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Demographic Census **Data** for Estimating Fertility-A Case Study on Kuwaiti Population

Introduction

'T'HE social add economic life of Kuwaiti population has undergone great improvement during the last 30 years. As such these developments are expected to influence the fertility behaviour of Kuwaiti Women. In an earlier article an attempt was made to determine levels and trend of fertility of Kuwaiti women based upon vital registration data. In the article the fertility estimates were analysed through two different approaches viz: (i) various calender demographic measures such as birth rates, total fertility rates, gross reproduction rates were derived using the vital registration data in conjunction with population estimates; and (ii) computation of birth cohort fertility based upon the parity data of women who had completed their reproductive life. The analysis showed that the fertility of Kuwaiti women has started declining. This gets support from the results of the Sample Survey of Fertility of Kuwaiti women conducted in 1980 incorporated in the article. The survey has indicated that there are prospects for further reduction in the fertility of Kuwaiti women in the near future as Kuwaiti women now desire a smaller family size.

In this article, an attempt is made to measure fertility levels based upon estimates derived through indirect techniques which have been developed recently in the demographic field. These methods utilise fertility data collected through a sample survey or census. The type of fertility data required for these methods relate to total number of children ever born, births during twelve months preceding the census or survey and duration of first marriage in respect

of all ever married women of reproductive age (15-49 years) in addition to their age data. The following indirect techniques have been employed to analyse fertility data from the 1975 and 1980 Censuses:

(i) Current and retrospective data method (P/F)
(ii) Intercensal parity change method
(iii) Method on children ever born and duration of marriage.

Data Base

Information regarding current and retrospective fertility was collected from all the ever-married women in the last two censuses of 1975 and 1980. Regarding current fertility, questions were asked on the number of live births during the twelve months preceding the census. About retrospective fertility, information about the total number of live births was collected from these women. This information on current and retrospective fertility was in addition to all the other data such as age, nationality, duration of marriage, marital status etc., collected during these censuses.

Current and Retrospective Data

In the two Censuses of 1975 and 1980, data on fertility was obtained from all ever-married women. The data related to (i) number of children ever born alive and (ii) births during 12 months preceding the census. Techniques have been developed by Brass and Coale to derive reliable estimates of fertility keeping in view the nature of errors involved in these two kinds of data. In addition to the errors due to mis-statement of age, a major limitation of data on retrospective fertility is due to memory lapse on the part of the more elderly persons; this results in an apparent decrease in the mean number of children born to them compared to relatively younger women.

Regarding the current fertility data a major source of error arises from inaccuracy in placement in time of the last birth so that the births are generally reported for a reference period ranging between 9 and 15 months back instead of 12 months. Assuming that the error about reference period affect all the age groups uniformly, the pattern of fertility indicated by the age specific fertility rates from the 'current' fertility data may be accurate, though the 'level' of fertility may not be. Under the estimation procedures of Brass technique, the correction factor for correct level of fertility is broadly obtained by comparing the parity of the younger women in the age groups (20-24) and (25-29) derived from retrospective fertility data with the 'synthetic' cumulative fertility derived from 'current' fertility data for these age groups.

Table 1 and Table 2 show the results of fertility estimates of Kuwaiti women in 1975 and 1980 through the application of the current and retrospective data

TABLE 1—ESTIMATION OF FERTILITY FOR KUWAITI WOMEN—1975 CENSUS DATA (BRASS METHOD)

Age Group of Women	*i*	*No. of Kuwaiti Women*	*Total Live Births during the preceding 12 Months*	*Total No. of Children Ever Born*	*Average No. of Births in the preceding 12 Months* $(f_i)^*$		*Multiplying F_i Factors* K_i		*Average No. of Children Ever Born* (P_i)	$\frac{P_i}{F_i}$	*Adjusted Fertility Rates* F_i	
											$\frac{P_2}{F_2} \times F_i^*$	$\frac{P_3}{F_3} \times F_i^*$
15—19	1	25357	1950	4625	.0769	—	1.927	0.1482	0.1482	1.2308	.0876	.0926
20—24	2	21539	5141	26047	.2387	.3845	2.836	1.0615	1.2093	1.1392	.2719	.2875
25—29	3	18212	5219	53527	.2866	1.5780	3.008	2.4401	2.9391	1.2045	.3265	.3452
30—34	4	12898	3092	61925	.2397	3.0110	3.094	3.7526	4.8011	1.2794	.2730	.2887
35—39	5	10895	1946	65548	.1786	4.2095	3.214	4.7835	6.0163	1.2577	.2035	.2151
40—44	6	7720	700	49385	.0907	5.1025	3.433	5.4139	6.3970	1.1816	.1033	.1092
45—49	7	5881	221	37071	.0376	5.5560	4.142	5.7117	6.3035	1.1036	.0428	.0453
										TFR =	6.5430	6.9180

$$\frac{f_1}{f_2} = \frac{.0769}{.2387} = .3222$$

M = Mean age of fertility = 29.73 years.

