AN ANALYSIS OF A METHODOLOGICAL STUDY TO ESTIMATE THE BIRTH RATE AND DEATH RATE OF RURAL POPULATION OF HYDERABAD DISTRICT

BY

A.H KALWAR AND SIRAJUDDIN MEMON

1. Introduction

Population censuses and sample surveys in Pakistan suffer two serious defects, viz one, under-emuneration, specially of the female and infant population, and two, erroneous age reporting. An attempt is made in this paper to investigate the errors in age reporting, under-enumeration of population and under-registration of vital events. This attempt is based on some statistical analysis of the data collected and complied for "A Methodological Study to estimate the Birth Rate and the Death Rate of Rural population of Hyderabad District". This study was undertaken to find out whether repeated visits (every quarter) to a sample of households would appreciably reduce the under-remuneration of vital events, as compared to just one visit to elicit the information for the year as a whole. Two independent random samples of rural households of Hyderabad District were drawn. The information was collected from the Q-Sample, with five quarterly visits and from the A-Sample by a single visit for the year 1981. The age data, in the case of Q-Sample, was edited on the basis of reproductive histories of ever-married women of the sample household. No such effort could be made in the case of the A-Sample as corroborating evidence was not available for this purpose.

The population of Hyderabad district (rural) was divided into ten strata of approximately equal size (according to 1981 population)[1]. One village per stratum was selected with probablity proportionate to size. A sub sample of households selected from the sampled villages, sub sampling ratio varying from stratum to stratum in such a manner that overall sampling ratio was the same (one half of one percent) in every stratum.

Inter alia, every "ever married woman" in the sample was asked her up-to-date reproductive history. Every "ever-married woman" in Hyderabad district rural population had an equal chance of being selected in the sample. Every "child ever born" in this community, except those whose mothers were not living in the rural area at the time of survey, had also an equal chance of being in the sample.

About 82% of the people of this area are illiterate[2] they are not in the habit of keeping any record with respect to age, birth and death. The system of birth and death registration, in the rural areas, is very deficient. The sample surveys, so far undertaken to estimate birth and death rates, also seem to under estimate, probably due to memory lapse and

imprecise concept of the reference year.

In this paper attempts will be made to answer the following questions:

i) Did we get any better enumeration of females by intensive interviewing of households by both male and female enumerators; the latter collecting the reproductive histories of the ever married females?

ii) If the age data were edited primarily on the basis of reproductive histories of ever married females in the household, would we get a better age distribution than if the original responses were not edited?

iii) Was the memory bias in under-reporting of events of births and deaths reduced significantly by reducing the references period to one quarter as compared to one year?

2. Sex-ratio

One of the problems of population censuses and surveys in Pakistan is the relative under-enumeration of females. The 1972 and 1981 Population Censuses of Pakistan showed sex-ratio of 114 and 111 males per 100 females respectively for rural area [3]. and [4]. Sample surveys employing the same technique as that of Census, viz usually male interviewers asking the male informants, information about their household composition, have also produced similar results.

The 1981 Population Census showed a sex-ratio of 111 for the rural area of Hyderabad district. In our study under consideration, heads of the household in the Q-Sample were interviewed by male enumerators and their ever married women by female interviewers. For the households in the A-Sample only the heads were interviewed by male enumerators. We got the sex-ratio of 101 and 119 respectively for the two random samples.

Based on the data of the reproductive histories of ever married females in the Q-Sample, we got the sex-ratio at birth being 110, 109 and 101 for the decades 1951-60, 1961-71 and 1972-80 respectively, and the ratio of their corresponding survivors at the end of 1981 was 99, 98 and 105 respectively. The sex-ratio at birth for all live-births occurring between 1900 to 1980 to the ever married females in the sample works out to be 106 and the sex-ratio of their corresponding survivors at the end of 1981 comes out to be 101.

Although these calculations are based on small samples 1901 children (980 males and 921 females) born alive to 348 ever married females, they do indicate the limitation of census approach in counting population of households. The vigilant female enumerators have a much better chance than male enumerators, of catching infants and female members of the households these two groups being more liable to under-enumeration in Pakistan. The

female enumerators are in a better position to observe them, if they are not absent from their households at the time of interview. This latter problem could, however, be solved, to a great extent, by asking the reproductive histories of her ever married females. But employing of large number of female enumerators do not appear to be very practicable under the circumstances prevailing at present in Pakistan. But if ways could be found to make the field enumeration by female interviewers feasible, we could, most likely, gather better quality data.

