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Data Analytics for 0-6 Sex Ratio – Census 2001 (Telangana and Andhra Pradesh States).

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Abstract:

The study on the sex ratio of overall population and of children in 0-6 age group for different districts in A.P. concentrates on the following:

1) *Is there any likely relationship between overall sex ratio and children sex ratio (in particular, are there any significant patterns?).*
2) *In each district, using the distinct averages as the norm, which sub districts are above/below 2*s.d. among the rural and the urban groups. One can use this information to examine "possible" causes for such departures.*
3) *Aggregating with the districts identify sub-districts which have significantly high (+ 2*s.d.) or low (-2*s.d.) sex ratio, as compared to the state average and also as compared to the ideal of 1000.*

This is done, for both the rural and the urban groups separately.

Key Words: 0-6 Sex Ratio, rural and urban groups, sub districts

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Introduction:

The provisional results of Census of India 2001 released by the Census Commissioner, India showed a substantial decline in the sex ratio in the age group 0-6 years (child sex ratio). The 2001 Census highlighted this issue by devoting a full section on this subject. This distressing state of affairs raised voice of grave concern across all sections of society. It set into motion serious debates and resulted in a series of action on several fronts to curb the menace of female foeticide in certain parts of the country.

The analysis of results in Andhra Pradesh district level data revealed a significant insight into the problem at levels below the state at the national and sub national level particularly in certain parts of the country. The rural-urban differentials in the sex ratio in the age group 0-6 further sheds light on the spatial analysis of possible adverse impact on the female child due to the spread of the modernization and technological Advancement in the villages and urban centres.

The number of states recording child sex ratio above thousand has also reduced from two to one. The pattern of this ratio in urban areas is more masculine as compared to rural areas. There is no state, which has child sex ratio of thousand or more. There were nineteen States/ Union territories recording child sex ratio in the range 959-999 at the 1991 Census and this number has now reduced to eight. Conversely there has been an increase in the number of States having urban child sex ratio in the lower ranges during the 2001 Census.

The child sex ratio has registered fourteen points decline in the rural areas at the national level while this decline is of thirty-two points in respect of the urban areas. The most disturbing aspect is the decline in the rural areas of twenty-six States and Union territories at the 2001 Census.

Child Sex Ratio District Level:

The district level data on child sex ratio provides further insight into the pattern that exists at this level within a state/union territory. The highest child sex ratio of 1040 has been recorded in South district of Sikkim followed by the tribal district of Bastar in Chhatisgarh (1020).

Keeping this in view we analysed the Andhra Pradesh District Level Data with urban and rural segregation, and found that an alarming situation exists in the districts in Andhra Pradesh where a highest fall in the sex ratio is observed.

What explains this surge in the sex ratio which has favoured the female in the 2001 Census, in spite of inconvertible evidence that mass scale female foeticide was responsible for the highest ever drop in the CSR during the same period? The Census calls this increase in the sex ratio a 'welcome development'. If the increase were the result of improved conditions for women, that

would be true. But instead, what if the increased ratio is not due to improved female indicators but due to the disappearance of significant numbers of males instead?

Results and Conclusions:

Sex ratio (total population) in districts in 1991-2001 -- Table 1
Comments:

Except in 3 districts (where there is a marginal fall) in all districts there is a favourable move of the sex ratio (the 3 districts are Hyderabad, Nalgonda and Nizamabad). Also this fact is clear from the Table 1 and figure 1.

However, for children the sex ratio has come down in many districts. Table2 and Figure 2, which shows the sex ratio in 1991and 2001, clearly shows this fact.

On the whole the sex ratio at district level is below the ideal of 1000.However, as will be seen later in many sub- districts variations in sex ratio are very considerable being quite low in some districts and relatively very high in some other districts.

Analysis for the present situation follows: in each district for each of the sub-districts the sex ratio of all children, rural children and urban children as well as entire Population including the children and Rural and Urban separately also are available in the PCA-2001.

