

## An Overview of the Sample Registration System in India.

**Prasanta Mahapatra**

*Institute of Health Systems, Hyderabad, AP500004, INDIA; Email:pmahapat@ihs.org.in*

**Abstract:** There are four major sources of vital statistics in India, namely; (a) the Sample Registration System (SRS), (b) the Civil Registration System (CRS), (c) Indirect estimates from the decennial census and (d) Indirect estimates from the National Family Health Surveys (NFHS). The SRS is the most regular source of demographic statistics in India. It is based on a system of dual recording of births and deaths in fairly representative sample units spread all over the country. The SRS provides annual estimates of (a) population composition, (b) fertility, (c) mortality, and (d) medical attention at the time of birth or death which give some idea about access to medical care. The population composition from SRS coupled with the decennial census counts, enables fairly reliable estimate of population in the intercensal periods. Average time to publication of SRS annual reports is about two years. SRS estimates are generally valid and reliable for the country as a whole and for bigger states with more than 10 million population. Recently the sample size of SRS has been increased to allow for estimates by natural divisions within the bigger states. Evaluations during 1970s and 1980s showed that completeness of recording of births and deaths by the SRS, was generally good, and errors in recording of events minimal. However, systematic evaluation of the SRS has not been taken up for quite some time. Indirect estimates for 1990s and after suggests that registration completeness has worsened and interstate variations widened. A pluralistic evaluation framework is recommended.

**Key words:** Sample Registration Systems; India; SRS; Vital Statistics; Civil Registration Systems

## Introduction:

There are four major sources of vital statistics in India, namely; (a) the Sample Registration System (SRS), (b) the Civil Registration System (CRS), (c) Indirect estimates from the decennial census and (d) Indirect estimates from the National Family Health Surveys (NFHS). The first three are operated by the Registrar General India (RGI) working under the Ministry of Home Affairs. The NFHS is organised by the International Institute of Population Sciences (IIPS), working under the Ministry of Health and Family Welfare. Table-1 gives a bird's eye view of these four sources of vital statistics in India.

Table-1: An overview of sources of vital statistics in India and their usability.

Source	Periodicity	Estimated Parameters	Small-Area Estimates	Usability
SRS	Annual, Since 1970	Fertility and Mortality Indicators.	State Level Estimates for Bigger States.	Representative sample. Regular availability of reports. Relied source of fertility & mortality statistics.
Census	10 Years	Population count by age sex, and area. IMR, Child Mortality	Population counts: Down to village level. Mortality: District Level	Population data, reliable & valid, available within about 2 years. Fertility and indirect mortality estimates: About 8 year time lag.
CRS	Annual, Since 1958	Fertility and Mortality Indicators.	District Level and Large Cities with more than 100000 population.	Less than 50% of deaths are registered. Wide interstate variation. Average time to publication: 45 months until 1994. No report since then.
NFHS	6 Years I- 1992-93 II-1998-99 III- 2005-06	IMR (Indirect Estimates)	State Level Estimates. Sample not enough for district level est.	Indirect estimates. Quick estimates are available within a year of the survey. IMR and fertility indicators, cross tabulated by socioeconomic variables.

a SRS: Sample Registration System, Operated by the Registrar General, India

b CRS: Civil Registration System, Operated by Local Bodies, Managed by State Governments, Tabulation, Publication and National Coordination by the Registrar General, India

c NFHS: National Family Health Survey, By the International Institute of Population Sciences, Mumbai.

The SRS was conceived during the 1960s, as an interim measure to generate vital statistics until full fledged development of the CRS. The primary objective of the system is to provide reliable annual estimates of vital rates for the states and the country on the basis of a probability sample (RGI, 1971). Pilot studies were taken up in various states from 1964, onwards. By the middle of 1971, the system had established throughout India. The SRS is based on a system of dual recording of births and deaths in fairly representative sample units spread all over the country. Sampling design, registration and validation methodology of the SRS has been published (RGI, 1972; RGI 1993). The sampling frame is revised every ten years and old sample clusters are replaced by new ones. Replacement of existing sample clusters with newly identified clusters usually takes place gradually over a period of 2-3 years. Recently, after the 2001

census, the RGI has replaced old clusters with new ones in one go. The sample size of SRS has also increased over time (Table-2).

