

Limitations of Vital Registration System in Pakistan against Sample Population Estimation Project: A Case Study of Rawalpindi

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Introduction

The study of population dynamics in a country is based primarily on the knowledge of the rates of occurrence of two natural vital events of births and deaths in relation to the population size. A continuous appraisal of population necessitates availability of reliable birth and death data for understanding the factors influencing population growth and also for making projections for future on the basis of the prevalent and anticipated vital rates for use in drawing up future social and economic plans in accordance with the realistic requirements of the population. Measurements of fertility, mortality and population size are also required in planning and evaluation of health programmes and in assessing effectiveness of the population planning programme.

In Pakistan the estimates of population size for demographic analysis are drawn from the periodic censuses, but the information pertaining to births and deaths statistics, as provided by the official registration system, has been inadequate both in coverage and quality.

Some estimates of the extent of undercoverage in Pakistan's vital registration system have been reported in the studies made by Khan [8] and Gustafson [6]. The purpose of the present study is to describe the findings of these studies and to provide further empirical evidence on the relative extent of the adequacy of the vital registration system in Pakistan. This will be done by comparing the vital statistics estimates drawn from the more recent data of

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the vital registration system with the past estimates prepared from the same source by Khan and Gustafson and the estimates obtained from the data collected through the sample population projects, viz., the Population Growth Estimation (PGE) project and the Population Growth Survey (PGS).

For the purposes of the present study the vital data registered by the Rawalpindi Municipal Committee and the Cantonment Board were collected as a test case for an appraisal of the overall system in the country. Rawalpindi being a sample for both the PGE (See Table I) and the PGS, a comparison of the results of the present study with the corresponding estimates of the Rawalpindi sample in the PGE (1964) and the PGS (1968) will not only indicate the extent of undercoverage in this city but would also reflect indirectly the conditions in the country as a whole within the perspective of the studies by Khan and Gustafson referred to earlier. With the above general aim in view, the specific objectives of the study are as follows:

- (a) to compute birth and death rates in Rawalpindi on the basis of registered data and to work out the extent to which the vital events are underregistered by comparing these rates with those provided by the Rawalpindi sample area of the PGE and the PGS;
- (b) to examine the utility of registration data from the distribution of births by sex and deaths by age and sex; and
- (c) to describe some of the major limitations of the official registration system and to discuss the factors responsible for these shortcomings as against the advantages and usefulness of the vital data obtained through the sample projects like the PGE and the PGS.

Though the present study draws on comparative data relating to a single urban area of Pakistan, the observed differences in the coverage of vital events between the official registration system and the PGE/PGS in respect of that area are considered to be reflective of the quality and coverage of the official registration data as currently existing in Pakistan.

Previous Studies of Vital Registration System

The earliest estimates on the extent of coverage in the official vital registration system in Pakistan were made by Khan who estimated that in the Punjab where the system was comparatively better than in other areas, the actual number of births during the period 1950-52 was 27 percent higher than the number of registered births; and the actual number of deaths was 53 percent more than the registered deaths [8]. In another study by the same author it was estimated that registered deaths in Pakistan were only 50 percent of the actual deaths and registered births were 63 percent of the actual births [10].

Following the above-mentioned estimates by Khan, a detailed study which provided a systematic picture of the extent to which vital events are actually registered in Pakistan was carried out by Gustafson [6]. This study provided estimates of crude birth rates and crude death rates on the basis of the data collected from official registers existing in the sample areas where the PGE experiment was being carried out. The estimated rates from each of the sample areas and for Pakistan, as provided by this study, are given in Table I.

Table I

Vital Rates from Official Registration System PGE Sample Areas: 1964

Area	Crude Birth Rate	Crude Death Rate
Karak	45	10
Simbli	9	14
Bhedian Chak 35	15	3
Aliwah	6	6
Raman	4	1
Khudadad	3	1
Mochh	27	3
Wazirabad	14	14
Leghari	0	0
82/G-B	32	14
Rawalpindi (Urban)	21	2
Hyderabad (Urban)	10	2
Pakistan	21	8

Source: [6]

The estimated rates provided in Table I show marked variation from area to area which reflects, primarily, variations in the quality of coverage. For Pakistan as a whole the crude birth rate is estimated to be 21 per thousand and crude death rate as 8 per thousand. These rates are much lower than the 1964 crude birth rate of 41 and crude death rate of 15 per thousand estimated from the PGE longitudinal registration (LR) system from the same sample areas. The results of Gustafson's study show that compared to the LR estimates of the PGE, about fifty percent of the vital events were missed by the official registration system. While the estimation procedures used by Gustafson and M.K.H. Khan were different, their results were essentially comparable. Other studies have also pointed out such inadequacies of Pakistan's vital registration system [1, 2, 3].