The following analysis is based on these figures:

Hyderabad is a singleton sub district and hence, is not considered along with other districts. West Godavari is now given the code '7' and Hyderabad is given code '23' and is being omitted.

Table 3 has 3 sub - tables giving the district wise sex ratio (number of unit's average and s.d.) for:

(a) All children and all population

(b) Rural children and rural population.

(c) Urban children and urban population.

Table 4 gives the sex ratios of (a) children in Rural and Urban areas. (b) Rural and Urban Population.

Table 5 gives the minima, lower quartile, median upper quartile and maximum for the entire state with respective to the total children, rural children, urban children, entire population rural and urban.

Table 6 gives for each of these groups viz., total children, rural, urban, all population rural and urban populations over the districts giving the frequencies in lower quartile, middle 50% and upper quartile with the state values as the boundaries along with the Chi-square. This table will throw light on significant deviations in sex ratio patterns in the different districts.

From the Table 3a and figure-3(a) (TC and TA) that practically in all the districts, the sex ratio (S-R) for children is lower than that for the entire population in the district.

Though in some of the districts S-R is very near 1000,for children at least in districts Vizag and Vizianagaram it is more than 980.However, in the over all population, districts Karimnagar, Nizamabad, Srikakulamand Vizianagaram show a S-R greater than 1000.

In other words, among the children the S-R is below the ideal and also below the overall population S-R of the district but among all the population, the S-R is sufficiently near the ideal of 1000. (In the absence of infant mortality and other relevant data, it is not easy to explain the relative shortfall in S-R in children).

Table 3(b) and figure 3(b) present the S-R data among children and adults in rural areas. It is found that in general, S-R in rural children is relatively lower in about 16 districts as compared to general rural population, in the district. Which latter shows a value higher than 1000 in four districts (viz., Karimnagar, Nizamabad, Srikakulum, Vizianagaram, same as in overall population). However, in the first 3 of them, children S-R are less than 970.

Table 3(c) and figure 3(c) show again a similar profile of S-R between children and general population in urban sub districts. Here also, S-R in children is, on the whole, lower than in general urban population, though in districts Medak, Nalgonda, Rangareddi, and Visakhapatnam, S-R in urban children is relatively higher than the corresponding general population S-R.

Table 4(a) and Figure 4(a) present the S-R data for children in rural and urban areas. It is found that in 15 districts S-R in rural children is relatively higher than the S-R in urban children an un expected result.

Table 4(b) and Figure 4(b) presents the S-R for rural and urban population. The picture is also rather mixed 12 of the districts having higher S-R among rural as compared to urban

population. However, as already noted in both the groups there are quite a few districts which are quite near the ideal S-R 1000.if not a little on the higher side.

However, an interesting finding comes out when for each of the 6 groups (TC, CR, CU, TR, AR, and AU) for districts are compared to the overall distribution of corresponding S-R over the entire state.

Table 5 presents the frequency distributional characteristics of the S-R in the different categories, for the many sub-districts in the state.

Thus, for instance, one finds that out of the 1109 sub-districts the sex ratio for 'all children' has a minimum value of 880, the first quartile Q1=943,etc.,.One can use this as a yard stick to examine as to which districts, if any, differ significantly from this 'overall picture' and in what direction.

Table 6 and figure 5 present the relevant analysis. For district Adilabad, for instance, the number of sub-districts with S-R less than Q1, between Q1 and Q3 and above Q3, among the S-R for 'all children (TC)' are counted. If the distribution pattern were effectively the same as the overall pattern, one should expect a quarter of the sub-districts to have S-R<Q1, etc. The Chi-square statistic with 1 degree of freedom is calculated, to test this hypothesis and is found to be 0.4231, which is not significant. However, a similar analysis with respect to AR for instance, gives a Chi-square =10.8, quite a significant value. That is district Adilabad conforms to overall state pattern with respect to TC but significantly differs from the state –pattern with respect to AR.

The table 6 shows that with respect to (Adilabad, Anantapur, Districts 3,6,7,8,9,10,11,13,15,16,17,18,19,22) are not significant, that is (Districts Cuddapah, 5,12,14,20,21) are significantly different.