Table-2 SRS Population and Sample Units

Sample Population			Year	Sample Units		
Rural	Urban	Total		Rural	Urban	Total
2,633,349	1,029,687	3,663,036	1970	2,367	1,256	3,623
	Not Available		1971	2,432	1,290	3,722
			1976	2,450	1,344	3,794
			1979	2,460	1,344	3,804
			1982	4,147	1,875	6,022
			1983	4,149	1,873	6,022
4,624,293	1,319,323	5,943,616	1989	4,149	1,873	6,022
4,706,000	1,088,000	5,794,000	1993	4,149	2,151	6,300
4,668,000	1,265,000	5,933,000	1994	4,420	2,193	6,613
4,516,000	1,286,000	5,802,000	1995	4,420	2,198	6,618
4,598,000	1,319,000	5,917,000	1996	4,436	2,235	6,671
5,064,000	1,387,000	6,452,000	2003	4,410	2,235	6,645
4,936,000	1,798,000	6,734,000	2004	4,433	3,164	7,597
5,085,000	1,848,000	6,932,000	2006	4,433	3,164	7,597

a Source: SRS Annual Reports. After the first report for 1969-70, population figures for the sample area were not provided in the annual reports until, 1989.

b Years for which there was no change in number of sample units with respect to previous year, are skipped in this table. For example, total sample units remained at 3722 from 1971 until 1975.

Registration work in new sample clusters is preceded by a base-line survey to obtain usual resident population of the sample area. Then, a resident part time enumerator continuously enumerates births and deaths in each of the sample village or urban block. An independent six monthly retrospective survey is done by a full time supervisor. Unmatched and partially matched events are re-verified in the field. Monthly reports are held at the state level for six months for incorporation of results from the retrospective surveys. These reports are then sent to the RGI office in Delhi, for tabulation, analysis and publication at the national level.

Main publication of the SRS is the Annual Report, which provides annual estimates of (a) population composition, (b) fertility, (c) mortality, and (d) medical attention at the time of birth or death (Table-3). In the 1970s, early years of the SRS, annual reports for more than one year were combined, for example, 1970-75, 1976-78, and 1979-80. From 1981 onwards, annual reports for each years have been published separately. The annual reports broadly consists of, (a) the summary chapters, and (b) the detailed tables. The first chapter of each annual report introduces the basic structure, sample design, organisation, flow of returns, and estimation procedure. Until 1988, statement-A in this chapter gives the number of sample units, by rural - urban area in each state and union territories. From 1989, statement-A included the

absolute sample population in addition to the sample units. In 1993, the identification of this "Statement-A" was changed to "Statement-1". The states and union territories were grouped together. Presentation of states was revised in 1993, grouping them as major states and smaller states. The All India figures were brought up to the top row, instead of the bottom row as in the past. From 1993, the population figures were rounded to nearest 000. This statement allows for computation of SRS population by age sex groups with help of the % age distribution statistics, and then number of deaths by age sex groups with help of the age sex death rates. Chapter 2 summarises the population composition, with statements of population distribution by broad age groups. From 1991, this chapter includes cross tabulation of population by marital status and estimates of female age at marriage. Chapter-3 presents the various measures of fertility, and chapter-4 provides the measures of mortality. During the 1970s, all of the principals results, namely, population composition, fertility and mortality indicators were presented in chapter-2. Chapter-3 in some reports in this period contained abridged life tables, which have since been moved to a separate SRS analytical series. Chapter-4 of the 1970-75 report summarised an evaluation regarding completeness of death registration by the SRS. Subsequently, evaluation reports have been published separately (RGI, 1982, 1984a-b, 1988). Cross tabulation variables in the summary statements may vary according to contemporary perceptions and policy makers' interest. For example, the broad age groups used until 1990 were 0-14, 15-49, and 50+ years. From 1991, the broad age groups were expanded to 0-4, 5-9, 10-14, 15-59, and 60+. In 1994, another two broad age groups were added, namely, 15-64, and 65+ years. Statements on effective age at marriage, and distribution of population by marital status, reflects Government of India's concern for fertility control.

