

Statistical Analysis of Rural-Urban Infant Mortality Rate in Rajasthan

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ABSTRACT: Children are the future of a nation. Infant mortality rate is among the three indicators used to monitor achievements of the Fourth Goal of the eight Millennium Development Goals. Development of social and economic conditions of a country and the quality of life can be reflected by infant and child mortality rates. Although government has started various schemes and policies for mother and child health still the decline rate in infant mortality is low. Even the rural-urban gap of infant mortality prevails. Male- female differentiation in the society is a major obstacle in the development of our society. In this paper, we evaluate comparisons between Rural and urban infant mortality, Neonatal mortality and Post neonatal mortality in various districts of Rajasthan as per AHS (Annual Health Survey) data 2012-13.

KEYWORDS: Infant Mortality, Rajasthan, Rural-Urban, Neo-natal, Post Neo-natal

I.INTRODUCTION

One of the major objectives in Indian planning is improvement in living standard and the health conditions of the population. India is also a signatory with the international aspirations that reflect long term visions. These long term visions are reflected in all five year plans and are being stressed in National Population Policy, National Health Policy, and National Nutrition Policy etc. To achieve these goals there has to be an improvement to the access and utilization of various family, health and nutrition services with special attention on under privileged segments of population.

Infant mortality concerns with the death of a child before its first birthday. It is measured by IMR(infant mortality rate).Number of children deaths below one year divided by total live births in that year multiplied by 1000 is called infant mortality rate.

The IMR, however is further classified in the following sub-categories:

1. Perinatal Mortality – It is late fetal death (22 weeks gestation to birth), or death of a newborn up to one week.
2. Neonatal mortality- It is death occurring within 28 days of delivery.
3. Postneonatal mortality- It is death of children aged 29 days to one year.

The government and the public citizens are working at their best to protect the infants from all dangers. A study of infant health is therefore of importance to the policy makers. Infant mortality reduces the potential of a society and human capital. Various policies have been initiated by the government; some of them are listed below.

Child Health Programs

- 1978- Expanded Program of immunization (EPI)
- 1984- Universal Immunization Program (UIP) For prevention of deaths due to 6 VPDs
- 1985- Oral Rehydration Therapy Program for prevention of deaths due to diarrhea
- 1990- UIP and ORT universalized in all districts
- 1990- ARI Program taken up as a pilot in 26 districts
- 1992- CSSM (Child Survival & Safe Motherhood)
- 1997- RCH-1 (Reproductive Child Health)
- 2005- NRHM and RCH II (National Rural Health Mission)
- 2005- RBSK (Rashtriya Bal Swasthya Karyakram)

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- 2011- JSSK (Janani Shishu Suraksha Karyakram)
- 2013- RMNCH+A (Reproductive, Maternal, Newborn, Child & Adolescent Health)
- 2014- INAP (India Newborn Action Plan)

The major objectives of the Child Health Programs initiated by the various governmental or non-governmental agencies can be listed below as:

- Reduction of IMR
- To ensure full immunization
- To ensure quality essential newborn care
- To promote safe motherhood
- Prevention of waterborne diseases
- To promote hygiene and sanitation practices
- Setting of yearly targets of process indicators

There has been an effective decrease in the infant mortality in India since 1970. Infant mortality rate of India in early 1970's was 130-140 deaths per 1000 live births which reduced to 60 per 1000 in the year 2000 and further to 40 deaths per 1000 live births as per Sample Registration System (SRS) 2013.

India shows wide variations of Infant Mortality among its various states. There is a high infant mortality rate in Rajasthan, Madhya Pradesh, Uttar Pradesh, Orissa and Bihar in comparison to the nation's average. Rajasthan shows an alarming Infant Mortality rate. The decrease in infant mortality is very slow which shows that the implementation of various policies and programs is not being carried out efficiently in Rajasthan. Also there is an increase of the proportion of neonatal deaths.