Where as wrt CR only districts 4, 5,9,12,14,20,21 are significantly different; wrt CU all districts seem to conform to overall state pattern.

Wrt TA only 9,10,12,13 are not significantly different, all others being highly different (obliviously not in the same direction) from overall pattern.wrt AR also is same as TA.wrt AU, only 5,7,18 and 21 are different from the overall pattern.

In other words in respect of TA and AR, the overall state pattern is not reflected in the sub-districts of the different districts of the state, It therefore appears to be a fit case to go into the possible reasons for the marked differences in patterns among the districts wrt to TA and TR.

Table-7 gives the number of sub-districts in each district and the number of those above 2*Sigma and below 2*Sigma from the district mean, for the six categories.

As can be expected, in many districts numbers are not large, but the distribution appears rather lopsided and significantly different (very much on the higher side –the number being almost 1/4 or 1/3)

Of the total number of sub-districts .In particularly, in districts 16 and 19,the number of sub districts on the higher side, is quite substantial, particularly wrt TA and AR, being 13 out of 36 and 7 out of 38.

On the whole, there are sub districts, which are obviously outliers with S-R as low as 649 and 743 etc., An explanation for this fact should be worth serious thought.

Since in overall comparisons children's sex ratio is found to be lower in rural than in urban communities, reason for this anomaly needs looking in to. Does it imply larger female infant mortality in rural areas or is there a selective migration of families from rural to urban setting over a period of time?

An investigation about possible different mortality ratio of girl –infants in the rural and urban areas is perhaps in order. Also, the distribution of 'last child's sex and of the birth sequence, by sex in the families, and socio economic status of families may throw some light on this matter.

References:

1) Data C.D's from Census India-2001

2) www.censusindia.com

Table-1	
Over all Sex Ratio for 1991-2001	
Sex Ratio for 1991	Sex Ratio for 2001
980	989
1017	1016
986	1000
970	976
933	945
941	941
973	970
962	967
962	973
961	975
1012	1013
1000	1004
975	991
998	992
994	992
969	961
970	984
970	971
980	983
955	975
953	965
946	957
966	983

