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Fertility Transition in Pakistan: Evidence from Census

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INTRODUCTION

In the absence of an accurate and complete registration system, efforts were made to estimate the levels of vital statistics through sample surveys. The first such effort was made through the Population Growth Estimation (PGE) project conducted from January, 1962 to December 1965. Later on, various demographic surveys were conducted almost at regular intervals and the last effort in the series was Pakistan Reproductive Health and Family Planning Survey (PRHFPS) in the year 2000-01.

Although all these efforts were made to ascertain levels and trends of various demographic events, yet the estimates particularly the ones on fertility remained controversial. The first signal of fertility reduction was emanated from the 1975 Pakistan Fertility Survey (PFS) which estimated a Total Fertility Rate (TFR) of 6.3 children from over 7 children estimated earlier from PGE data. However, all hopes of the onset of fertility transition were shattered by the [Retherford's, *et al.* (1987)] study entitled "Fertility Trend in Pakistan: The Decline that Wasn't". By using the Own Children Method, they confirmed that the decline in fertility was an artifact of the data. Another study by Shah, Pullum, and Irfan (1986) also termed the fertility decline shown by the PFS data as spurious. The Pakistan Labour Force and Migration Survey, conducted five years later, in 1979-80, estimated a TFR of 6.5 children, thus providing another proof supporting the fact that fertility had not declined to the extent believed.

However, 1984-85 Pakistan Contraceptive Prevalence Survey (PCPS) estimated a TFR of 6 children. This decline was a ray of hope for Pakistani demographers. The 1990-91 Pakistan Demographic and Health Survey also confirmed declining trend as it estimated a TFR of 5.4 children for the last 6 years. But Juarez and Sathar (n.d.) refuted this claim and argued that 1990-91 PDHS data suffered not only from massive misdating of the births but also from serious omissions. Adjusting for these through the Gompertz Relational Model, they estimated a TFR of 6.1 children for the period 1987–91.

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Table 1

Estimates of Total Fertility Rates for Various Time-periods

1974-75 Pakistan Fertility Survey	1960–65	7.1
	1965–70	7.1
	1970–75	6.3
(1979-80) Population Labour Force and Migration Survey	1965–70	6.8
	1970–75	7.1
	1975–80	6.5
1984-85 Pakistan Contraceptive Prevalence Survey	1984–85	6.0
1990-91 Pakistan Demographic and Health Survey	1986–91	5.4
	1987–91	6.1*
1994-95 Pakistan Contraceptive Prevalence Survey	1994–95	5.6
1996-97 Pakistan Fertility and Family Planning Survey	1982–87	7.7
	1992–97	7.1
	1997–2001	5.3
2000-01 Pakistan Reproductive Health and Family Planning Survey	1997–2001	4.8

Source: Various sample survey reports and Blacker and Hakim (1999).

* This rate was calculated by Juarez and Sathar (n.d.) using the Gampertz Relational Model.

Nevertheless, in the mid 90s a TFR of 5.6 children for the period 1994-95 was estimated from the 1994-95 Pakistan Contraceptive Prevalence Survey data [Population Council (1998)]. This result appeared to reassure that the fertility decline was underway. The 1996-97 Pakistan Fertility and Family Planning Survey (PFFPS) data also reconfirmed the decline in fertility. However, a subsequent analysis of this data set, pointed out misdating and omissions of births for the last 4 years preceding the survey. The preliminary result of 2000-01 Pakistan Reproductive Health and Family Planning Survey estimated a TFR of 4.8 children for the period 1997–2001. As the data of this survey is not yet available, it is difficult to ascertain the authenticity of the TFR estimated of this data set.

Another way of looking at this controversy is through the study of Children Ever Born (CEB). However, one must remember that CEB is a measure of cumulative fertility and the changes in CEB in no way reflect the changes in the current fertility. The following Table 2 shows the mean number of Children Ever Born and the absolute change among various surveys.