IMR of Rajasthan has shown a decline from 123 deaths per 1000 live births in the year 1972 to 55 deaths per 1000 live births in the year 2010. The percentage decline in IMR is 55 % in last 3 decades in Rajasthan. Among the districts of Rajasthan, Jalore has the highest IMR which is 79 deaths per 1000 live births and Kota has the lowest IMR i.e. 36 deaths per 1000 live births. Jaipur has an IMR of 55 as per AHS (Annual Health Survey) 2007-09.

According to SRS 2012, IMR of Rajasthan is 49 deaths per 1000 live births and U5MR is 59 deaths per 1000 live births. IMR and U5MR of India are 42 per 1000 and 52 per 1000 respectively. The state has to take proper measures to ensure proper immunization coverage, appropriate nutrition access, on time detection of diseases and their proper treatment. Anganwadi centers must have improved sanitation facilities and good nutrition supplementation.

II.DATA

To analyze infant mortality in different districts of Rajasthan, data is taken from AHS (Annual Health Survey) which is conducted by the Ministry of Health and family Welfare, in collaboration with the Registrar General of India (RGI).

This survey is undertaken for Empowered Action Group States (Bihar, Jharkhand, Madhya Pradesh, Chhattisgarh, Uttarakhand, Uttar Pradesh, Orissa and Rajasthan) and Assam. AHS provides District-wise data on Total Fertility Rate (TFR), Infant Mortality Rate (IMR) and the Maternal Mortality Ratio (MMR) at the regional level.

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2012-13	Infant Mortality Rate									Neo-Natal Mortality Rate			Post Neo-Natal Mortality Rate		
	Total			Rural			Urban			Total	Rural	Urban	Total	Rural	Urban
	Total	Male	Female	Total	Male	Female	Total	Male	Female						
Rajasthan	55	51	60	59	55	64	38	35	42	37	40	26	18	19	12
Ajmer	50	39	62	58	46	72	35	24	45	31	40	15	19	19	20
Alwar	52	49	55	53	50	57	38	34	41	33	34	18	19	19	20
Banswara	57	54	60	57	54	61	-	-	-	36	36	-	21	21	-
Baran	55	54	57	54	54	53	66	50	84	36	34	45	20	19	21
Barmer	70	66	75	71	66	76	58	56	61	53	54	34	17	17	24
Bharatpur	49	45	53	50	46	55	43	40	47	37	38	33	12	12	10
Bhilwara	64	65	62	68	69	67	42	46	37	46	49	35	17	19	7
Bikaner	47	42	53	56	49	63	32	27	36	32	37	24	15	19	8
Bundi	65	65	66	72	72	71	38	34	42	47	52	27	18	20	11
Chittaurgarh	63	64	63	68	69	67	37	34	40	47	50	28	16	18	9
Churu	48	44	51	52	49	55	35	30	40	30	31	25	18	20	10
Dausa	53	44	64	54	46	65	38	25	52	31	32	26	22	23	13
Dhaulpur	58	55	62	62	58	66	-	-	-	38	40	-	21	22	-
Dungarpur	63	61	65	63	60	66	-	-	-	41	40	-	23	23	-
Ganganagar	52	46	58	57	52	63	36	31	42	34	39	18	18	18	17
Hanumangarh	45	43	48	48	46	51	34	35	33	29	31	23	16	17	11
Jaipur	50	44	57	61	54	68	40	34	46	35	39	31	15	22	8
Jaisalmer	50	43	57	52	45	60	37	31	42	27	28	21	22	23	16
Jalor	72	66	78	73	67	80	45	46	45	52	53	23	20	20	23
Jhalawar	63	61	65	66	65	68	39	36	42	46	48	31	17	18	7
Jhunjhunun	48	43	53	50	45	56	39	35	42	35	37	28	12	13	10
Jodhpur	46	40	52	53	45	60	33	29	36	29	34	20	17	19	13
Karauli	69	66	74	69	64	76	70	79	58	45	44	48	25	25	22
Kota	36	36	37	46	45	47	26	27	26	25	31	19	12	16	8
Pali	54	51	56	57	56	59	37	31	44	39	42	25	15	15	12
Rajsamand	59	55	65	63	57	70	-	-	-	38	39	-	21	23	-
Sawai Madhopur	67	65	70	71	69	74	50	47	54	48	51	37	19	20	13
Sikar	50	43	58	52	46	61	42	34	50	31	33	23	19	19	19
Sirohi	65	62	68	69	67	71	35	22	50	44	46	19	21	22	16
Tonk	57	61	54	66	69	64	26	34	16	39	45	19	18	21	7
Udaipur	63	60	66	67	63	71	44	46	41	41	43	32	21	23	12