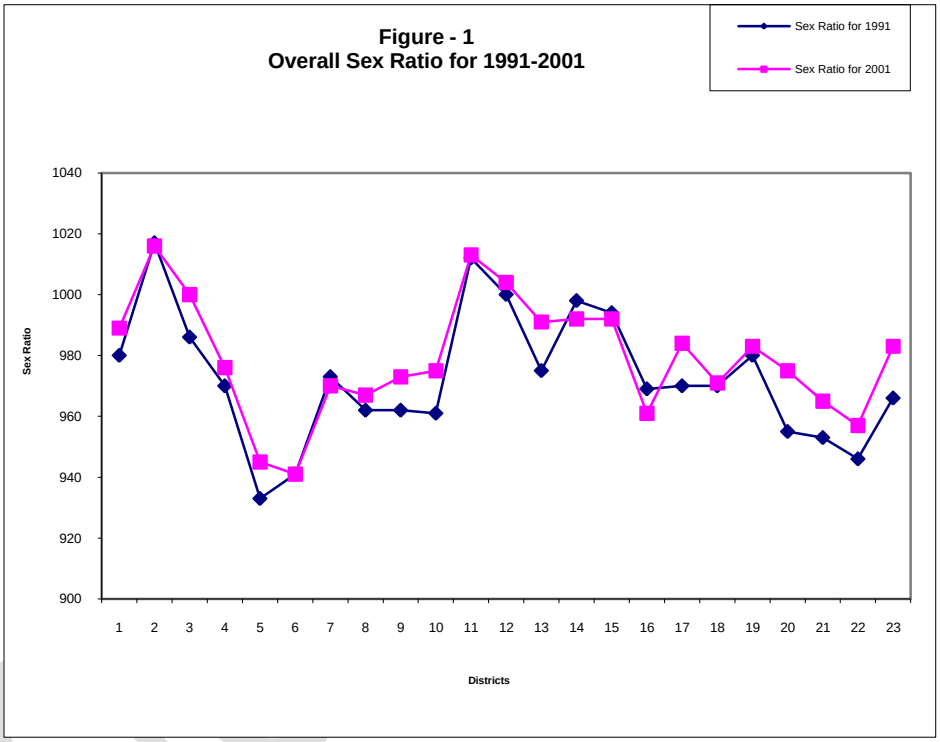

Table-2	
Sex Ratio for Children for 1991-2001	
Sex Ratio for 1991	Sex Ratio for 2001
964	962
966	959
977	962
964	964
950	943
970	959
957	952
962	952
955	955
968	971
976	967
981	980
973	976
978	976
977	970
959	963
955	659
966	955
955	954
952	951
944	958
963	959
959	955

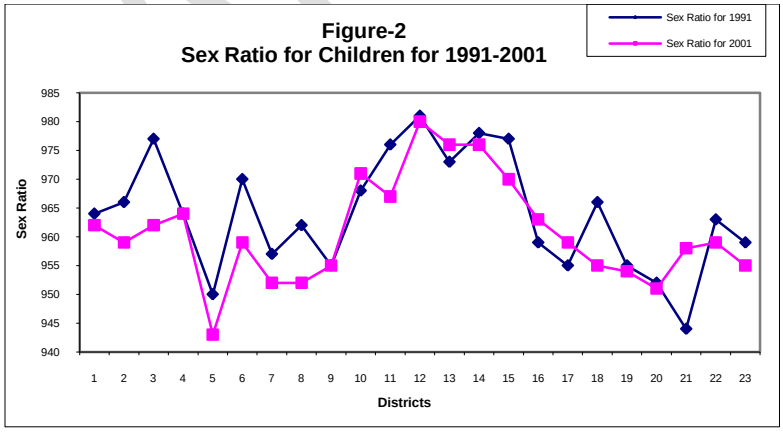

Table-3a

Means and st.dev. Of TC and TA			
Mean TC	Mean TA	SD TC	SD TA
966.5	993.4	29.3	33.8
959.5	957.2	34.6	15
956.9	986.7	30.5	14.6
950.1	971.5	23	21.2
978.8	992.6	25.2	19.1
957.5	982.8	23.7	16.1
969.2	988.6	28.2	18.1
965.4	1004.9	25.7	29.2
974.8	979	29.1	26.1
961.5	978.6	25.5	21.7
958.6	963.8	23	20.7
949.2	973	28.5	23.8
965.9	977.2	25.6	29.1
952	969.3	24.8	16.3
955.8	985.5	26.3	18.3
960.9	1025.1	21.6	31.7
955.4	970.7	25.8	26.3
964.6	958.6	21.1	31.9
969.3	1014.5	22.5	38.4
987.1	996.8	40.5	28.2
982.7	1009.2	26.2	22.6
955.6	974.1	26.1	16.8
969.7	996.8	30.1	35.4
958.6	955.4	35.7	15.6
956.9	986.8	31.1	14.7
951.2	971.9	27.1	21.3
978.9	991	26.7	20.2
957.2	982	24.4	15.7
968.8	985.8	31.3	17.2
967.2	1007.2	28.7	29.1
975.4	977.8	29.3	27
963.9	977.9	26.4	21.3
960.7	959	30.3	48.1
949.9	974.3	28.8	23.6
966.6	978.7	26.3	26.7
951.9	970.9	25.4	15.8
955.3	984.7	26.3	19.1
960.9	1027.8	22.1	30
954.3	970.5	26.8	26.4
970	964.2	20.1	29.8
968.9	1016.7	23.5	43.7
988.1	996.3	41	35.2
984.7	1008.3	23.9	23.4
955.4	974.6	26.6	18.4

