.096217
Assam	7.5	0.529466881	1.928598	0.280335
Bihar	6.4	0.294860635	0.105305	0.086943
Chhattisgarh	7.7	0.222178978	2.722709	0.049363
Delhi	4.0	0.270911611	4.216473	0.073393
Goa	6.6	0.111444377	0.297398	0.01242
Gujarat	6.4	0.276278742	0.095247	0.07633
Haryana	6.2	0.223590662	0.023289	0.049993
Himachal Pradesh	6.7	0.066024359	0.395231	0.004359
Jammu & Kashmir	5.2	0.24586422	0.730271	0.060449
Jharkhand	6.3	0.598887858	0.040375	0.358667
Karnataka	6.9	0.200501203	0.650361	0.040201
Kerala	6.9	0.367531641	0.756824	0.13508
Madhya Pradesh	7.8	0.404740921	2.909613	0.163815
Maharashtra	6.1	0.221440644	0.000549	0.049036
Manipur	4.2	0.199997495	3.637738	0.039999
Meghalaya	7.4	0.423508389	1.829837	0.179359
Mizoram	4.3	0.081051074	3.130874	0.006569
Nagaland	3.4	0.569111629	7.326959	0.323888
Odisha	8.1	0.406068387	4.237856	0.164892
Punjab	6.5	0.325114454	0.165419	0.105699
Rajasthan	6.4	0.21026152	0.132085	0.04421
Sikkim	5.2	0.30116859	0.819586	0.090703
Tamil Nadu	7.0	0.409499513	0.928477	0.16769
Tripura	5.0	0.332142264	1.214707	0.110318
Uttar Pradesh	7.5	0.364528914	1.950244	0.132881
Uttarakhand	6.2	0.262030064	0.030949	0.06866
West Bengal	6.1	0.240334621	0.003661	0.057761

ISSN 2454-8596
www.vidhyayanaejournal.org
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Andaman & Nicobar Islands	4.8	0.258534042	1.659562	0.06684
Chandigarh	4.1	0.239629047	3.682073	0.057422
D&N Haveli	4.3	0.289426781	3.220576	0.083768
Daman & Diu	4.8	0.146063854	1.706054	0.021335
Lakshadweep	6.2	0.153792572	0.02513	0.023652
Puducherry	7.0	0.233874878	0.838465	0.054697

Calculation for z score

STATES/UT	2011	2012	2013	2014	2015	2016
Andhra Pradesh	1.132784	1.06409	0.974187	0.974187	0.816331	0.579546
Arunachal Pradesh	-0.18258	-0.19767	-0.19268	0.421689	-0.05188	0.105976
Assam	1.535696	1.459922	1.368829	0.895259	0.816331	0.500617
Bihar	0.529588	0.425424	0.421689	0.105976	0.105976	-0.05188
Chhattisgarh	1.434901	1.447129	1.457114	1.289901	1.132044	1.053116
Delhi	-1.37756	-1.46183	-1.52002	-1.788304	-1.94616	-1.63045
Goa	0.501843	0.458691	0.435904	0.421689	0.263832	0.500617
Gujarat	0.524269	0.434433	0.342761	0.105976	0.027047	0.027047
Haryana	0.331663	0.282854	0.184904	0.027047	0.027047	-0.13081
Himachal Pradesh	0.500146	0.508785	0.466427	0.500617	0.421689	0.579546
Jammu & Kashmir	-0.44619	-0.49709	-0.58017	-0.762236	-0.92009	-0.84116
Jharkhand	0.579546	0.579546	0.579546	-0.130809	-0.20974	-0.44652
Karnataka	0.782563	0.797284	0.737402	0.579546	0.421689	0.500617
Kerala	0.748602	0.658424	0.658474	0.421689	0.421689	1.210972
Madhya Pradesh	1.660869	1.573202	1.526686	1.368829	1.132044	0.816331
Maharashtra	0.218888	0.178477	0.105976	-0.051881	-0.20974	-0.13081
Manipur	-1.55766	-1.61873	-1.59602	-1.393662	-1.63045	-1.23581
Meghalaya	1.370523	1.248139	1.180538	1.132044	1.053116	0.421689
Mizoram	-1.32019	-1.34574	-1.3747	-1.393662	-1.47259	-1.47259
Nagaland	-2.16734	-2.29832	-2.35676	-2.340802	-2.41973	-1.23581
Odisha	1.93301	1.945968	1.842399	1.447757	1.210972	1.368829
Punjab	0.559487	0.548057	0.500617	0.263832	0.105976	-0.05188
Rajasthan	0.483549	0.419025	0.342761	0.263832	0.184904	0.027047
Sikkim	-0.39025	-0.56194	-0.65374	-0.762236	-0.84116	-1.07795
Tamil Nadu	1.014919	1.072245	0.974187	0.737402	0.500617	0.263832
Tripura	-0.86539	-1.0303	-1.11592	-1.077949	-0.68331	-0.44652
Uttar Pradesh	1.409909	1.3068	1.289901	1.053116	0.895259	0.658474
Uttarakhand	0.071	0.038195	0.011356	-0.051881	0.263832	0.500617
West Bengal	0.114977	0.221222	0.263832	0.027047	-0.13081	-0.20974