Note: Multiplying factors (K_i) for the age groups 15-19, 20-24 and 25-29 are based upon value of f_i/f_2 and for other age groups on value of $\overline{M}$. These are derived from *Methods of Estimating Fertility and Mortality from Limited and Defective Data*: Table 2.

TABLE 2—ESTIMATION OF FERTILITY FOR KUWAITI WOMEN—1980 CENSUS DATA (BRASS METHOD)

Age of Women	*i*	*No. of Kuwaiti Women*	*Total Live Births during the preceding 12 Months*	*Total No. of Children ever born*	*Average No. of Births in Preceding 12 Months* $(f_i)^*$	*Multiplying Factors* K_i			*Average No. of Children Ever Born* P_i	$\frac{P_1}{F_i}$	*Adjusted Fertility Rates* f_i	
											$\frac{P_2}{F_2} \times f_i^*$	$\frac{P_3}{F_3} \times f_i^*$
15—19	1	31028	1833	4116	.0591	—	1.782	.1053	.1327	1.2602	.0691	.0715
20—24	2	26565	5782	28164	.2177	.2955	2.810	.9072	1.0602	1.1686	.2544	.2634
25—29	3	21975	6217	59347	.2829	1.3840	2.998	2.2321	2.7007	1.2099	.3306	.3423
30—34	4	16286	410	70782	.2530	2.7985	3.085	3.5790	4.3462	1.2144	.2956	.3061
35—39	5	13261	2546	78832	.1920	4.0635	3.202	4.6783	5.9556	1.2707	.2244	.2323
40—44	6	10256	930	67332	.0907	5.0235	3.405	5.3323	6.5651	1.23120	.1060	.1097
45—49	7	7549	287	50329	.0380	5.4770	4.022	5.6298	6.6670	1.1842	.0444	.0460
										TFR =	6.6225	6.8565

$\frac{f_1}{f_2} = \frac{.0591}{.2177} = .27147$

M = Mean age of fertility = 30.20 years.

Note : Multiplying Factors (K_i) for the age groups 15-19, 20-24 and 25-59 are based upon value of f_1/f_2 and for other age groups on value of M. These are derived from *Methods for Estimating Fertility and Mortality from Limited and Defective Data* : Table 2.

method to the census data. For 1975, the estimate of total fertility rate comes to 6.54 or 6.92 depending upon the correction factor *(P3/F2)* or *(P3 / F3)* is used. These estimates are quite, low when compared with TFR = 7.1 based upon birth registration data. On the other hand, the estimate of TFR for 1980 using the correction factor (P2 / F2) comes to 6.62 which tallies with the estimate of TFR = 6.6 calculated from the registration data, though the correction factor *(P3/F3)* provides higher estimate 6.85. However, in view of the recent decline in fertility shown by the registration data, the estimates based upon the corrective factor derived from the responses of younger women in the age group (20-24) may be considered as more reliable. Thus the fertility of Kuwaiti women in 1980 can be considered to be equivalent to TFR = 6.6 as shown by the application of Brass method to the 1980 census data and this is also supported by the vital registration data results.

Intercensal Parity Change

If information about children ever born is available from the two censuses approximately 5 years apart, then the change in children ever born by a particular age group of women does reflect their intercensal fertility. As such it becomes possible to estimate an intercensal age specific fertility schedule. Coale and Trussell have developed a method for using such information when intercensal interval is five years. This method has been applied to the fertility data of Kuwaiti women derived from 1975 and 1980 Censuses. However, the results of the application of this technique (Table 3) provide a low estimate of fertility

TABLE 3—FERTILITY ESTIMATES FROM INTERCENSAL PARITY CHANGE 1975-80

Age Group	*i*	*Average Parity*		*Cohort Parity Increment*	*Hypothetical Cohort Parity 1975-80 P_t*	*Weights* W,	*Cumulative Fertility F_t*	*Age specific Fertility Sates ft*
		1975	*1980*					
15—19	1	.1824	.1327	(.1327)	.1327	.6892	.4056	.0811
20—24	2	1.2093	1.0602	.8778	1.0105	.5159	1.7335	.2656
25—29	3	2.9391	2.7007	1.4914	2.5019	.4768	3.2381	.3009
30—34	4	4.8011	4.3462	1.4071	3.9090	.3988	5.5965	.2717
35—39	5	6.0163	5.9446	1.1425	5.0525	.4217	5.3698	.1547
40-44	6	6.3970	6.5651	.5488	5.6013	.2262	5.8102	.0881
45-49	7	6.3035	6.6670	.2700	5.8713	—.0975	5.9277	.0235

equivalent to TFR = 5.93, which cannot be accepted. The distortion in parity data may be due to various types of errors. It may be that there was a greater tendency among older women to the omit children in their responses as compared to younger women. Also differential errors in age statements of women of different ages in the two censuses can distort the linkage of women belonging to the same birth cohort.