Table-3: Overview of demographic statistics from the SRS

Information	Available Statistics	Location in Annual Reports
Population distribution	Population by 5 year age sex groups 0-4, to 70+ until 1994, and to 85+ since 1995	Table-1 in all Annual Reports
Fertility	Population by Marital Status	Available from 1992 as Table-2.
	Age Sp. & Marital Fertility Rates	Table-3 since 1993. Earlier Tables 2-4.
	Age Sp. Fertility Rates by Education	Available from 1996, as Table-4.
	Birth order and interval wise distribution of births	Available from 1990. Tables 4,5&6 from 90-95, and Tables 5,6&7 since 1996.
Mortality	Age Specific Death Rates by 0, 1-4, and 5 year age groups from 5-9 until 70+ or 85+	Table-8 since 1996. Earlier table 4, 5 or 7.
	Mort. Indicators: Crude Death Rate, Child mortality, IMR etc.	Table-9 since 1996. Earlier, 3, 4, 5, 8 or 9.
	% Distribution of deaths by age	Since 1997, Table-10.
Access to	Medical Attention at Birth	Statements 25, 30, 31, 34, 35, 38, 39 or 40
Med. Care	Medical Attention at Death	Statements 42,44,47,48,51,53,55,56 or 57

The "Detailed Tables" section of the annual reports contains population distribution, fertility and mortality estimates by five year age groups. The cross tabulation variables in the detailed tables are modular and consistent over time. For example, the population and mortality tables use five year age groups, from 0-4 to 65-69, and 70+ for all years. From 1996, 70+ group was expanded into five year age groups up to 85+ years. From 1992, this section of the annual report has been erroneously labelled as "Appendix: Detailed Tables". Actually, the detailed tables in SRS annual reports are the most valuable, as they are amenable for many kinds of analytical work, including time trend analysis, computation of life tables etc. Detailed tables in the annual reports give estimates of age specific fertility rates, and age sex specific death rates for bigger states having more than 10 million people. Estimates for smaller states and union territories are made on the basis of data for three consecutive years. For each state, SRS provides estimates for rural and urban areas. Recently, starting with the 2004 annual report, the SRS is giving estimates of mortality indicators by the NSSO natural divisions within the major states. The National Sample Survey Organisation (NSSO) natural divisions are contiguous group of administrative districts having similar geographic features, rural population densities, and crop-pattern (NSSO, 2001). But estimates for districts and smaller areas are not available from SRS. Some statistical tables like the population composition, fertility and mortality indicators have been published by the SRS continuously from its beginning. Subsequently, additional tabulations and new statistics were added in response to emerging requirements. For example; tables showing distribution of births by birth order and birth interval were, added from 1990. Population distribution by marital status, were added from 1994. Tables showing fertility by educational status of women was added from 1996. The new tables have usually been inserted to retain functional contiguity of tables. As a result table numbers in the annual reports, for the same statistic have changed over time, except for table-1 which has consistently presented the population composition in all annual reports of SRS, so far. Table-3 shows the time series of table numbers for the respective demographic indicators.

SRS bulletins, expected half yearly, were meant for quick release of key fertility and mortality indicators, such as crude birth rate, crude death rate, and IMR. However, publication of the bulletin has not been regular. SRS Analytical Studies series usually provides abridged life tables by sex and residence for India and major states estimated from the SRS mortality statistics. In addition, the analytical series report 1 of 1971, which, brought together IMR estimates for India from 1900 to 1950 is an useful reference for study of long term time trend of infant mortality in India. Occasionally, special surveys are conducted in SRS areas to inform contemporary policy concerns. For example, a comprehensive fertility survey schedule was canvassed along with the half-yearly survey for 1972 (RGI, 1976). Comprehensive surveys on Infant and Child Mortality was conducted in 1979 (RGI, 1980) and 1984 (RGI, 1989).