The above data is of the Annual Health Survey for the year 2012-13. Now, we show the graphical representation of data related to IMR of various districts of Rajasthan.

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Infant Mortality Rate (District wise)

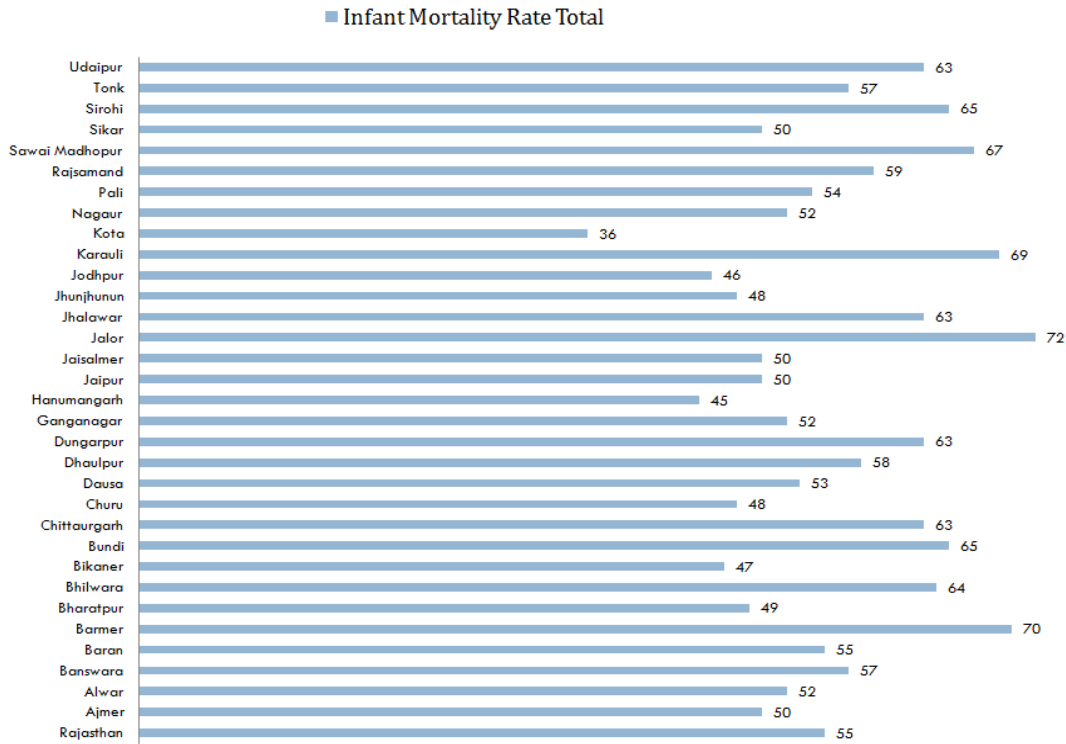


Fig.1

From the above graph, it is very clear that highest IMR is of Jalor i.e. 72 per 1000 live births and lowest is of Kota i.e. 36 per 1000 whereas average of Rajasthan is 55 per 1000.

Next, is the graphical presentation of IMR of rural and urban areas of districts of Rajasthan.