The mean number of Children Ever Born for all ages does not show any distinct pattern between 1975 and 2001. For example, where as a negative absolute change of 0.2 children is estimated between 1975 and 1979-80, a gain of 0.18 children is observed between 1979-80 and 1984-85. Interestingly, a negative absolute change of the same magnitude (0.18 children) is found between 1984-85 and 1990-91. Thereafter children ever-born increased by 0.38 children in 1994-95

Table 2

Distribution of Mean Children Ever Born and the Absolute Change Estimated from Various Surveys

	Mean Children Ever Born						Absolute Change in Mean CEB					
	PFS 1975	PLM 1979-80	PCPS 1984-85	PDHS 1990-91	PCPS 1994-95	PRHFPS 2000-01						
Age	I	II	III	IV	V	VI	II-I	III-II	IV-III	V-IV	VI-V	VI-I
15–19	0.60	0.50	0.63	0.60	0.57	0.60	–0.10	0.13	–0.03	–0.03	0.03	0.00
20–24	1.90	1.50	1.79	1.60	1.82	1.70	–0.40	0.29	–0.19	0.22	–0.12	–0.20
25–29	3.40	3.00	3.36	3.10	3.30	3.00	–0.40	0.36	–0.26	0.20	–0.30	–0.40
30–34	5.20	4.60	4.99	4.60	4.91	4.60	–0.60	0.39	–0.39	0.31	–0.31	–0.60
35–39	6.40	5.70	6.13	5.70	6.26	5.60	–0.70	0.43	–0.43	0.56	–0.66	–0.80
40–44	7.50	6.50	7.01	6.50	7.17	6.70	–1.00	0.51	–0.51	0.67	–0.47	–0.80
45–49	7.40	6.80	7.53	6.60	7.50	7.20	–0.60	0.73	–0.93	0.90	–0.30	–0.20
All Ages	4.30	4.10	4.28	4.10	4.48	4.10	–0.20	0.18	–0.18	0.38	–0.38	–0.20

showing an all time high figure of 4.48 children. Then in 2000-01 CEB stabilises at 4.10 children. On account of inconsistency observed here, one is unable to reach any conclusive results.

Although all these efforts were made to ascertain a trend in the fertility levels but in fact our faith in the fertility estimates of various sample surveys was shaken. In view of the limitations of the survey data, efforts are made here to estimate fertility rates by using census data. As census data do not permit direct estimate of fertility we attempt to estimate levels of fertility by using indirect techniques.

DATA AND METHODOLOGY

As stated earlier, the data for this exercise was taken from 1961 and onward censuses. Although the initial analysis was carried out on the data of four censuses i.e. 1961, 1972, 1981 and 1998, yet fertility rates based on regression analysis as suggested by Bogue (1971) were estimated for 1998 census only. The independent variables required for the regression analysis are (i) child-woman ratio (ii) proportion of females married (iii) infant mortality rate (iv) female survival ratio of 15–40 years of age (v) age composition of women in various reproductive age groups. The coefficients of partial regression and intercept provided by Bogue (1971) are calculated by using the data for the nations where information both for fertility and for the explanatory variables was available. In order to estimate the fertility rates for a country with poor vital statistics, the values of the explanatory variables are substituted into various regression equations as suggested by Bogue (1971). The procedure is theory based because the explanatory variables that are used are known to have a causal influence upon fertility levels. The procedure is empirical because the multiple regression equations average-out place to place variations and make partial adjustments for numerous other explanatory factors that cannot be explicitly quantified.

LIMITATIONS OF THE STUDY

Admittedly, the Pakistani data especially age reporting, suffer from misplacement, and omissions. This limitation of the data needs to be adjusted and smoothed before carrying out the analysis. At present, it was not possible to carry out the smoothing and adjustment of the data. However, since our analysis is based on five years age group data, some of the smoothing of age data is automatically taken care of and it may not suffer badly from misplacement of ages.

Nevertheless, when expanding this exercise for earlier censuses as well as for the sub-national level, we will carry out adjustment and smoothing of the data. Therefore, we caution our readers that present results may change slightly after an analysis is carried out on the smoothed data.

RESULTS

Crude Birth Rate (CBR) is the most basic but important component of population change. Here we estimate CBR indirectly from the census data by using reverse survival ratios.[1] The following method is used to estimate CBR:

$$CBR = \frac{P_{0-4}}{{}_{t-2.5}P_{\text{all}}} \times \frac{lo}{{}_4Lo}$$

Whereas
$P_{0\text{-}4}$ the number of persons in ages 0–4 years at time '*t*'
${}_{t\text{-}2.5}P_{all}$ Population in all ages at time *t*-2.5
t Is the year of census
lo Radix of the life table (100,000)
${}_4L_O$ Person-years of population 0 to 4 years.