Brief Description of PGE and PGS Experiments

A turning point of interest in the demographic history and population growth potential of Pakistan occurred as a result of the 1961 Census.¹ In-depth analysis of the 1961 Census indicated that the actual population was more than that counted in the census. It was within this perspective of rapid growth that the need for independent estimates of population growth rates was seriously felt by planners, ultimately resulting in the setting up of the Population Growth Estimation (PGE) Project in Pakistan, beginning in 1962. The PGE project aimed at estimation of population parameters from a country-wide set of selected sample areas through two systems of data collection, viz., continuous registration (LR) of vital events through specially appointed registrars in each of the sample areas and through periodic household surveys (CS) in the same areas for

¹The history of vital statistics system in the areas comprising Pakistan dates back to 1864. Subsequently, in 1886, the Government of (British) India passed the Births, Deaths and Marriages Registration Act. For detailed history of the system, see [9].

enumeration of vital events retrospectively. Reported events collected through the two systems were then matched and verified in the field. The PGE experiment generated two primary series of fertility and mortality rates, viz., Longitudinal Registration (LR) estimates and Cross Sectional (CS) Survey estimates. A third series of estimates (CD), based on the Chandrasekar-Deming formula, was also constructed from the data collected through the LR and CS systems. [3,4]. The CD estimates were arrived at by matching of events collected through the LR and CS systems and summing up (i) the matched events, (ii) the unmatched events covered only by CS, (iii) the unmatched events covered by LR only and (iv) estimated number of events which were missed by both LR and CS.²

The PGE experiment, carried out from 1962 through 1965, provided data for arriving at such demographic indices as age specific fertility rates, mortality rates, and average life expectancy, and also helped in preparing population projections. The PGE project, completed in 1967, provided results through 1965. This experiment was conducted jointly by the Central Statistical Office and the Pakistan Institute of Development Economics.

In January 1968, the Population Growth Survey (PGS) was started as a substitute for PGE project by the then Central Statistical Office (now Statistical Division) to estimate vital rates on the basis of survey data alone, i.e., dispensing with the registration part of the PGE [2]. The set of vital rates provided by the PGS, based on periodic surveys alone, are methodologically and conceptually similar to the Cross-sectional Survey (CS) part of the PGE. The PGS was carried out from 1968 through 1971 but so far detailed results are available for 1968 and 1971 only.

Vital Statistics from Registered Data in Rawalpindi

For the registration of vital events in Pakistan separate registers are maintained for recording births and deaths. The birth and death registers require the following information in respect of each of the vital events.

BIRTHS

1. Date of registration of birth
2. Date of birth
3. Sex
4. Father's name
5. Place of birth (address)
6. Occupation, caste, religion of the father
7. Name of the child (if any)
8. Name of the midwife who attended delivery
9. Name and address of person reporting the birth with his signature

DEATHS

1. Date of registration of death
2. Date of occurrence of death
3. Name, religion, and residence of the deceased
4. Father's name (or husband's name in case of married woman)
5. Sex
6. Age at the time of death
7. Cause of death
8. Place of death
9. Name and address of person reporting the death with his signature

²If C is the number of matched events, N₁ is unmatched events covered only by LR, and N₂ is unmatched events covered only by CS, then the estimate of actual events (births or deaths), N, is given by Chandrasekar-Deming formula:
$$N = C + N_1 + N_2 + \frac{N_1 N_2}{C}$$

From the required information about births listed above, the important omission of 'age of mother' is noted. Adequate analysis of fertility, including changes in fertility over time, requires data on ages of women giving births. Thus, from the vital registration system in Pakistan it is not possible to derive such important rates as age-specific fertility rates, etc. The foregoing weakness in the registration system exists apart from any considerations on the extent to which coverage of events is adequate. Secondly, it will be noted that for registration of births there is no requirement that an event be registered with reference to "place of usual residence" of the mother along with "place of birth." Both *de jure* and *de facto* references are important, as are recorded in the case of a death, for adequate demographic analysis on sub-national levels. While looking through the registers of births and deaths in Rawalpindi it was also noticed that in most of the cases the information provided was incomplete and frequently vague.

For the purpose of the present study it was decided to carry out an analysis of the data as they existed in the registers for the years 1967 and 1972. The reason for study with a five-year gap between those two years was to examine the degree of consistency in the reporting of vital events for different characteristics.

