

CHAPTER - 1

INTRODUCTION

Registration of births and deaths is an important source for demographic data for socio-economic development and population control in developing countries. The data on population growth, fertility and mortality serves as the prime constituent for population projections. Apart from these vital indicators, an adequate evaluation of a number of programs in the health sector, including family planning, maternal and reproductive health, immunization programs, is dependent upon the availability of accurate, up-to-date fertility and mortality data. In India, the need for dependable demographic data was felt soon after independence heralding the era of five year planning. The registration of births and deaths started on voluntary basis and there was no uniformity in statistical returns resulting in both under-registration and incomplete coverage. In order to unify the Civil Registration activities, the Registration of Births & Deaths Act, 1969 was enacted. Despite having the registration of birth & death compulsory under the statute, the level of registration of births and deaths under the Act has continued to be far from satisfactory in several States/UTs. With a view to generate reliable and continuous data on these indicators, the Office of Registrar General, India, initiated the scheme of sample registration of births and deaths in India popularly known as Sample Registration System (SRS) in 1964-65 on a pilot basis and on full scale from 1969-70. The SRS since then has been providing data on a regular basis.

1.2 The demographic scenario in the country has been undergoing a change since the inception of SRS; however, the profile and rate of change is not uniform across all the States/UTs. Overall, the crude birth rate in the country has come down from 36.9 per one thousand population in 1971 to 20.4 in 2016, whereas the crude death rate has declined from 14.9 to a low of 6.4 in the same period. The infant mortality rate, which is an important indicator of the health status of the country, has registered a significant decline from 129 per one thousand live births in 1971 to 34 in 2016. During the period, the total fertility rate of the country has declined from 5.2 to 2.3. To fulfill its objective of monitoring the changes in vital indicators, the SRS sampling units are retained for about ten years, making it a panel household survey.

1.3 Various methods based on the application of sampling techniques have been tried and tested in many developing countries. Such methods include single and multi-round retrospective surveys and the dual record system. The SRS in India is based on a dual record system. The field investigation under Sample Registration System consists of continuous enumeration of births and deaths in a sample of villages/urban blocks by a resident part-time enumerator, and an independent six monthly retrospective survey by a full-time supervisor. The data obtained through these two sources are matched. The unmatched and partially matched events are re-verified in the field to get an unduplicated count of correct events. The advantage of this procedure, in addition to elimination of errors of duplication, is that it leads to a quantitative assessment of the sources of distortion in the two sets of records making it a self-evaluating technique.

1.4 The revision of SRS sampling frame is undertaken every ten years based on the results of latest census. While changing the sample, modifications in the sampling design; wider representation of population; overcoming the limitations in the existing scheme; meeting the additional requirements etc. are taken into account. The first replacement was carried out in 1977-78 and the last being in 2014. Whereas the replacement of samples in earlier years was undertaken in phases spread over 2-3 years, the replacements in 2004 and 2014 were done in one go within a year. The following table provides the sample size in different replacement period.

Statement 1
Number of sample units at different replacement period

Residence	1969-70	1977-78	1983-85	1993-95	2004	2014
Rural	2432	3684	4176	4436	4433	4961
Urban	1290	1738	1846	2235	3164	3892
Total	3722	5422	6022	6671	7597	8853

1.5 The earlier sample was based on the reliability of birth rate at the State level, whereas the 2004 and 2014 sample is estimated using IMR reliability at natural division level. The present report ‘SRS Statistical Report, 2016’ is based on the latest sample from Census 2011 frame.

1.6 The main objective of SRS is to provide reliable estimates of birth rate, death rate and infant mortality rate at the natural division level for major States and at the State level for smaller States. Natural divisions are National Sample Survey (NSS) classified group of contiguous administrative districts with distinct geographical and other natural characteristics. It also provides data for other measures of fertility and mortality including total fertility, infant and child mortality rate at higher geographical levels.

Structure of the Sample Registration System

1.8 The main components of SRS are:

- (i) Base-line survey of the sample units to obtain demographic details of the usual resident population of the sample areas;
- (ii) Continuous (longitudinal) enumeration of vital events pertaining to usual resident population by the enumerator;
- (iii) Independent retrospective half-yearly surveys for recording births and deaths which occurred during the half-year under reference and up-dating the Houselist, Household schedule and the list of women in the reproductive age group along with their pregnancy status by the Supervisor;
- (iv) Matching of events recorded during continuous enumeration and those listed in course of half- yearly survey;
- (v) Field verification of unmatched and partially matched events; and
- (vi) Filling of Verbal Autopsy Forms for finalized deaths.