Infant Mortality (Rural-Urban)

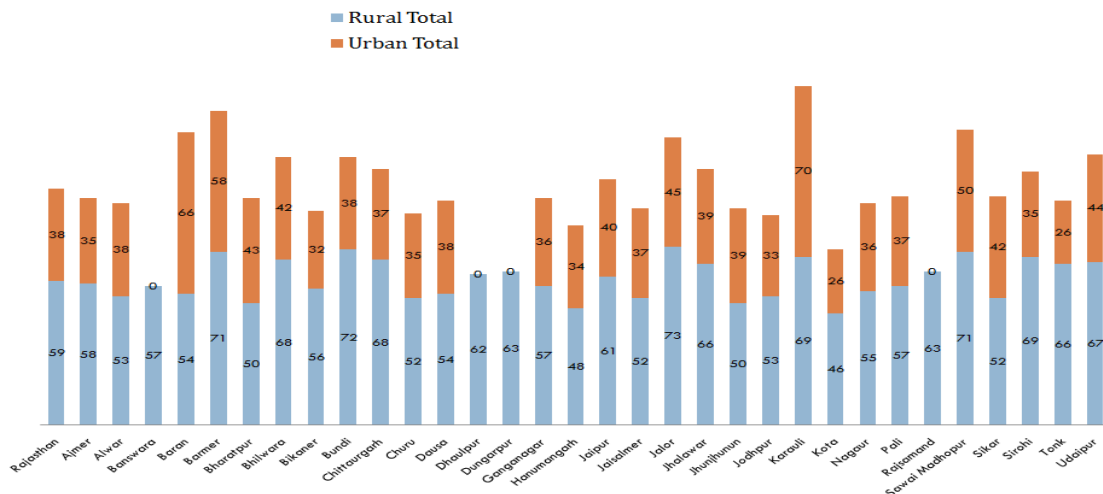


Fig.2

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It is very clear aided from the graph that for each district, infant mortality is more in rural areas in comparison to urban areas.

Rural IMR is highest for Jalor i.e. 73 per 1000 and lowest for Kota i.e. 46 per 1000, urban IMR is highest for Karauli i.e. 70 per 1000 and lowest for Kota and Tonk i.e. 26 per 1000

Rajasthan rural IMR is 59 per 1000 and urban IMR is 38 per 1000.

Next is the graphical presentation of neonatal and post neonatal mortality of various districts of Rajasthan.

Infant Mortality (Neonatal-Post neonatal)