The total number of births in Rawalpindi reported through the vital registration system for 1967 was 9,413 and for 1972 was 11,602. Relating these births with the corresponding estimated mid-year population for Rawalpindi for 1967 (470,000) and for 1972 (615,000) the crude birth rate comes out to be 20 per thousand for 1967 and 19 per thousand for 1972. The number of reported deaths was 1,413 and 2,071 for the two years respectively, resulting in estimated crude death rates of 3.0 for 1967 and 3.4 for 1972.* These obviously low rates compare well with Elizabeth Gustafson's estimates for Rawalpindi in 1964 (Table I) of the crude birth rate at 21 per thousand and death rate at 2 per thousand. Estimates for Rawalpindi from the PGS data for the city in 1968 give the birth rate as 33 and crude death rate as 15 per thousand [14]. Estimates for 1964 based on registration data only in the PGE areas place the crude birth and death rates at 26 and 8 per thousand respectively [5]. If one takes the PGS rates for 1968 as standard for comparison, then the registered births in 1967 for Rawalpindi are underenumerated to the extent of 39% and in 1972 to the extent of 42%. Similarly, the underenumeration of deaths is estimated at 80% for 1967 and about 77% for 1972. Thus it appears that a great majority of deaths and a substantial percentage of births are not registered. These findings support earlier studies in the conclusion that there appears to be gross underenumeration of both births and deaths in the vital registration system of Pakistan.

The sex ratio, i.e., the number of males per 100 females, can be a useful measure to evaluate the quality of demographic statistics. On the basis of registered data in Rawalpindi the sex ratio at birth in 1967 was 114.5 and in 1972 it was 118.7. These sex ratios are comparable to the sex ratio at birth for Rawalpindi based on the PGE sample data for 1964. The sex ratios at death from the registered data for the years 1967 and 1972 were 169.6 and 168.6 respectively. These ratios are much higher than the sex ratio at death of 113.8

*Rawalpindi population for 1972 has been taken from the Census whereas for 1967 it has been estimated from observed intercensal growth rate for Rawalpindi.

estimated from the Rawalpindi PGE sample data for the years 1962-65, suggesting in addition to relatively higher male mortality a possibly higher level of under-reporting of female deaths. The most plausible reason for these differentials by sex is the greater need of death certificates for males than for females, for inheritance of property and other legal purposes.

In Table II, the reported deaths are presented for 1967 and 1972, with their break-up by broad age groups and sex. As expected, it is observed that the highest number of deaths for both sexes was reported for the age group "50 and Over." Much more conspicuous, however, is the male-to-female ratio of deaths in this age group which shows 437 male deaths and 175 female deaths in 1967 and 653 male to 266 female deaths in 1972. In this age group the disproportionately higher number of male deaths tends to suggest that there is relatively better reporting of male deaths. It should be recognised, however, that greater fluctuations in rates are to be expected within small populations than in large populations.

Looking at deaths in the age group "less than one," the events registered would appear to be much less than actual infant mortality. The infant mortality rate derived from registered data is 31 per thousand reported live births for 1967 and 36 per thousand live births for 1972. These rates are very much lower than the estimated infant mortality rate for Pakistan in 1968 from the PGS data which was about 124 deaths per thousand live births. While infant mortality might actually be lower in urban areas than in the country as a whole, it would appear that in Rawalpindi there was gross under-reporting of infant deaths. This is probably because of the lack of any practical necessity of obtaining death registration certificate for an infant death.

Limitations in the Reporting and Registration of Vital Events

The present study of the registration system in Rawalpindi has clearly shown that the existing system of reporting as well as that of registration seriously lacks in both coverage and quality and thus cannot be used for computing birth and death rates. This handicap deprives administrators, planners and researchers of the opportunity of making use of such data for estimation of the rates of growth of population as they exist from time to time. An examination of the registered vital data leads to the conclusion that information even on the reported events is frequently incomplete and vague. It is felt by the authors that one of the root causes of the present gross under-reporting and incomplete reporting of vital events is the lack of realization on the part of planners, administrators, the registration staff and the public in general of the importance of getting correct vital statistics. Unless the need for such statistics is fully understood for a variety of purposes, including administration of programmes, and future planning, public health activities and research in the field of population, epidemiology, etc., the reporting of the events would continue to be sparse and defective.