## **Completeness of Registration of Vital Events by the SRS:**

Several evaluations of the SRS have been made, both in-house by the RGI, and other authors. While many of these studies used analytical methods, some of the evaluations by the RGI were based on intensive inquiry of a sub-sample (Table-4). Both direct and indirect estimates showed that the incidence of under registration of births and deaths were within the tolerable range of up to 10%. However, all these evaluations of the Indian SRS were done for the period in 1970s and 1980s. The Registrar General has not taken up any direct or indirect evaluation study of the SRS during the 1990s and after. As a result, these old evaluations continue to be cited as evidence of completeness of registration of vital events by the

SRS. For example, the WHO-HMN chapter<sup>1</sup> on issues in health information cites the indirect estimate by Bhat et al. (1984) to say that "the SRS has been shown to have attained a high level of completeness within sampled areas".

Table-4: An Overview of Evaluation Studies on Sample Registration System in India

Dates	Sponsors	Study Design	Findings	Reference
1970 - 1975	RGI	Indirect estimate (Brass 1975).	6% under reporting of adult deaths.	RGI, 1982
1971 - 1976	NRC - CPD (USA)	Indirect estimate (Brass 1975, Preston & Coale 1980)	10% under reporting of deaths. No evidence of significant interstate variations. Excludes Bihar & West Bengal for poor data quality.	Bhat et al. 1984
1978	RGI	Indirect estimate (P/F Ratios, UN, 1983 Ch-II)	6% under reporting of births. State underestimates in 1978 ranged from <1% (Gujarat) to > 17% (Karnataka).	RGI 1984a-b; Swamy et al. 1992
1980 - 1981	RGI	Direct estimate based on intensive inquiry of 10% sub-sample.	3% under estimation of birth rate, and death rate. State underestimates around 1% (Gujarat, Haryana & Madhya Pradesh) to 11% (Karnataka).	Grover 1988; Swamy et al. 1992
1985 - 1986	RGI	Direct estimate based on intensive inquiry of 10% sub-sample.	State underestimates, <1% (Andhra Pradesh, Bihar, Gujarat, Kerala, Madhya Pradesh, Maharashtra, Orissa, and Tamil Nadu) to > 3% (Assam & West Bengal).	Swamy et al. 1992
1972, 1978, 1982 & 1988	RGI & EW Ctr	Indirect estimates of total fertility using; Palmore (1978), Gunasekharan and Palmore (1984) and the Rele (1967, 1987) methods.	SRS adjusted estimates very good, but interstate differences exist, particularly for the years prior to 1975. The estimates are good for 10 <sup>b</sup> out of the 17 study states. In case of Himachal Pradesh, Orissa, and Tamil Nadu, estimates prior to 1975 were too low. In Bihar and Rajasthan, SRS estimates of fertility were higher. State level adjusted estimates are more accurate for 1985-86.	Swamy et al. 1992
		Indirect estimates of life expectancy using four methods including Gunasekaran, Palmore and Gardner (1981); and Rele-Palmore (1992).	Indirect estimates of mortality usually higher than the SRS estimates. SRS may be overestimating mortality. In recent years (1988) SRS and indirect estimates converge for most states. The only exception was Punjab in 1988, where SRS may be underestimating mortality.	Swamy et al. 1992
1978 - 1992	IIPS, & EW Ctr,	Comparison of SRS with NFHS fertility estimates.	At least 10% under registration of births.	Narasimhan et al. 1997

<sup>a</sup>RGI=Registrar General of India; NRC-CPD = National Research Council Committee on Population and Demography; IIPS=International Institute of Population Sciences, Mumbai; EW Ctr = East West Center, Hawaii, Honolulu, USA

<sup>b</sup>These are AP, Assam, Gujarat, Haryana, J&K, MP, Maharashtra, Punjab and West Bengal.