1.9 **Baseline Survey:** The base-line survey is carried out prior to the start of continuous enumeration. This involves preparation of a notional map of the area to be surveyed, house numbering and house listing and filling of a household schedule. The supervisor prepares a notional map with the help of the enumerator showing important landmarks and location of the houses to be covered in the sample unit. Subsequently, a list of houses/households to be covered by the sample in the House List (Form-1) is prepared and the Household Schedule (Form-2) is filled in. In the Household Schedule (Form-2), the residential status and other demographic particulars of each individual residing in the household viz. identification code, name, sex, date of birth, age, educational/marital status and relation to head of household, etc. are recorded. The inmates of public institutions like hotels, inns, schools and hospitals are excluded, but households living permanently within the compound of such institutions are covered. A list of all women in the reproductive span along with their pregnancy status is also prepared in Form 3 at the time of the base line survey.

1.10 Continuous enumeration: The enumerator maintains a Birth Record (Form 4) and a Death Record (Form 5) in respect of his/her area. The enumerator is expected to record all births and deaths occurring within the sample unit, as well as those of the usual residents occurring outside the sample unit. The events in respect of visitors occurring within the sample unit are also listed, but these are not taken into account while calculating rates. Thus, the events to be netted by the enumerator are those pertaining to: (i) usual residents inside the sample unit; (ii) usual residents outside the sample unit; (iii) in-migrants present; (iv) in-migrants absent; and (v) visitors inside the sample unit.

1.11 For ensuring complete netting, the enumerator uses different sources to get information of the occurrence of vital events in the sample unit. These include the help of the village priest, barber, village headman, midwife and such other functionaries. The enumerators maintain contact with these informants at frequent intervals and collect information about the occurrence of births and deaths. On being informed about the occurrence of an event, the enumerator visits the concerned household and records the prescribed particulars. The enumerator also keeps in touch with other socially important persons and visits local or nearby hospitals, nursing homes, cremation or burial grounds, at frequent intervals to keep updated about the occurrence of events. Besides, enumerator maintains and updates a list of all women in the reproductive span along with their pregnancy status, which helps in better netting of all the births. Despite all these efforts, the enumerator may miss information about some of the events and is, therefore, required to visit all the households once a month in urban area and once in a quarter in rural areas so as to ensure that all the events have been recorded.

1.12 Half-yearly survey: Half-yearly survey is carried out independently in each sample unit by a full-time supervisor. The supervisor belonging to the statistical cadre of the State Census Directorates (either a Compiler or a Sr. Compiler or a Statistical Investigator or any suitable official) visits each household in the sample unit and records the particulars of births and deaths in Forms 9 & 10 respectively in respect of all the usual residents and visitors (only those occurring within the sample unit) which had occurred during the half-yearly period (January-June or July-December) under reference. Simultaneously, the house-list, the household schedule and the pregnancy status of women are updated by making entries of changes, if any. While carrying out this survey the supervisor does not have access to the birth and death records of the enumerator for the same periods which are withdrawn from the field before the supervisor's visit for the half yearly survey. The Half Yearly Surveys are retrospective in nature and therefore the first HYS for reference period January-June of a year takes place in July- November period of that year and the Second HYS pertaining to July-December of a year takes place in January-May of the subsequent Year.

1.13 Matching: On completion of the half-yearly survey, the events captured in the Forms 9 & 10 (filled-in by the supervisors) are compared with those in the Forms 4 & 5 (filled-in by the enumerators). This is done at the office of Directorate of Census Operations for all States except for rural areas of Kerala and Maharashtra, where it is done at the Directorate of Economics and Statistics of the respective States. Selected important entries in the enumerator's and supervisor's record are matched item by item and events are classified as fully matched, partially matched and unmatched. The items generally considered for matching for birth events are: Identification code of the head of Household and mother, Relationship of the mother to head, date of live birth, month in case of still birth/abortion, sex in case of live birth /still birth and the items considered for death events are: identification code of the head of household and mother in infant death, relationship of the deceased to head, date of death and sex of the deceased.