Table 3 shows a declining trend in the crude birth rate over the period 1961 to 1998. The maximum decline is evident between 1961 and 1972 and the minimum between 1972 and 1981. Actually the period between 1972 and 1981 was associated with political turmoil as well as religious fervor leading to moratorium of family planning activities [Alam, Ifran and Farooqui (n.d.)]. Hence a meagre decline of 0.44 per 1000 population between this period is an outcome consistent with the situation stated above.

In Pakistan, where almost all births occur within wedlock, a change in the proportion married has implications for fertility. As is evident from Table 4, the proportion of married women of reproductive ages has continued to decline since 1961 and overall it has declined over 24 percentage points during 1961 to 1998. Interestingly, among various age groups, the highest decline in the proportion of

Table 3

The Estimates of Crude Birth Rates of 1961, 1972, 1981 and 1998 Censuses

Census	CBR
1961	42.64
1972	37.51
1981	37.07
1998	35.24

Note: CBR of 1961, 1972 and 1981 were taken from Afzal, *et al.* (1993) where as 1998 estimates are calculated by applying reverse survival ratios of an appropriate South Asian model life table of United Nations.

[1]These estimates are subject to assumptions that the population is closed to migration (i.e. no in or out-migration is taking place) and that 0–4 years children enumerated here are essentially the survivors of the children born in the 5 years preceding the census.

married women is evident in the age group 15–19 years followed by successive age groups. This observation is also consistent with the increasing age at marriage of women. The Singulate Mean age at marriage for females has increased 5.8 years in the last 5 decades [NIPS (2001)].

The most important aspect of the Table 4 is that a considerable negative change in the proportions of married women has occurred in the age group 20–29—a group of women with highest fertility outcome. Such a change may have brought down the Crude Birth Rate and fertility levels in Pakistan.

Table 4

Distribution of Proportion Married Women and Percentage Change During 1961 to 1998 by Age of Women.

Age	Proportion Married				Percentage Change			
Group	1961	1972	1981	1998	1961-72	1972-81	1981-98	1961-98
15–19	53.41	34.44	29.44	20.71	35.52	14.52	29.65	61.22
20–24	87.97	78.68	73.46	61.48	10.56	6.63	16.31	30.11
25–29	94.89	92.76	91.27	85.29	2.24	1.61	6.55	10.12
30–34	97.02	96.44	96.08	92.77	0.60	0.37	3.44	4.38
35–39	97.35	97.89	98.26	95.66	0.60	0.38	2.65	1.74
40–44	97.83	98.05	98.38	96.34	0.22	0.34	2.07	1.52
45–49	98.04	98.51	98.99	97.53	0.48	0.49	1.47	0.52
15–49	92.39	81.45	78.00	69.96	11.84	4.24	10.31	24.28

ESTIMATION OF BASIC FERTILITY MEASURES BY REGRESSION ANALYSIS

Below we present basic fertility measures estimated on the basis of the regression analysis suggested by Bogue (1971). The constants and intercepts involved in these multiple regression equations are calculated by using the data for the 50 nations for which valid data on fertility are available. The explanatory variables are taken from 1998 population census, UN model life table for South Asian region and interpolated IMR for 1998 from the estimates of 1996-97 PFFP and 2000-01 PRHFP surveys.

The stepwise regression analysis (see Table 5.1) estimates General Fertility Rate of 166.65 children. The Appendix 1 and the Appendix 2 calculate the preliminary estimates of TFR and ASFRs. We arrive at the final ASFR's and TFR in the Table 5.2 by using GFR estimated in Table 5.1 along with the preliminary estimates of TFR and ASFRs (Appendices 1 and 2) and explanatory variables such as proportion married, IMR, female survival ratio and age composition of women 15–44 (see Table 5.2).

The estimated ASFR's and TFR is given in Table 5.2. The ASFR's estimated here follow a pattern very close to the pattern observed for 1996-97 PFFPS and 2000-01 PRHFPS. Where as a TFR of 5.06 children estimated indirectly in this exercise lies in between 5.3 and 4.8 children—the estimated TFR's of 1996-97 PFFPS and 2000-01 PRHFPS respectively.

Another way of substantiating the validity of our estimates is to translate TFR into CBR by using the following regression equation suggested by Bogue and Palmore (1964):

$$CBR = 0.0070\ TFR + 0.2453$$
$$= 35.64$$

The robustness of the above equation may be solicited from the fact that the authors estimated a linear correlation of .98 between CBR and TFR by using the data of the 50 nations of the world on which this equation is based upon. It may be mentioned that the estimated CBR in Table 3 for 1998 is 35.24 births per 1000 population. The closeness of CBR estimated from applying two different methods validates our confidence in the estimates of the two fertility measures i.e. CBR and TFR.