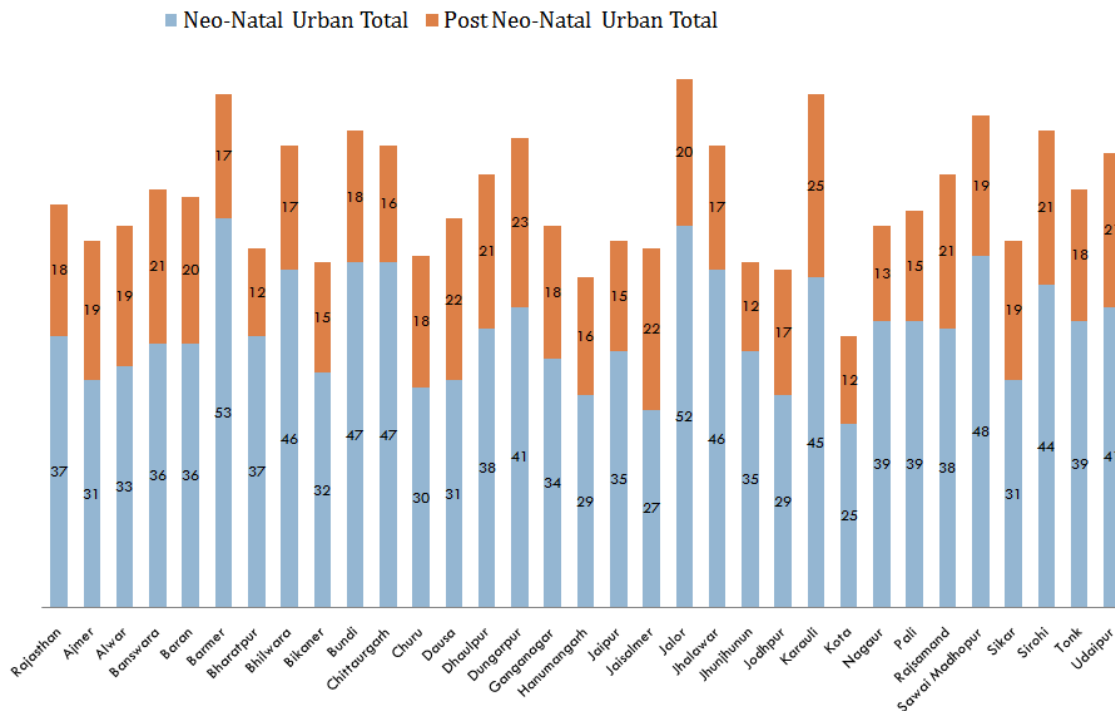


Fig.3

From the above graph, we can see that neonatal mortality is more for all districts in comparison to post neonatal mortality.

Neonatal Mortality is highest in Jalor i.e. 52 per 1000 and lowest in Kota i.e. 25 per 1000, post neonatal mortality is highest in Dungarpur i.e. 23 per 1000 and lowest in Bharatpur, Jhunjhunu and Kota i.e. 12 per 1000

Neonatal and post neonatal mortalities of Rajasthan are 37 per 1000 and 18 per 1000 resp.

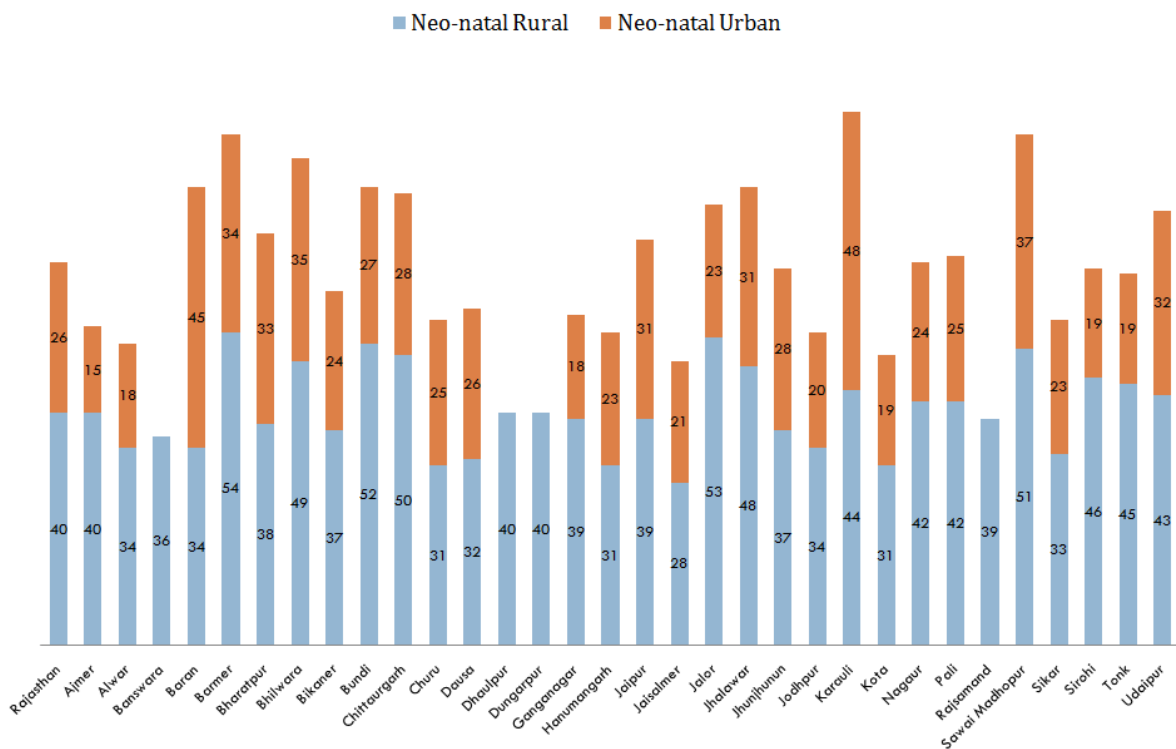
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Next is the graphical representation of neonatal mortality for rural and urban areas of districts of Rajasthan.
Fig.4