Table-3b

Means and st.dev. Of CR and AR			
Mean CR	Mean AR	SD CR	SD AR

Figure-3

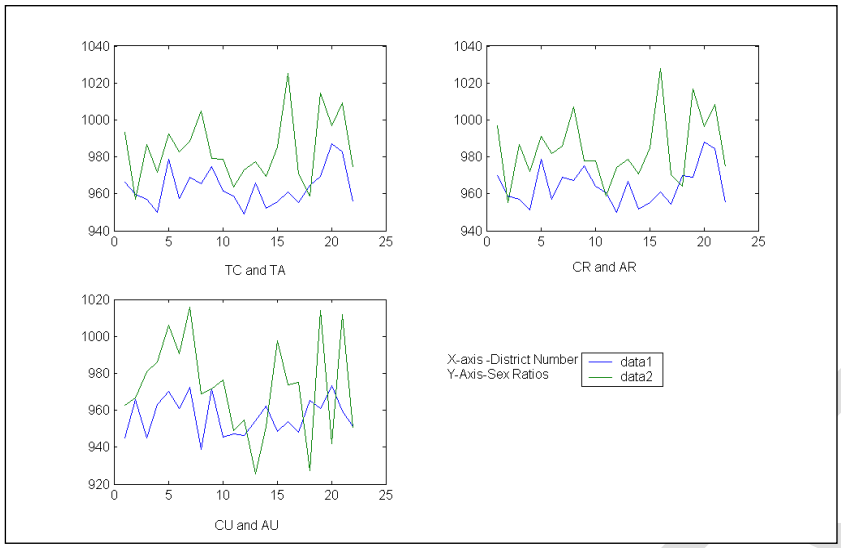

Table-3c

Means and st.dev. Of CU and AU							
Mean CU	Mean AU	SD CU	SD AU	Mean CU	Mean AU	SD CU	SD AU
944.9	962.6	25.3	21.3	954.4	925.6	23.9	94.8
965.7	966.8	26.3	12.9	962.2	951	33.8	34.7
945.1	980.6	36.8	18.7	948.6	997.6	33	40.2
963.3	986	20.6	24.5	954	973.7	14.5	5.1
970.2	1006.1	39.8	16.5	948.2	975.2	58.4	51.4
960.9	990.8	39.8	22.6	965.3	927.5	45	47.6
972.2	1015.7	18.1	21.7	960.8	1013.8	24.7	39.3
939	968.8	28.9	18.7	973.5	942.1	36.3	82.2
971.4	971.6	37.8	26.5	959.8	1012	59.9	40.6
945.6	976.6	41.4	38.4	951	950.4	13.9	29.1
947	949.1	37	38.6				
946.4	954.6	46	26.1				

Table-4

Table-4a

Means and st.dev. Of CR and CU			
Mean CR	Mean CU	SD CR	SD CU
969.7308	944.8889	30.1181	25.2658
958.6032	965.7	35.7065	26.2934
956.8939	945.0909	31.0752	36.7898
951.1569	963.2857	27.1112	20.6132
978.9123	970.25	26.737	39.7541
957.1579	960.9167	24.3969	39.8028
968.8478	972.25	31.3418	18.1167
967.1786	939	28.6808	28.8721
975.3696	971.375	29.3116	37.7697
963.9184	945.625	26.444	41.4037
960.6852	947	30.2523	37.0097
949.9219	946.4286	28.8314	46.0429
966.6	954.375	26.3321	23.9042
951.8983	962.2222	25.3953	33.7705
955.3043	948.6	26.2618	33.0273
960.8889	954	22.0775	14.5258
954.3036	948.2222	26.7574	58.3562
969.9697	965.2857	20.1471	45.0238
968.9474	960.8333	23.5153	24.7339
988.0714	973.5	40.9565	36.3265
984.6765	959.7778	23.8502	59.9433
955.4	951	26.6267	13.9104