3. Age Distribution

About 82 percent of the people living in the rural area of Hyderabad District are illiterate [5], with the result that they do not keep any record of births and deaths.

The ages reported by them are subjective, and, therefore, subject to many different types of errors. The most important is the very imprecise quantitative concepts of the people. Misreporting of ages may sometimes be deliberate and, more often, results in an under statement of ages. A further source of error may be due to misunderstanding of questions e.g when it is required to report age at the last birthday, the report age may be in the years completed to the nearest birthday, which very often is the next birthday. This latter source, however, does not cause as great distribution as the lack of precise knowledge or deliberate under-statement.

These errors have been common to all enumerative Population Censuses and Sample Survey in Pakistan. The reported age data, therefore, need to be corrected. We believe the reproductive history data which were collected very meticulously by the trained female interviewers direct from every ever married female for the first sample (as compared to age-data for all members of the households being reported by the head of the household concerned or some other responsible member) appeared a very good and sound basis for editing the reported age-data. The edited and unedited age data for the Q and A samples respectively have been subjected in the following paragraphs to certain Accuracy Tests [6] developed in an article (1).

i) Sex-Ratio Test

One means of testing the accuracy of age distributions in five-year groups is to compare the sex-ratio (number of males per 100 females) for successive age groups. If the distribution are accurate or if the errors for males as frequent and of the same kind as those for females, sex-ratio will change very gradually from one age group to another, as a result of sex differences in mortality. The presence of marked fluctuations in these ratios testifies to errors which are not the same for the two sexes.

The edited and unedited age and sex distributions of the two random

samples respectively of rural population of Hyderabad District are given in Table-I.

The sex-ratios (number of males per 100 females) are calculated for the two samples and the differences of the successive age groups are given in Table-2.

The sex-ratio, as shown in Table-2 shows gradually changes in the case of the Q-sample, as compared to marked fluctuations in the A-sample. This indicates that editing of age-data of the sample smoothed their distribution and thus increased their accuracy. On the other hand, the observed data for the A-sample which could not be edited show large reporting errors.

ii) Age-Ratio Test

Another means of testing the accuracy of age distributions in five year age groups is by Age-Ratio Test which is defined as the numbers reported in one age group per 100 of the mean of numbers reported in two adjacent age-groups for each sex separately. Any considerable fluctuations of age-ratios indicate inaccuracies in age reporting. The age-ratios for the two random samples are given in Table-3.

Age-ratios, on the other hand, show a considerable change in male of the first sample and marked fluctuations in the female age-ratios of the second sample. This includes that editing in the Q-sample do help us in smoothing the age distribution, in the case of females, but in the A-sample the reporting of female ages are loaded with mistakes.

iii) Test Scores

These facts can be summarized by calculating the "Sex-Ratio Score", "Age-Ratio Score", and "Joint Score" which are known as summary measures of degree of variability, the sex-ratios and age-ratios exhibit.[7]

Sex-ratio is defined as the mean difference between sex-ratios for the successive age-groups averaged irrespective of sign and "Age-Ratio Score" as the mean deviation of age-ratios from 100 percent, irrespective of sign. Finally, the "Joint Score (unadjusted)" is defined as adding three times the Sex-Ratio Scores to the sum of the Age-Ratio Scores for the two sexes.

An allowance for the smallness of population is, however, to be made, by the following formula:

Adjusted Joint Score = Unadjusted Joint Score X $(-3,500/p)$[8].

Where p stands for the population under consideration. The Sex-Ratio Score, Age-Ratio Score, Unadjusted and Adjusted Joint Scores are given below:

SEX RATIO, AGE RATIO AND JOINT SCORES OF TWO RANDOM SAMPLES OF HYDERABAD DISTRICT (RURAL)

Q-Sample

Sex Ratio Score 13

Age -Ratio Scores

Male 36
Female 32
Un-adjusted Joint Score 108
Adjusted Joint Score 33

A-Sample

Sex-Ratio Score 14

Age-Ratio Scores

Male 31
Female 29
Unadjusted Joint Score 102
Adjusted Joint Score 45

It is evident from the Joint Scores that errors in age reporting are considerably reduced by editing.