Table 5.1

Estimate of General Fertility Rate

Child-Woman Ratios	Census 1998
Children 0–4 to Women 14–44 Years	159.78
Children 0–14 to Women 15–49 Years	0.00
Proportions Married	
Women Aged 15–19 Years	7.78
Women Aged 20–24 Years	–3.75
Women Aged 25–29 Years	19.96
Women Aged 30–34 Years	7.70
Women Aged 35–39 Years	–47.47
Mortality	
Infant Mortality Rate	8.80
Female Survival, Age 15 to 40	13.59
Age Composition of Women 15–44	
Proportion Aged 15–19 Years	10.66
Proportion Aged 20–24 Years	44.35
Proportion Aged 25–29 Years	11.44
Proportion Aged 30–34 Years	–30.82
Proportion Aged 35–39 Years	24.27
Total	226.30
Intercept with the Regression Line	–59.650
General Fertility Rate	**166.649**

Table 5.2

Estimates of Age-specific Fertility Rates

Age Group	15–19	20–24	25–29	30–34	35–39	40–44
General Fertility Rate	121.82	370.29	480.95	–103.99	–40.33	45.50
Total Fertility Rate	458.30	–63.38	–248.65	355.92	360.79	965.36
Age Specific Fertility Rates						
Women 15–19 Years	0.00	0.00	0.00	0.00	0.00	–70.11
Women 20–24 Years	–80.59	0.00	0.00	0.00	–111.57	–216.87
Women 25–29 Years	–200.04	126.37	0.00	0.00	–73.43	–254.68
Women 30–34 Years	–23.78	–221.10	43.90	0.00	18.90	–220.09
Women 35–39 Years	–209.23	0.00	0.00	0.00	0.00	–158.03
Women 40–44 Years	0.00	0.00	0.00	0.00	0.00	0.00
Proportions Married						
Women Aged 15–19 Years	19.49	–24.35	–33.05	22.21	–15.50	1.95
Women Aged 20–24 Years	–18.89	113.35	–45.98	–128.40	32.40	–10.94
Women Aged 25–29 Years	11.92	–24.91	66.88	75.00	–12.84	7.27
Women Aged 30–34 Years	–23.28	–117.62	–172.45	–122.04	–55.29	–20.03
Women Aged 35–39 Years	12.71	18.45	352.90	166.45	37.92	31.69
Mortality						
Infant Mortality Rate	3.96	0.53	5.72	3.17	2.11	1.76
Female Survival ,Age 15 To 40	5.94	–18.79	44.63	–55.73	6.72	–10.07
Age Composition of Women 15–44						
Proportion Aged 15–19 Years	–3.80	20.02	–1.51	1.93	–5.68	–0.79
Proportion Aged 20–24 Years	–8.39	–116.80	–56.07	–10.88	11.41	–5.42
Proportion Aged 25–29 Years	–43.51	5.54	–106.42	38.75	–12.31	–13.68
Proportion Aged 30–34 Years	–3.17	–64.22	5.12	0.33	10.06	1.38
Proportion Aged 35–39 Years	–2.75	8.58	3.82	10.70	–9.88	2.29
Total	16.71	11.95	339.79	253.40	143.48	76.49
Intercept with The Regression Line	54.22	205.95	–75.76	–37.12	10.22	11.87
Age Specific Fertility Rates	**70.93**	**217.90**	**264.03**	**216.28**	**153.70**	**88.36**
Total Fertility Rate			**5.06**			

CONCLUSION

The analysis of census data clearly suggests that fertility has declined in Pakistan. An analysis of the proportion of married women over four decades suggests a continuous reduction in their proportions. This reduction was sharper in younger age cohorts. The main reason for this decline in the proportion married of younger cohort is the ever increasing age at marriage which is currently estimated at 22.7 years for females [NIPS (2001)].

The contraceptive prevalence rate (CPR) are also showing a continuous increase in the 80s and 90s and today CPR is estimated at 28 percent [NIPS (2001)]. Moreover, there are indications that now women are shifting to temporary method for spacing purposes. The increased use of contraception between 1996-97 and 2000-01 among women of 20-24 years of age [NIPS (2001)] also imply the desire of young women to enjoy a somewhat prolonged span of freedom from childbearing and child rearing.