Table-4b

Means and st.dev. Of AR and AU			
Mean AR	Mean AU	SD AR	SD AU
996.8	962.6	35.4	21.3
955.4	966.8	15.6	12.9
986.8	980.6	14.7	18.7
971.9	986	21.3	24.5
991	1006.1	20.2	16.5
982	990.8	15.7	22.6
985.8	1015.7	17.2	21.7
1007.2	968.8	29.1	18.7
977.8	971.6	27	26.5
977.9	976.6	21.3	38.4
959	949.1	48.1	38.6
974.3	954.6	23.6	26.1
978.7	925.6	26.7	94.8
970.9	951	15.8	34.7
984.7	997.6	19.1	40.2
1027.8	973.7	30	5.1
970.5	975.2	26.4	51.4
964.2	927.5	29.8	47.6
1016.7	1013.8	43.7	39.3
996.3	942.1	35.2	82.2
1008.3	1012	23.4	40.6
974.6	950.4	18.4	29.1

Figure-4

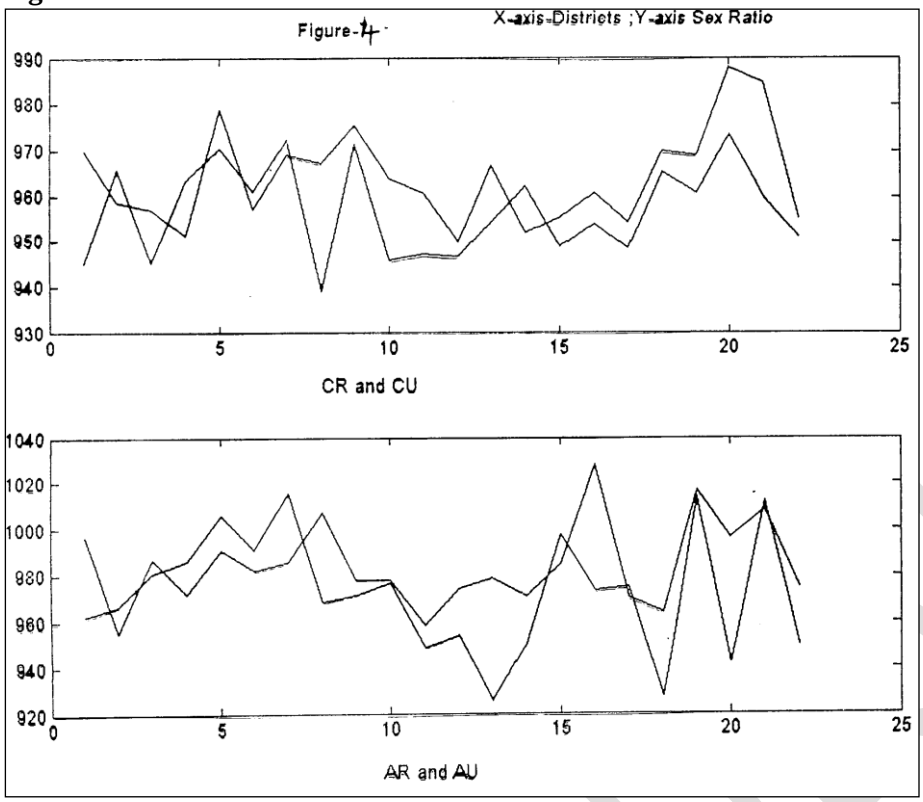

Figure-5

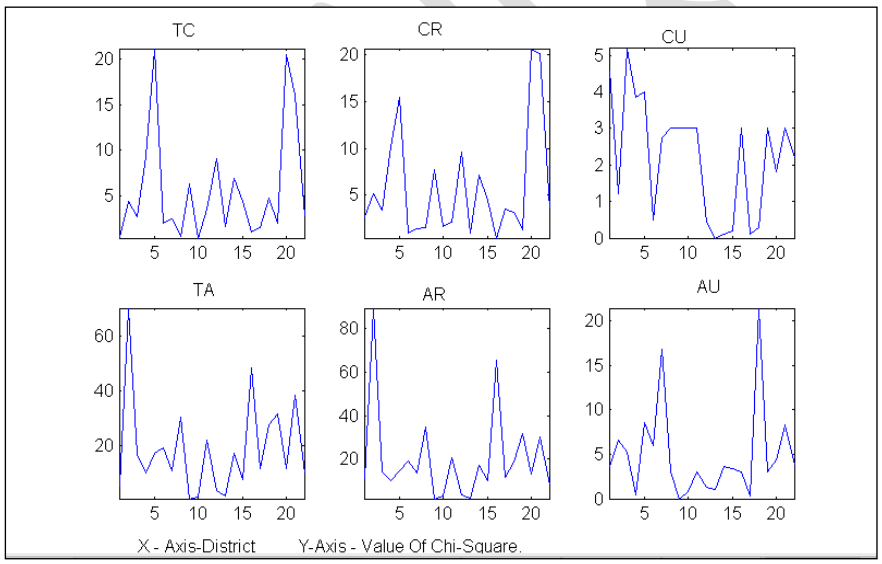

Table-5

	Freq.	Min	Q1	Median	Q3	Max	Ave	Std.
TC	1109	880	943	962	979	1093	962.6	28.7
CR	1100	880	943	962	980	1100	963.2	29.9
CU	184	847	939	957.5	975	1105	958.0	36.8
TA	1109	873	964	981	997	1129	982.8	28.7
AR	1100	638	964	981.5	997	1179	982.9	31.0
AU	184	709	949	975	997	1075	971.6	46.9

Table 6

Chi-square values for all districts, for each of TC, CR, CU, TA, AR, AU

Dist.	TC	CR	CU	TA	AR	AU
1	0.4231	2.7692	4.556	5.2308	10.885	3.6663
2	4.3651	5.127	1.2	70.27	89.571	6.6
3	2.697	3.4242	5.182	17	13.849	5.1818
4	9.3137	10.216	3.857	10.059	9.9412	0.4286
5	21.203	15.456	4	17.237	14.474	8.5
6	1.9825	1	0.5	19.246	19.246	6