1.14 Field verification of unmatched and partially matched events: Every unmatched or partially matched event is verified by a visit to the concerned household. This is done either by a third person or jointly by the supervisor and the enumerator, depending upon the availability of staff.

Sample design

1.15 The Sample design adopted for SRS is a uni-stage stratified simple random sample without replacement except in stratum II (larger villages) of rural areas, where two stage stratification has been applied. In rural areas of bigger States/UTs (population with ten million or more as per Census 2011), the NSS natural division is the first level of geographical stratification. The overall stratification in rural areas has been done on size of villages with villages having population less than 2,000 forming Stratum I and villages with population 2,000 or more forming Stratum II. Smaller villages with population less than 200 were excluded from the sampling frame in such a manner that the total population of villages so excluded did not exceed 2 per cent of the total population of the State. The number of sample villages in each State was allocated to the substrata proportionally to their size (population). The villages within each size stratum were ordered by the female literacy rate based on the Census 2011 data, and three equal size substrata were established. The sample villages within each substratum were selected at random with equal probability. In the case of villages of Stratum II, each sample village with a population of 2,000 or more was subdivided into two or more segments in a way that none of the segments cut across the Census Enumeration Blocks (CEBs) and the population of each segment formed by grouping the contiguous CEBs was approximately equal and did not exceed 2000. A frame of segments was then prepared and the selection of segments was done at random at the second sampling stage for the SRS enumeration.

1.16 In urban areas, the categories of towns/cities have been divided into four strata based on the size classes in contrast to the six strata in the earlier sampling frame. Towns with population less than one lakh have been placed under stratum I, towns/cities with population one lakh or more but less than 5 lakhs under stratum II, towns/cities with population 5 lakh or more under stratum III and four metro cities of Delhi, Mumbai, Chennai and Kolkata as separate strata viz. stratum IV. The sampling unit in urban area is a Census Enumeration Block. The Census Enumeration Blocks within each size stratum were ordered by the female literacy rate based on the Census 2011 data, and three equal size substrata were established. The sample Census Enumeration Block within each substratum was selected at random with equal probability. A simple random sample of these enumeration blocks has been selected within each sub-strata without replacement from each of the size classes of towns/cities in each State/Union Territory.

Sample size

1.17 The Infant Mortality is the decisive indicator for estimation of sample size. The permissible level of error has been taken as within 15prse (percentage relative standard error) at Natural Division level in respect of major States having population more than 10 million as per Census 2011. For minor States, 15 prse has been fixed at the total State level. By and large the above criteria have been followed. However, there have been a few exceptions on account of operational constraints. Half Yearly survey 2016 was conducted in 8779 units. The field work in the Ladakh Valley natural division of Jammu & Kashmir could not be carried out and hence the estimates of Jammu & Kashmir and India in this report excludes the 71 PSUs of the Ladakh Valley natural division.

Statement 2
Number of sample units and population covered
India, States and Union Territories, 2016

India/States/ Union Territories	Number of sample units			Population covered (in'000)		
	Total	Rural	Urban	Total	Rural	Urban
India	8779	4909	3870	7708	5674	2033
Bigger States/UTs						
1. Andhra Pradesh	326	198	128	321	260	61
2. Assam	300	90	210	215	106	109
3. Bihar	330	200	130	360	283	76
4. Chhattisgarh	158	73	85	114	70	44
5. Delhi	199	10	189	128	15	114
6. Gujarat	478	231	247	416	289	127
7. Haryana	256	144	112	235	182	53
8. Jammu & Kashmir*	276	174	102	225	182	44
9. Jharkhand	212	91	121	150	90	60
10. Karnataka	511	361	150	491	411	80
11. Kerala	280	175	105	359	307	51
12. Madhya Pradesh	449	285	164	399	303	96
13. Maharashtra	662	306	356	501	340	161
14. Odisha	405	290	115	347	288	59
15. Punjab	249	130	119	202	142	60
16. Rajasthan	350	236	114	314	259	55
17. Tamil Nadu	545	235	310	504	327	177
18. Telangana	224	121	103	206	153	53
19. Uttar Pradesh	500	328	172	505	406	99
20. Uttarakhand	375	195	180	285	181	104
21. West Bengal	555	304	251	534	408	126
Smaller States						
1. Arunachal Pradesh	65	50	15	40	30	10
2. Goa	95	45	50	85	63	22
3. Himachal Pradesh	210	155	55	116	91	25
4. Manipur	165	120	45	146	120	26
5. Meghalaya	130	95	35	79	60	19
6. Mizoram	45	25	20	35	24	11
7. Nagaland	50	35	15	30	23	6
8. Sikkim	65	50	15	60	49	11
9. Tripura	90	65	25	105	90	14
Union Territories						
1. Andaman & Nicobar Islands	55	37	18	45	36	9
2. Chandigarh	40	5	35	30	10	21
3. Dadra & Nagar Haveli	35	15	20	40	27	13
4. Daman & Diu	25	15	10	27	21	6
5. Lakshadweep	14	2	12	12	3	9
6. Puducherry	55	18	37	48	26	21