Data on Children Ever Born and Duration of First Marriage

This method has been developed by Coale, Hill and Trussel (1975). The application of the method is limited to the populations where there is and has been very little voluntary control of fertility and where only a small proportion of births occur outside marriage. As such the method can suitably be applied to traditional Muslim Arab populations of Middle East countries. The method is considered robust due to following reasons:

(i) the age specific marital fertility rates are very similar in different populations (not practising voluntary fertility (control) though their levels may differ from one population to another; and
(ii) there is usually lesser distortion in reporting the duration of marriage than in that of age.

Further the method does not assume that the mean age at marriage has remained constant in the recent past as do other indirect methods which use data classified by age.

The application of this method to Kuwaiti female parity data by duration of first marriage from 1980 Census may be seen in Table 4. The singulate mean age at marriage (SMAM) for Kuwaiti women has been calculated from proportions single reported in 1980 Census (Table 5) and it comes to 21.99 years. Further, the distribution of women married first time by duration of marriage from 1980census data showed that 8.8 per cent of Kuwaiti women were married before they were 15 years old. Thus assuming $A(O) = 12$, the expected parities corresponding to the SMAM = 21.99 years for the specified duration of marriage are calculated, by interpolation, and the adjustment factors 'R' are obtained by evaluating the ratio of observed (Pi) to the expected $(P^{\hat{}}_i)$ parities. The values of R vary only between 0.802 to 0.889 and this variation may be due to errors in statements regarding parity and duration of marriage. On the basis of the medium value of $R = 0.860$, the estimate of total marital fertility rate comes to 10.2 in 1980. It may be noticed that this estimate coincides with the estimates of 10.3 based upon age specific fertility rates from the 1980 registration data combined with proportion married from 1980 Census data (Table 5).

TABLE 4—FERTILITY ESTIMATION FROM PARITIES BY DURATION OF FIRST MARRIAGE, KUWAITI WOMEN, 1980 CENSUS **DATA**

A(0) = 12, Singulatc mean age at marriage (SMAM) = 21.99

Duration of Marriage	*No. of Women*	*No. of Children Ever Born*	*Observed Average Parity* P_t	*Expected Average Parity** $_{P}A_{i}$	$R = \frac{P_t}{P_t}$	
0—4	20029	17525	0.875	1.091	0.802	
5—9	18503	51429	2.779	3.230	0.860	Standard Total Marital Fertility Rate = 11.853
10_14	14794	67611	4.570	5.142	0.889	Medium Value of R = 0.860
						Expected Total Marital Fertility Rate = 0.860 X 11.853 = 10.20

*P_t are expected parities corresponding to A(0) = 12 and SMAM = 21.99 years interpolated from the Standard Table.

TABLE 5—MARITAL AGE SPECIFIC FERTILITY RATES, KUWAITI WOMEN 1980

Age Group	*Marital Status in 1980 Census (percent)*				*A.S.F.R**	*A.S.M.F.R***
	Unmarried	*Married*	*Divorced*	*Widowed*		
15-19	79.8	19.6	0.5	0.1	.089	.454
20—24	38.7	59.1	2.0	0.2	.292	.494
25—29	14,8	81.6	2.6	1.0	.369	.452
30-34	8.1	86.9	3.0	2.0	.270	.311
35—39	3.4	88.8	3.3	4.5	.222	.250
40—44	L9	84.2	4.5	9.4	.059	.070
45-49	1.5	76.7	5.1	16.7	.026	.034
15-49	31.8	63.1	2.4	2.7 TFR =6.6		Total Marital Fertility Rate = 10.3

*Based upon registration data for 1980

**Based upon ASF Rates from registration data for 1980 and population married from 1980 Census.

Conclusions

Indirect demographic techniques to estimate fertility from census or survey data have been developed which can provide valid estimates of fertility provided the concerned population fulfills, to an extent, the assumptions underlying the theory of these techniques. Additionally these techniques provide an alternative approach to check the validity of estimates derived from the vital registration data.

Current and Retrospective Data (Brass) method utilising the data on current and retrospective fertility of Kuwaiti women collected in 1980 census provide an estimate of TFR — 6.62 which gets support from the registration data showing also TFR = 6.6. The Intercensal Parity Change method has, however, provided a low estimate of fertility (TFR = 5.93).

Coale's method of fertility estimation utilising the data on parity of women by duration of first marriage is more suitable to Kuwaiti population because of little voluntary control of fertility and full legitimacy of births among them. The total marital fertility rate of 10.3 is provided by Coale's method which is in complete agreement with the estimates provided by registration data and the Brass Method. Thus the estimates provided by the Brass and Coale methods are valid and mutually supportive and are in agreement with the estimate provided by registration data. The fertility of Kuwaiti women in 1980 can safely be considered equivalent to a total fertility rate of 6.6.

References

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