7	2.4783	1.4348	2.75	10.826	13.609	16.75
8	0.5714	1.5357	3	30.679	34.964	3
9	6.3478	7.6957	3	0.7391	1.6522	0
10	0.36	1.6531	3	1.52	3	0.75
11	3.5926	2.1111	3	22	20.778	3
12	9.0938	9.5938	0.429	3.8438	3.375	1.2857
13	1.6222	0.9111	0	1.8444	1.8444	1
14	6.9322	7.1017	0.111	17.136	17.271	3.6667

15	4.4348	4.4348	0.2	7.7391	9.7826	3.4
16	1.0556	0.4444	3	48.667	65.5	3
17	1.5357	3.5357	0.111	11.536	11.714	0.3333
18	4.7838	3.2424	0.286	27.703	18.758	21.429
19	2	1.3158	3	31.632	31.632	3
20	20.488	20.619	1.8	11.605	13.048	4.4
21	16.118	20.118	3	38.647	30.177	8.3333
22	2.6863	3.56	2.2	9.9412	7.76	3.8

TC=Total Children; CR=Children rural; CU=Children urban;

TA=Total all; AR=All rural; AU=All urban.

Table-7

The no.of relevant subdistricts,and no. beyond 2 sigma from grand mean are:

	District-1					
	TC	CR	CU	TA	AR	AU
< 2*sigma	1	1	0	0	0	0
>2*sigma	2	2	0	6	6	0
no.of sub-districts	52	52	9	52	52	9

District-2					
TC	CR	CU	TA	AR	AU
4	4	0	1	1	0
5	3	0	0	0	0
63	63	10	63	63	10

	District-3					
	TC	CR	CU	TA	AR	AU
< 2*sigma	1	0	1	0	0	0
>2*sigma	3	1	0	0	0	0
no.of sub-districts	66	66	11	66	66	11

District-4					
TC	CR	CU	TA	AR	AU
1	1	0	1	0	0
0	1	0	0	0	0
51	51	7	51	51	7

	District-5					
	TC	CR	CU	TA	AR	AU
< 2*sigma	0	0	1	0	0	0
>2*sigma	4	4	0	2	3	0
no.of sub-districts	59	57	12	59	57	12