Note:1. 'Total' population may not add up to 'Rural' and 'Urban' population due to rounding.

* : Estimate of Jammu & Kashmir excludes the Ladakh Valley Natural Division.

Estimation procedure

1.18 For major States, estimates of population, births, deaths and infant deaths are generated for rural/urban areas separately at the natural division level. For smaller States, these estimates are generated for rural/urban areas separately at the State level. The estimates of birth, death and infant death rates are obtained as the ratios of the 'estimated births to estimated population', 'estimated deaths to estimated population' and 'estimated infant deaths to estimated births' respectively expressed in terms of per thousand.

Organization

1.19 From 1995, the SRS is being implemented mainly through the Directorates of Census Operations in both rural and urban areas. However, in the States of Kerala and Maharashtra the implementation of field work and their monitoring for rural units has been entrusted to the Directorate of Economics & Statistics of the respective State Government and the urban units to the Directorate of Census Operations.

1.20 For continuous enumeration, there is a resident part-time enumerator for each of the sample unit, who is usually an anganwadi worker/teacher and is paid honorarium for this work. The independent retrospective half-yearly surveys are carried out by the full-time supervisors who are the regular staff of the State Directorate of Census Operations. One supervisor is usually assigned a set of 10 to 12 sample units for conducting half-yearly surveys. Each State headquarters has a complement of staff necessary for planning and organizing various field operations, imparting training to the field staff, effecting proper supervision and control, ensuring regular flow of returns from the field, forwarding of various returns to the Office of the Registrar General, India and for undertaking certain minimum tabulations.

1.21 At the National level, the Vital Statistics Division of the office of the Registrar General, India coordinates the implementation work, formulates and prescribes necessary standards, provides necessary instructions and guidance, undertakes tabulation, analysis and dissemination of data.

Training and Supervision

1.22 Before the commencement of work, requisite training is imparted to the enumerators to make them understand their role and responsibility. This is followed by trainings at periodic intervals to clarify the doubts and also to keep the enumerators update with the improvements introduced in the system from time to time. Besides, they are also provided with a manual of instructions for day-to-day consultation to remove the difficulties in course of work. Supervisors are also given necessary training with a view to enabling them to carry out the half-yearly surveys properly and efficiently. They are also provided with a manual of instructions named "Instruction cum operating Manual" for this purpose. In addition to these, various State officials associated with the implementation of the SRS are also given necessary training. The detailed instructions and guidance, with regard to the various stages of work, to these officials have also been explained in the Instruction cum operating Manual.

1.23 Supervision of the field work is an important component of SRS. The supervisory level officials such as the Investigator, Assistant Director, Deputy Director, Joint Director and Director undertake this. Officers at the State headquarters undertake visits to sample units and inspect the work at the field level. Officers of Vital Statistics Division in the headquarters also undertake surprise checks and visits in SRS units for control of the quality of work.

Data collection

1.24 In the baseline survey, which is conducted jointly by both the enumerator and the supervisor, the data is being collected in Forms 1, 2 and 3 and Form 0 is also filled in at the end of survey in a unit. The baseline survey is a decennial exercise which takes place after availability of new frame through latest census. The data collection in the field is carried out by the enumerators for continuous enumeration and supervisors for retrospective survey. Half Yearly Survey is conducted by the full-time supervisor. In Half Yearly Survey, besides updating the Forms 1, 2 and 3, the details of births and deaths occurred in the sample units in the reference period are also collected in Forms 9 and 10 respectively.