The increased level of poverty in Pakistan [Qureshi and Arif (1999)] may also be contributing in the decline of fertility. In our society, men are the breadearner and providers of the needs of a family. The increased rate of unemployment and economic hardships may compel a man to go out of the place of his residence in search of bread, causing in interruptions in the conjugal life.

The two authors of the latest studies namely Sathar (1998) and Soomro (2000) agree that fertility has declined in Pakistan. However, Soomro (2000) dissents that this decline in fertility is not reflective in the Marital Total Fertility Rate. Although a difference of opinion is present between the two authors, the fact remains that fertility transition has begun even though presently at a slower pace. It is hoped that this transition will gain momentum and reach its completion soon.

Appendices

Appendix 1

Preliminary Estimate of Total Fertility Rate

Child-Woman Ratios	Census 1998
Children 0–4 to Women 14–44 Years	4981.45
Children 0–14 to Women 15–49 Years	0.00
Proportions Married	0.00
Women Aged 15–19 Years	42.04
Women Aged 20–24 Years	–121.89
Women Aged 25–29 Years	926.02
Women Aged 30–34 Years	–1287.88
Women Aged 35–39 Years	–85.27
Mortality	0.00
Infant Mortality Rate	255.20
Female Survival ,Age 15 to 40	–556.51
Age Composition of Women 15-44	0.00
Proportion Aged 15–19 Years	499.09
Proportion Aged 20–24 Years	583.90
Proportion Aged 25–29 Years	–228.24
Proportion Aged 30–34 Years	–1358.81
Proportion Aged 35–39 Years	773.19
Total	4422.28
Intercept With The Regression Line	453.3
Total Fertility Rate	**4875.58**

Appendix 2

Preliminary Estimates of Age-specific Fertility Rates

Age Group	15–19	20–24	25–29	30–34	35–39	40–44
General Fertility Rate	223.31	709.92	459.95	–93.32	–553.27	–728.26
Total Fertility Rate	–195.02	–536.31	–195.02	341.29	731.34	780.09
Proportions Married						
Women Aged 15–19 Years	28.24	–61.22	–28.67	20.25	26.55	15.03
Women Aged 20–24 Years	66.49	214.34	–73.65	–127.85	–67.75	–12.37
Women Aged 25–29 Years	–46.51	–67.60	84.01	79.20	4.08	53.72
Women Aged 30–34 Years	117.61	–115.80	–192.64	–93.33	53.63	220.89
Women Aged 35–39 Years	–199.83	84.19	378.82	119.82	–108.30	–259.56
Mortality						
Infant Mortality Rate	–2.64	0.00	7.04	3.52	0.88	–7.04
Female Survival, Age 15 To 40	3.26	40.74	36.56	–37.32	–28.76	–23.29
Age Composition Of Women 15–44						
Proportion Aged 15–19 Years	22.29	37.65	–5.59	–18.86	–25.15	–10.52
Proportion Aged 20–24 Years	–41.32	–139.98	–57.36	–5.99	100.21	144.38
Proportion Aged 25–29 Years	–17.01	–79.20	–99.85	30.38	61.38	93.51
Proportion Aged 30–34 Years	–36.44	–59.62	4.60	–2.04	39.19	57.61
Proportion Aged 35–39 Years	8.78	5.66	4.97	5.05	–13.82	–9.46
Total	–68.79	32.77	323.17	220.79	220.19	314.75
Intercept With The Regression Line	135.50	183.88	–79.56	–17.57	–62.16	–150.48
Age Specific Fertility Rates	**66.71**	**216.65**	**243.95**	**203.22**	**158.03**	**164.27**

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Comments

I was a little bit reluctant when I was asked to be a discussant for a paper simply because it is very difficult to please others by speaks the truth. However since the conference is organised by this august research body, i.e. PIDE, I could not refuse. My comments, specific in nature, are as follows.