Table II
Registered Deaths by Age Groups in Rawalpindi, 1967 and 1972

Age Groups	1967						1972					
	Male		Female		Total		Male		Female		Total	
	No	%	No	%	No	%	No	%	No	%	No	%
Less than One	164	18.4	131	25.1	295	20.9	237	18.3	181	23.5	416	20.2
1 — 4	39	4.4	35	6.7	74	5.3	86	6.6	78	10.1	164	7.9
5 — 14	39	4.4	28	5.4	67	4.7	69	5.3	40	5.2	109	5.3
15 — 49	212	23.8	153	29.3	365	25.8	255	19.6	206	26.7	461	22.2
50 and more	437	49.0	175	33.5	612	43.3	653	50.2	266	34.5	919	44.4
All Ages	891	100.0	522	100.0	1,413	100.0	1,300	100.0	771	100.0	2,071	100.0

In the above general context, some of the specific factors responsible for the existing shortcomings in the registration system are as under:

- (i) Lack of appreciation of the necessity of reporting and recording of vital events as a result of the high level of illiteracy and the general apathetic attitude not only of the public but also of those who are involved in the system of registering vital events.
- (ii) General lack of knowledge by the public of the procedures involved in getting births or deaths registered and the likely inconvenience to the public in getting events registered.
- (iii) Lack of requirement of birth certificates for such purposes as school enrolment, age identification for legal purposes, etc., and death certificates for purposes other than those of the settlement of property and inheritance claims.
- (iv) Lack of understanding of the concepts by those who report and those who record vital events, regarding the nature of the vital event, especially of the cause of death. For reporting of births there is no basis in the system by which an infant death is differentiated from a still-birth or a foetal death, as a result of which such events may be erroneously entered into the birth or death register.

It may be mentioned here that in the urban areas the registration of vital events is being carried out under the Municipal Administration Ordinance 1960, and it is the responsibility of the respective Municipal or Town Committee to collect such data. In the rural areas, however, the registration of births and deaths was being carried out under the Basic Democracies Order of 1959, *which has now been repealed*. Since the repeal of Basic Democracies Order, the union councils are not functioning and the work of registration of births and deaths is practically at a standstill.

Need for Another Sample Population Project

The present study provides further evidence of the futility of data being collected through the vital registration system in Pakistan for purposes of demographic analysis. The fact that little use is possible of the data obtained from the Rawalpindi registers would strongly suggest that in the other urban areas, where data are being collected under the Municipal Administration Ordinance 1960, the registration would be equally defective, if not worse. In the rural areas, containing the great majority of the population, where the registration work is currently understood to be practically at a standstill due to the repeal of Basic Democracies Order 1959, there was a substantial under-registration, even when the registration was actually going on. Findings from this study along with those of Khan for 1950-52 and Gustafson for 1964, suggest that the coverage of vital events by the existing system has not shown any improvement during the past two decades. It is, therefore, doubtful that there would be an improvement in the foreseeable future, in view of the limitations outlined in the last section.

A comparison of the estimated vital rates from this system with those given by the PGE and PGS projects has given some indication of the extent to

which the events are missed by the official system while at the same time it has given some idea of the efficiency of the sampling approach in vital data collection. While it is obviously desirable in any country to have a vital registration system in which there is reliable reporting of vital events, for Pakistan the urgent need for reliable vital statistics, and rates derived therefrom, can best be satisfied through sample population estimation projects rather than through undertaking (at least in the short range) the improvement of the existing vital registration system. The costs involved in sample projects are much less and the reliability of data much greater.

It may be mentioned here that recommendations were made as far back as 1953 in the *United Nations Handbook of Vital Statistics Methods* [13] for adoption of sampling procedures in vital registration systems in countries where the conventional vital statistics system was inadequate to meet the needs of measurement of population change. Later Hauser, in a paper published in 1954 [7], suggested that in the less developed countries sampling methods could be applied to meet their needs of vital statistics provided these are properly utilized and that in view of limited resources such methods would be more efficient and economical for the basic needs of such countries. The First Five Year Plan of the Government of Pakistan (1955-60) also noted that there was a need for reliable data based on sample surveys concerning the size of population and its major characteristics [11].

In view of the above-mentioned recommendations for adoption of sampling procedures for vital data collection and the relative efficiency of the PGE/PGS type of projects in comparison with the official registration system as shown by the results of the present study, the necessity of another sample population project for the collection of vital data in Pakistan has been clearly demonstrated. The choice of approach, however, has to be made on the basis of past experience of the PGE (1962-65) and the PGS (1968-71) projects and from similar experiences in other countries. With little hope of improvement in the official registration system in the foreseeable future, a project for sample registration of vital events in Pakistan needs to be established at the earliest date in order to meet the requirements of demographic data in the country.

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