Introduction of Automation in SRS

1.25 The quality of data collection is of paramount importance in any survey specially in Sample Registration System considering its focus on data of births, deaths, infant deaths, details of pregnancy etc which are to be collected with utmost care. Towards fulfilling this objective, dual record system has been in practice in SRS apart from other quality measures in the field. To take the credibility and efficiency of the field survey to greatest heights, it was the endeavor of the Office of the Registrar, India, to implement full automation in Sample Registration System. Accordingly from Baseline 2014 onwards the entire process of data collection and processing has been automated. This pioneering step of a paper-less survey, for the first time in the history of SRS, can be viewed as greatly contributed to the recent Digital India initiatives of the Government of India.

1.26 In the automated procedure, the supervisor is now carrying a hand held device to the sample units and the data is collected directly to the machine saving time and cost of survey with efficiency. A dedicated server is installed at all the Directorates of Census Operations (DCO) to enable the activities like file creation, download and upload of files, generation of various Forms etc. The Directorate of Census Operation after finalizing the data directly uploads it on the central server which makes the system almost paper less as there is no need to send finalized results in paper format. At the Head Quarters validations are undertaken before preparing the vital rates.

SRS Forms and their flow

1.27 For collecting information on population and vital events various forms/schedules have been prescribed under the SRS. Depending upon various operations under the system, the following 17 types of forms are in use:

A. Baseline Survey Forms

- Form 1: House List
- Form 2: Household Schedule
- Form 3: Pregnancy Status of women

B. Continuous Enumeration Forms

- Form 4: Outcome of Pregnancy recorded by Enumerator (January-June/July-December)
- Form 5: Deaths recorded by Enumerator (January-June/July-December)
- Form 6: Monthly report of Outcome of Pregnancy
- Form 7: Monthly report of Deaths

C. Half yearly Survey Forms

- Form 9: Outcome of Pregnancy recorded by Supervisor (January-June/July-December)
- Form 10: Deaths recorded by Supervisor (January-June/July-December)
- Form 15: Distribution of usual resident population by age, sex and marital status (as on 1st July/1st January)

Form 16: Distribution of Female population by broad age groups and levels of education (as on 1st July/1st January)

Form 17: Number of females who got married by age at effective marriage (January-June/July-December)

D. Compilation/Tabulation Forms

Form 8: Consolidated monthly report on births and deaths

Form 11: Finalised list of Outcome of Pregnancy (January-June/July-December)

Form 12: Finalised list of Deaths (January-June/July-December)

Form 13: Results of the HYS for Outcome of Pregnancy (January-June/July-December)

Form 14: Results of the HYS for Deaths (January-June/July-December)

1.28 The enumerator records the details of each birth and death event occurred during the reference period in Forms 4 and 5 respectively on a continuous basis. A monthly report on births and deaths (Forms 6 and 7) is required to be sent by the enumerators to the State headquarters in the first week of the following month. The relevant entries of birth and death records in monthly report are copied from six monthly records and sent to the State headquarter. On the basis of the monthly reports received from the sample units, the State headquarters are required to prepare a consolidated monthly report (Form 8) and forward the same to the Office of the Registrar General, India by the end of the following month. The monthly reports for the individual units remain at the State headquarters. The supervisor records the details of each birth and death event occurring during the six-month reference period in Forms 9 and 10 respectively. After matching of each birth and death event recorded in Forms 4 and 5 with those in Forms 9 and 10 and verification of partially and unmatched events in the field, finalized Forms 11 and 12 are prepared after necessary corrections and inclusion of additional events recorded during the survey. These forms are sent to the Office of the Registrar General, India along with the half-yearly survey results in Forms 13, 14, 15, 16 and 17. The processes of matching, re verification, generation of Forms 11 to 17 are now automated leading to less time consumption for data processing and more time for data collection in the field leading to improvement in quality of data. Flow chart of SRS returns is shown in Chart 1. Due to automation most of the errors in terms of wrong classification of sex or invalid coding, not legible details are taken care of. We do not get birth and death without sex classification or without essential details as the application does not allow for such omission /commission.

Chart 1: Flow Chart