4. Conclusions and Suggestions

The registration of vital events of births and deaths in Pakistan is incomplete due to non-realization of its importance by the people and inadequate administration arrangements for the purpose. To fill the gap in this area, attempts have been made through population censuses and surveys to collect data on births and deaths from the households, reference period being the "last year" preceding the date of enquiry. These attempts have also not been seen successful to attain completeness. This state of affaris has led to a surmise that "incompleteness" may be mostly due to memory bias of the respondents. The question was naturally raised whether shorter "reference period" say three months, would produce any better results. The Methodological Study undertaken by us was primarily designed to find the answer to this question, if possible. Two independent random samples of households in the Hyderabad District (Rural) were selected. One of these samples was visited every three months, asking data for the last quarter; five visits were made in all to cover the calander year 1981. The other sample was visited only once and Statistics of births and deaths were collected for the past year.

The two samples give estimates of crude birth rates 46.53 and 45.03

per thousand respectively. Their difference is insignificant. Both have, however, produced reasonable estimates. It may be concluded that asking only the past year's data on vital events, just in one visit, but with good field-enumeration work, would be sufficient and the costly quarterly visits (five times during the year) may not be necessary for the purpose.

Same is the case with the two estimates of crude death rates of 21.15 and 25.91 per thousand from the two samples respectively. Their difference is also insignificant.

This Methodological Study has, therefore, not produced any evidence to show that the mere reduction of the "reference period", other things remaining the same, would produce any better results. On the other hand we may conclude that what is more important in the case of such enquiries is a good Survey Design, executed rigorously in the field, rather than repeated visits at shorter intervals of time which are more costly.

In order to establish these conclusions, more firmly and other tentative inferences given in section 3, it may be worthwhile to conduct few more small-scale studies of similar type as attempted by us.

TABLE-I

AGE DISTRIBUTION BY SEX OF TWO RANDOM OF HYDERABAD DISTRICT (RURAL) 1981

AGE GROUP (YEARS)	Q-SAMPLE MALE	FEMALE	A-SAMPLE MALE	FEMALE
0-4	156	207	265	369
5-9	184	194	343	360
10-14	147	132	283	254
15-19	97	83	170	140
20-24	82	82	128	122
25-29	79	73	120	113
30-34	65	59	102	104
35-39	60	57	95	91
40-44	51	51	76	82
45-49	41	40	63	64
50-54	41	35	59	53
55-59	21	19	35	59
60-64	32	23	46	37
65-69	11	10	20	19
70-74	16	13	23	19
75 AND ABOVE	15	15	25	30
	1098	1093	1853	1890

TABLE-2

SEX RATIO BY AGE GROUP OF TWO RANDOM SAMPLES OF HYDERABAD DISTRICT (RURAL) 1981

AGE GROUP	Q-SAMPLE		A-SAMPLE	
	SEX RATIO	DIFFERENCE FROM SEX-RATIO FOR PRECEDING AGE-GROUP	SEX RATIO	DIFFERENCE FROM SEX- RATIO FOR PRECEDING AGE- GROUP
0-4	75	----	72	---
5-9	95	20	95	23
10-14	111	16	111	16
15-19	117	6	121	10
20-24	100	-17	105	- 16
25-29	108	8	106	01
30-34	110	2	98	-8
35-39	105	-5	104	6
40-44	100	5	93	-11
45-49	102	2	98	5
50-54	117	15	111	13
55-59	111	-6	106	-5
60-64	139	28	124	18
65-69	110	-29	105	-19
70-74	123	13	121	16
75 AND ABOVE	100	-23	83	-38

TABLE-3

AGE-RATIO OF TWO RANDOM SAMPLES OF HYDERABAD DISTRICT (RURAL) 1981

AGE GROUP	Q-SAMPLE		A-SAMPLE	
	MALE	FEMALE	MALE	FEMALE
5-9	85	106	77	103
10-14	125	147	121	142
15-19	152	159	166	182
20-24	118	101	133	115
25-29	104	112	107	108
30-34	122	124	118	109
35-39	108	104	107	114
40-44	118	112	125	111
45-49	124	128	121	128
50-54	100	114	107	121
55-59	195	184	169	161
60-64	66	83	76	89
65-69	291	230	230	195
70-74	69	77	87	100
75 AND ABOVE	107	87	92	63

References

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8. Ibid