Neo-natal Mortality Rate (Rural-Urban)



From the graph we can see that rural neonatal mortality is highest in Jalor i.e. 53 per 1000 and lowest in Churu, Hanumangarh and Kota i.e. 31 per 1000, urban neonatal mortality is highest in Karauli i.e. 48 per 1000 and lowest in Alwar and Ganganagar i.e. 18 per 1000
Rural and Urban neonatal mortality for Rajasthan is 40 per 1000 and 26 per 1000 resp.

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Next is the graphical representation of post neonatal mortality for rural and urban areas of districts of Rajasthan.

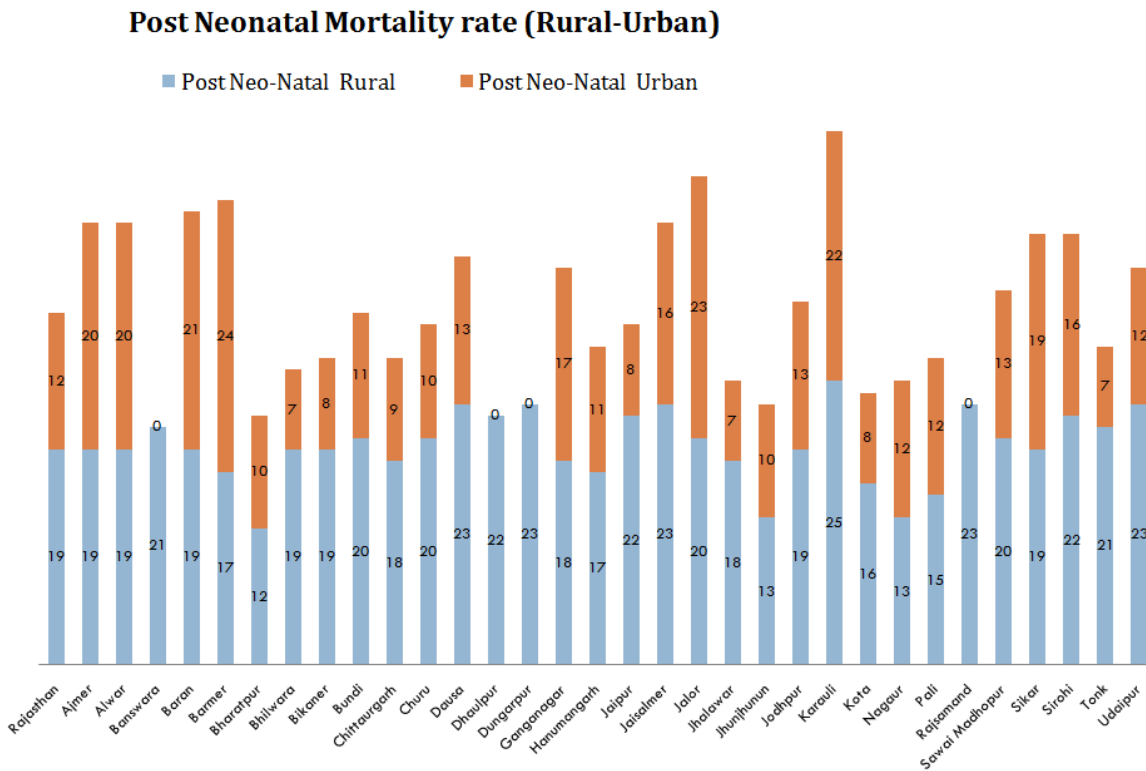


Fig.5

From the graph, we see that rural post neonatal mortality is highest for Karauli i.e. 25per 1000 and lowest for Bharatpur i.e. 12 per 1000, Urban post neonatal mortality is highest for Barmer i.e. 24 per 1000 and lowest for Bhilwara, Jhalawar and Tonk i.e. 7 per 1000

Post neonatal rural and urban mortality for Rajasthan is 19 per 1000 and 12 per 1000 resp.

It is observed that among the districts of Rajasthan, Kota stands good in terms of Infant mortality rates whereas Jalore is lacking behind all districts.

III.METHODOLOGY

It is clearly evident from the graphs that rural mortality rates are higher than urban mortality rates. We now apply statistical test to test whether there is any significant difference between rural and urban neonatal mortality rates, rural and urban post neonatal mortality rates and rural and urban infant mortality rates for various districts of Rajasthan. Since the data points are more than 30, we apply z-test.

Null hypothesis is set as follows:

- H_{01} : There is no significant difference between infant mortality in rural and urban areas.
- H_{02} : There is no significant difference between neonatal mortality in rural and urban areas.
- H_{03} : There is no significant difference between post neonatal mortality in rural and urban areas.

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Under H_0 , the test statistic used is

$$z = \frac{(\bar{x}_1 - \bar{x}_2)}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$$

Where:

\bar{x}_1 = mean of 1st sample,

\bar{x}_2 = mean of 2nd sample,

σ_1 = standard deviation of 1st sample,

σ_2 = standard deviation of 2nd sample,

n_1 = size of 1st sample,

n_2 = size of 2nd sample