ISSN 2454-8596
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Andaman & Nicobar Islands	-1.16561	-1.11884	-1.13492	-1.156877	-0.84116	-0.68331
Chandigarh	-1.58402	-1.66457	-1.65762	-1.630447	-1.31473	-1.23581
D&N Haveli	-1.12484	-1.23443	-1.32698	-1.472591	-1.70938	-1.63045
Daman & Diu	-0.89765	-0.97088	-0.92535	-1.156877	-1.07795	-1.15688
Lakshadweep	0.245924	0.24876	0.174902	0.027047	0.105976	-0.05188
Puducherry	0.864306	0.809828	0.765745	0.421689	0.579546	0.895259

Convert into score value on a ten point

STATES/UT	2011	2012	2013	2014	2015	2016
Andhra Pradesh	9	9	9	9	8	8
Arunachal Pradesh	5	5	5	7	5	6
Assam	10	10	10	9	8	7
Bihar	8	7	7	6	6	5
Chhattisgarh	10	10	10	10	9	9
Delhi	1	1	1	1	1	1
Goa	7	7	7	7	7	7
Gujarat	8	7	7	6	6	6
Haryana	7	7	6	6	6	5
Himachal Pradesh	7	7	7	7	7	8
Jammu & Kashmir	4	4	3	3	2	2
Jharkhand	8	8	8	5	5	4
Karnataka	8	8	8	8	7	7
Kerala	8	8	8	7	7	9
Madhya Pradesh	10	10	10	10	9	8
Maharashtra	6	6	6	5	5	5
Manipur	1	1	1	1	1	2
Meghalaya	10	9	9	9	9	7
Mizoram	1	1	1	1	1	1
Nagaland	1	1	1	1	1	2
Odisha	10	10	10	10	9	10
Punjab	8	8	7	7	6	5
Rajasthan	7	7	7	7	6	6
Sikkim	4	3	3	3	2	2
Tamil Nadu	9	9	9	8	7	7
Tripura	2	2	2	2	3	4
Uttar Pradesh	10	10	10	9	9	8
Uttarakhand	6	6	6	5	7	7
West Bengal	6	6	7	6	5	5
Andaman & Nicobar Islands	2	2	2	2	2	3

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Chandigarh	1	1	1	1	1	2
D&N Haveli	2	2	1	1	1	1
Daman & Diu	2	2	2	2	2	2
Lakshadweep	6	6	6	6	6	5
Puducherry	9	8	8	7	8	9

