

## 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 22.1 in 2010, whereas the crude death rate has declined from 14.9 to a low of 7.2 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 47 in 2010. During the period, the total fertility rate of the country has declined from 5.2 to 2.5. 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 2004. Whereas the

replacement of samples in earlier years was undertaken in phases spread over 2-3 years, the replacement in 2004 was 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**

<b>Residence</b>	<b>1969-70</b>	<b>1977-78</b>	<b>1983-85</b>	<b>1993-95</b>	<b>2004</b>
Rural	2432	3684	4176	4436	4433
Urban	1290	1738	1846	2235	3164
Total	3722	5422	6022	6671	7597

1.5 The earlier sample was based on the reliability of birth rate at the State level, whereas the 2004 sample is estimated using IMR reliability at natural division level. The present report ‘SRS Statistical Report, 2010’ is the seventh report of the new sample based on Census 2001 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 rural areas and at the State level for urban areas. 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.

1.7 In order to give more impetus covering both rural and urban areas and wider representation of sample villages and urban blocks for Causes of Death; the Survey of Causes of Deaths (Rural) has been merged with Sample Registration System from 1<sup>st</sup> January 1999. The primary objective of the survey is to build up statistics on “Most Probable Causes of Death” for rural and urban areas using “lay diagnosis reporting (Post Death Verbal Autopsy)” method through post death enquiry based on symptoms, conditions, duration and anatomical site of the disease as observed by family members of the deceased at the time of death. As the collection of causes of death requires knowledge on medical terminologies, symptoms of disease and interview techniques, the supervisors of SRS have been trained by medical professionals in the art of collection of data on causes of deaths. A well-designed VA instrument has been developed and introduced in SRS. Supervisors of all States have been trained with the new VA instrument. To enhance the objectivity of the system, the role of SRS supervisor is restricted to faithfully collect data on sign and symptoms by interviewing the close relative of the deceased. Apart from recording the responses for closed questionnaire, the supervisor has to fill up the narrative portion of the VA instrument. The data on causes of deaths through Verbal Autopsy for the year 2004 onwards is under finalisation and will be released in separate publications. However, a special bulletin on levels of Maternal Mortality in India 2007–09 has been released.

### **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-in 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 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 is 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.

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 (population with ten million or more as per Census 2001), 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 2001 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 2001 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 have 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 at Natural Division, the ultimate level for estimation and dissemination of indicators for rural areas. The permissible level of error has been taken as 10 prse (percentage relative standard error) at Natural Division level for rural areas and 10 prse at State level for urban areas, in respect of major States having population more than 10 million as per Census 2001. For minor States, 15 prse has been fixed at the total State level. By and large the above criteria has been followed, however, there have been a few exceptions, on account of operational constraints. Based on the above criteria, the number of units has been increased from 6671 to 7597 (4433 in rural and 3164 in urban areas). Statement 2 shows the number of sample units and population covered in 2010, separately for rural and urban areas of all the States and Union Territories.

**Statement 2**  
**Number of sample units and population covered**  
**India, States and Union Territories, 2010**

India/States/ Union territories	Number of sample units			Population covered (in'000)		
	Total	Rural	Urban	Total	Rural	Urban
1	2	3	4	5	6	7
<b>India</b>	<b>7,597</b>	<b>4,433</b>	<b>3,164</b>	<b>7270</b>	<b>5320</b>	<b>1950</b>
<b>Bigger States</b>						
Andhra Pradesh	375	235	140	410	320	90
Assam	300	90	210	216	94	122
Bihar	330	200	130	365	296	68
Chhattisgarh	130	40	90	108	45	63
Delhi	200	10	190	165	20	145
Gujarat	365	215	150	367	286	81
Haryana	210	100	110	215	138	78
Jammu & Kashmir	260	150	110	224	174	50
Jharkhand	170	60	110	119	64	56
Karnataka	480	330	150	439	356	83
Kerala	250	150	100	352	286	66
Madhya Pradesh	340	220	120	323	249	74
Maharashtra	485	250	235	412	279	134
Odisha	405	290	115	341	273	68
Punjab	250	150	100	244	177	67
Rajasthan	350	250	100	340	288	52
Tamil Nadu	465	250	215	470	332	138
Uttar Pradesh	500	350	150	575	474	101
West Bengal	555	310	245	600	436	164
<b>Smaller States</b>						
Arunachal Pradesh	60	45	15	34	22	12
Goa	85	43	42	81	57	24
Himachal Pradesh	190	140	50	97	70	27
Manipur	150	110	40	137	112	25
Meghalaya	120	90	30	69	51	17
Mizoram	40	20	20	32	18	14
Nagaland	45	33	12	37	29	8
Sikkim	60	45	15	65	54	11
Tripura	80	60	20	113	100	12
Uttarakhand	150	100	50	115	84	31
<b>Union Territories</b>						
Andaman & Nicobar Islands	50	34	16	40	30	11
Chandigarh	35	5	30	34	11	23
Dadra & Nagar Haveli	30	22	8	41	35	5
Daman & Diu	20	13	7	28	23	4
Lakshadweep	12	6	6	15	10	4
Puducherry	50	17	33	47	26	21

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

## **Estimation procedure**

1.18 Estimates of population, births, deaths and infant deaths for natural division in rural areas for bigger States and at State level for smaller States separately for rural/urban areas for all States/UTs are obtained using unbiased method of estimation. 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 have 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 for this purpose. In addition, various State officials associated with the implementation of the SRS are also given necessary training. There is a manual for the staff of the State headquarters which provides detailed instructions and guidance with regard to the various stages of work involved at the State level. The manual is very comprehensive and covers all aspects of the system.

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.

## **SRS Forms and their flow**

1.24 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 1<sup>st</sup> July/1<sup>st</sup> January)
- Form 16: Distribution of Female population by broad age groups and levels of education (as on 1<sup>st</sup> July/1<sup>st</sup> 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)

1.25 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. Flow chart of SRS returns is shown in Chart 1.