District-6					
TC	CR	CU	TA	AR	AU
0	0	0	0	0	0
0	0	1	0	0	0
57	57	12	57	57	12

	District-7					
	TC	CR	CU	TA	AR	AU
< 2*sigma	0	1	0	0	0	0
>2*sigma	2	2	0	0	0	0
no.of sub-districts	46	46	8	46	46	8

District-8					
TC	CR	CU	TA	AR	AU
0	0	1	0	0	0
2	3	0	8	8	0
56	56	6	56	56	6

	District-9					
	TC	CR	CU	TA	AR	AU
< 2*sigma	0	0	0	0	0	0
>2*sigma	6	4	0	1	1	0
no.of sub-districts	46	46	8	46	46	8

District-10					
TC	CR	CU	TA	AR	AU
1	1	0	1	1	0
1	1	0	0	0	0
50	49	8	50	49	8

	District-11					
	TC	CR	CU	TA	AR	AU
< 2*sigma	1	0	1	1	2	1
>2*sigma	1	2	0	0	0	0
no.of sub-districts	54	54	8	54	54	8

District-12					
TC	CR	CU	TA	AR	AU
5	5	1	3	1	0
0	0	0	0	0	0
64	64	7	64	64	7

Table-7 contd.

	District-13					
	TC	CR	CU	TA	AR	AU
< 2*sigma	0	0	0	2	0	1
>2*sigma	0	0	0	0	0	0
no.of sub-districts	45	45	8	45	45	8

	District-14					
	TC	CR	CU	TA	AR	AU
< 2*sigma	2	1	0	0	0	0
>2*sigma	1	0	0	0	0	0
no.of sub-districts	59	59	9	59	59	9

	District-15					
	TC	CR	CU	TA	AR	AU
< 2*sigma	0	0	0	0	0	0
>2*sigma	1	1	0	1	1	0
no.of sub-districts	46	46	5	46	46	5

	District-16					
	TC	CR	CU	TA	AR	AU
< 2*sigma	0	0	0	0	0	0
>2*sigma	0	0	0	13	11	0
no.of sub-districts	36	36	3	36	36	3

	District-17					
	TC	CR	CU	TA	AR	AU
< 2*sigma	0	0	2	2	1	0
>2*sigma	0	0	1	0	0	1
no.of sub-districts	56	56	9	56	56	9

	District-18					
	TC	CR	CU	TA	AR	AU
< 2*sigma	0	0	0	4	0	1
>2*sigma	0	0	1	0	0	0
no.of sub-districts	37	33	14	37	33	14

	District-19					
	TC	CR	CU	TA	AR	AU
< 2*sigma	0	0	0	0	0	0
>2*sigma	1	1	0	7	5	0
no.of sub-districts	38	38	6	38	38	6

	District-20					
	TC	CR	CU	TA	AR	AU
< 2*sigma	1	1	0	0	1	2
>2*sigma	8	7	1	1	1	0
no.of sub-districts	43	42	10	43	42	10

	District-21					
	TC	CR	CU	TA	AR	AU
< 2*sigma	0	0	1	0	0	0
>2*sigma	3	2	2	2	2	1
no.of sub-districts	34	34	9	34	34	9

District-22					
TC	CR	CU	TA	AR	AU
1	1	0	0	0	0
1	0	0	0	0	0
51	50	5	51	50	5

TC=Total Children; CR=Children rural; CU=Children urban;

TA=Total all; AR=All rural; AU=All urban.

Codes Used for the Districts

District	Code	District	Code
Adilabad	1	Ranga Reddy	18
Ananthapur	2	Srikakulum	19
Chittur	3	Visakhapatnam	20
Cuddapah	4	Vizianagaram	21
East Godavari	5	Warangal	22
West Godavari	6	Hyderabad	23
Guntur	7		
Karimnagar	8		
Khamma	9		
Krishna	10		
Kurnool	11		
Mahaboobnagar	12		
Medak	13		
Nalgonda	14		
Nellore	15		
Nizamabad	16		
Prkasam	17		