Convert score value into scale value

STATES/UT	MEAN	S.D	d^2	S.D^2	SCALE VALUE	C.V
Andhra Pradesh	8.666667	0.516398	9.028594	0.266667	3	5.958436
Arunachal Pradesh	5.5	0.83666	0.026213	0.7	2	15.212
Assam	9	1.264911	11.14288	1.6	3	14.05457
Bihar	6.5	1.048809	0.702404	1.1	2	16.13552
Chhattisgarh	9.666667	0.516398	16.03812	0.266667	3	5.342046
Delhi	1	0	21.73336	0	1	0
Goa	7	0	1.790499	0	3	0
Gujarat	6.666667	0.816497	1.009546	0.666667	2	12.24745
Haryana	6.166667	0.752773	0.254785	0.566667	2	12.20712
Himachal Pradesh	7.166667	0.408248	2.264308	0.166667	3	5.696488
Jammu & Kashmir	3	0.894427	7.085737	0.8	1	29.81424
Jharkhand	6.333333	1.861899	0.450816	3.466667	2	29.3984
Karnataka	7.666667	0.516398	4.01907	0.266667	3	6.735623
Kerala	7.833333	0.752773	4.715102	0.566667	3	9.609864
Madhya Pradesh	9.5	0.83666	14.73098	0.7	3	8.806948
Maharashtra	5.5	0.547723	0.026213	0.3	2	9.958592
Manipur	1.166667	0.408248	20.20717	0.166667	1	34.99271
Meghalaya	8.833333	0.983192	10.05796	0.966667	3	11.13048
Mizoram	1	0	21.73336	0	1	0
Nagaland	1.166667	0.408248	20.20717	0.166667	1	34.99271
Odisha	9.833333	0.408248	17.40082	0.166667	3	4.151678
Punjab	6.833333	1.169045	1.372245	1.366667	2	17.10798
Rajasthan	6.666667	0.516398	1.009546	0.266667	2	7.745967
Sikkim	2.833333	0.752773	8.000816	0.566667	1	26.56845
Tamil Nadu	8.166667	0.983192	6.273832	0.966667	3	12.03909
Tripura	2.5	0.83666	9.997642	0.7	1	33.4664
Uttar Pradesh	9.333333	0.816497	13.47939	0.666667	3	8.748178
Uttarakhand	6.166667	0.752773	0.254785	0.566667	2	12.20712
West Bengal	5.833333	0.752773	0.029388	0.566667	2	12.90467
Andaman & Nicobar Islands	2.166667	0.408248	12.21669	0.166667	1	18.84223
Chandigarh	1.166667	0.408248	20.20717	0.166667	1	34.99271

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D&N Haveli	1.333333	0.516398	18.73653	0.266667	1	38.72983
Daman & Diu	2	0	13.40955	0	1	0
Lakshadweep	5.833333	0.408248	0.029388	0.166667	2	6.998542
Puducherry	8.166667	0.752773	6.273832	0.566667	3	9.217624

Classification of states & UT by scale value

Score value	Scale value	Score value	Scale value
$\leq (\bar{X} - 0.425\sigma)$	1	≤4.385255	1
$(\bar{X} - 0.425\sigma)$ to $(\bar{X} + 0.425\sigma)$	2	4.385255 to 6.938555	2
$\geq (\bar{X} + 0.425\sigma)$	3	≥6.938555	3

$\bar{X}$and σ refer to mean and standard deviation of the total score and the classification of the sample units

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

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

ISSN 2454-8596
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Ranking of states & UT

Low		Medium		High	
State	Rank	State	Rank	State	Rank
Delhi	1	Lakshadweep	8	Goa	18
Mizoram	1	Rajasthan	9	Odisha	19
Daman & Diu	1	Maharashtra	10	Chhattisgarh	20
Andaman & Nicobar Islands	2	Haryana	11	Himachal Pradesh	21
Sikkim	3	Uttarakhand	11	Andhra Pradesh	22
Jammu & Kashmir	4	Gujarat	12	Karnataka	23
Tripura	5	West Bengal	13	Uttar Pradesh	24
Manipur	6	Arunachal Pradesh	14	Madhya Pradesh	25
Nagaland	6	Bihar	15	Puducherry	26
Chandigarh	6	Punjab	16	Kerala	27
D&N Haveli	7	Jharkhand	17	Meghalaya	28
				Tamil Nadu	29
				Assam	30

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 death rate are as follow.

1. Delhi, Mizoram, Daman & Diu
2. Andaman & Nicobar Islands
3. Sikkim

6. Reference:

- Data collected from NITI AAYOG government Site: www.niti.gov.in
  Link: http://niti.gov.in/state-statistics
- Details of various parameters index is taken from www.indexmandi.com

- www.google.com ;for all basic information needed for introduction portion