If $z_{cal} > z_{tab}$, we reject our null hypothesis at $\alpha\%$ level of significance i.e.

if $z_{cal} > 1.96$, we reject our null hypothesis with 5% level of significance

if $z_{cal} > 2.58$, we reject our null hypothesis with 1% level of significance

DISCUSSION & RESULTS

The test results obtained are as follows:

	Rural_Urban	N	Mean	Std. Deviation
Infant_Mortality	Rural	33	59.76	7.830
	Urban	33	35.42	16.260

$z_{cal} = 7.746$

	Rural_Urban	N	Mean	Std. Deviation
Neonatal	Rural	33	40.36	7.101
	Urban	33	23.55	11.530

$z_{cal} = 7.135$

	Rural_Urban	N	Mean	Std. Deviation
Post_Neonatal	Rural	33	19.30	3.107
	Urban	33	11.85	6.624

$z_{cal} = 5.853$

In all three cases, we reject our null hypothesis. It shows that there is a significant difference between rural and urban infant mortality, neonatal mortality and post neonatal mortalities. From the graphical representation, we can see that the mortality rates are higher for rural areas as compared to urban areas.

There can be many reasons for this discrepancy. Hygiene level and sanitation facilities are much higher in urban areas in comparison to the rural areas. Also education level is more in urban areas which increase the prenatal and post natal care of children as people are aware of the use and requirement of antenatal check-ups. Medical facilities in the rural areas are also one of the major reasons of this discrepancy. Steps have to be taken for the improvement of all these factors. Ante natal checkups and proper care and medication during pregnancy is also an important factor for the difference between neonatal and post neonatal mortalities.

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There is a lack of proper implementation of policies in the Indian society due to which the decline rate is comparatively lower than expected showing a variation for rural and urban areas. Mother's education is an important factor to improve perinatal and neonatal mortality. Education of the girl child is very important for the development of our country. Although government has started schemes for this too, but still it lacks implementation especially in the rural areas. Proper and effective measures are required for strict application and efficient running of the schemes and programs.

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