1. The authors said that decline in TFR was a ray of hope for Pakistani demographers. Is it not a hope for statisticians, planners, research workers and other data users? The authors may like to make necessary changes if he agreed that declining trend is hope for all beneficiaries in including demographers.
2. The authors have mentioned the Sample Survey Reports and J. Blacker and A. Hakim (1999) as the source of estimates of Total Fertility Rate (TFR) given in Table 1. I am really surprised that the authors are perhaps getting intuition in quoting the figures for the year 1997–2001 whereas the source year is 1999. Such prophecy cannot be appreciated in a research paper and should not be mentioned without ascertaining the authenticity of the period as well as the figures.
3. The authors have said that the age reporting suffers from misplacement, misstatement, and omissions. To me misplacement means shifting the ages from one digit to another through smoothing, misstatement means erroneous reporting of ages, while omission means that age has not been reported. If these terminologies have other connotations then would the authors like to explain to the audience the difference between misplacement, misstatement and omissions in age reporting? This will help in generating healthy discussion in understanding and appreciating the paper.
4. In Table 2, the authors have just given six surveys as source of mean number of Children Ever Born (CEB) whereas Federal Bureau of Statistics has collected enormous data on fertility through their series of Population Demographic Surveys. The last one was conducted in 1999 and by now the report is available for general users. Would the authors like to explain to the audience sitting before us why they did not include PDS series in the table? Again, while giving figures about absolute change in mean CEB, the authors have given only six combinations out of 15, why they omitted the remaining nine which could also be used for study of change, if any.

5. The authors have made a very categorical statement that the inconsistency observed in mean number of CEB may be due to the sampling and non-sampling errors and thus have failed to yield any conclusive results. The entire paper has not dealt with any figure relating to sampling and non-sampling errors. Therefore such conclusion is baseless and can mislead the users. The inconsistency could be the factual; it may have resulted from sampling errors as well as from non-sampling errors. Without decomposing the total inconsistency into factual change in CEB, sampling and non-sampling errors it is impossible to say anything with certainty that which of the three factors are responsible and to what extent.
6. The authors have estimated fertility rates for the 1998 census by applying regression equation as suggested by Bogue in 1971. This method measures present fertility rate if fertility is sustaining at certain level, while it gives fertility estimates five years preceding the survey time if fertility is in transition period. As most of audience sitting in this hall is aware of changing fertility level in Pakistan, therefore, this method is not measuring the current fertility rather it is estimating its level five years preceding the census year i.e. for the year 1993. Moreover, after 1971 Bogue along with Palmore, Palmore and many other authors have made many improvements in estimation of fertility rates based on regression analysis. Why the authors relied upon the old method suggested by Bogue needs necessary elaboration and justification in the paper.
7. Would the authors like to make a slight change in the following statement, “In Pakistan where almost all births occur out of wed lock” a change in the proportion married has implications on fertility”. Because of its different connotation, it would be appropriate to rephrase it as; “In Pakistan where almost all births take place as a result of wed lock” a change in the proportion married has implications on fertility.
8. On right half part of the Table 4, changes in proportion married from one census to another are given which is not the percentage decline. These are just changes in the proportion given in the right half part of the table. The interpretation is misleading because without converting the figures into percentage assuming the base figure as 100, the changes cannot be said as percentage decline. Thus the figure mentioned as 24.28 in the last column is just a change of proportion married over the year 1961 to 1998, but if we assume the figure for 1961 as 100, instead of 92.39, then the percentage decline from the year 1961 to 1998 would be 32.1 instead of 24.28. Thus this paragraph may needs necessary restructuring.

9. On page 7, paragraph 1 say that the most important aspect of this table is that a considerable negative change in the proportion of married women has occurred in the age group 20–29—a group of women with highest fertility outcome. In the preceding paragraph Table 4 has been referred to, whereas no table has been mentioned in the paragraph under discussion. Therefore, it can be assumed that the words "this table" mean Table 4. But the statistics in Table 4 do not support the author arguments. If we assume that this table means Table 5, again the statistics given under Table 5 do not support what authors have said. Would the authors like to tell the exact table number and the exact age group about which they are talking?
10. My last point of discussion is about the CBR worked out by applying the Bogue and Palmore method. Let us see its validity/consistency in the context of actual census data of children under 1. If the formula written in the paper is read at its faee value then inserting estimated TFR equal to 5.06, the CBR would be 28.72 and if CBR equal 35.64 estimated through this equation by the authors is considered as correct, then inserting this value in the suggested regression equation, the multiplier of TFR would be 7.0 and not 0.0070. The authors themselves should decide whether the multiplier mentioned in the regression equation is correct or the estimated CBR is correct. But just to generate discussion, let us apply these two CBRs and survivors rate matching IMR equal to 80.3 to the enumerated population (1998 census) the estimated children under 1 would be 3,400,425 (14 percent higher than the actual and 4,326,710 (49 percent higher than the actual) respectively. As children under 1 year generally under reported therefore the published figure of 2,992,999 seems to be considerably inconsistent with CBR equal to 35.64.
11. My comments are actually intended to generate discussion on the topic through raising points and not to put at unease the authors.

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