So an important question is, whether the high level of completeness achieved by the SRS during the 1980s has sustained since then. Hence, completeness of adult death registration by SRS for each year

<sup>1</sup>([http://www.who.int/healthmetrics/documents/hmnissue\\_measuringandmonitoring.pdf](http://www.who.int/healthmetrics/documents/hmnissue_measuringandmonitoring.pdf))

from 1990 to 2007 was indirectly estimated by the Preston and Coale method (Preston, Coale and others, 1980) for all India and four selected states, namely, Andhra Pradesh (AP), Maharashtra (MH), Orissa (OR), and Uttar Pradesh (UP). Selection of only four states was arbitrary, in view of time constraints. Details of methodology, for estimation of completeness of death registration with respect to the underlying population, is also described in the United Nations Manual X (UN 1983 pp130-139)<sup>2</sup>.

Two ratios are used by the Preston and Coale method to facilitate interpretation of the nature of data and identification of the completeness estimate. These are:

$$\frac{5\hat{N}_x}{5N_x} = \frac{\text{Estimated population in age group } x \text{ to } x+5}{\text{Enumerated population in age group } x \text{ to } x+5} \dots 5\hat{N}_x/5N_x : \text{ratio of population in 5 year age groups}$$

$$\frac{\hat{N}_{x-70}}{N_{x-70}} = \frac{\text{Estimated population from age } x \text{ to } 70}{\text{Enumerated population from age } x \text{ to } 70} \dots \hat{N}_{x-70}/N_{x-70} : \text{ratio of cumulative populations}$$

The first ratio of populations in five year age groups ( $5\hat{N}_x/5N_x$ ) is sensitive to age misreporting. The second ratio of cumulative population upto age 70 ( $\hat{N}_{x-70}/N_{x-70}$ ) is not very much affected by age misreporting. So the ratio of cumulative populations gives us a more consistent estimate of completeness of death registration with respect to the enumerated population.

Note that this estimation would require knowledge of the population growth rate ( $r$ ). However, the method allows us to start with a provisionally chosen growth rate and then iteratively arrive at the growth rate consistent with other assumptions about the population. The intercensal growth rate is a natural candidate for the provisional estimate of the growth rate. Best value of the growth rate  $r$  is the one that produces the most consistent set of completeness ratios across all age groups. In this analysis I have arrived at the iterated growth rate by minimising the slope of a line fitted to the estimated completeness for age groups 10-14 to 65-69 years . In case, the estimated completeness values for extreme age groups

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<sup>2</sup> Completeness of death registration ( $C$ ) is the proportion registered of actual deaths; which is same as the ratio of registered deaths to actual deaths. This proportion is estimated by the ratio of population derived from the distribution of registered deaths by age group and the enumerated population in corresponding age group. Thus  $\hat{C} = \frac{\text{Population derived from distribution of deaths by age}}{\text{Corresponding count, i.e. actual population}}$ . Preston, Coale and others (1980) use the relationship between the number of deaths that a population at an age say  $a$  will experience at each age above it and the number of current deaths recorded at each age above age  $a$ . A cohort now at age  $a$  will experience deaths in future at different ages above  $a$  till the last person in the cohort dies. If we could look into the future, count the deaths experienced by the cohort at different ages, and sum them up, the result would add up to the same number of people as we have in the cohort now at age  $a$ . In case of a stable population, we can estimate the number of deaths likely to be experienced by this cohort in future, from our knowledge of the current incidence of deaths at ages above  $a$  and the population growth rate. Preston and Coale use this relationship to derive the size of population in each group from the current deaths at that age group and higher and the population growth rate. Specifically, where  $N(a)$  is the number of persons at age  $a$  in a stable population and  $D(x)$  is the number of current deaths at age  $x$ ;

$$N(a) = \sum_{x=a}^{\omega} D(x)e^{r(x-a)}$$

The above relationship holds within a small margin of error for populations that are approximately stable i.e. gradual decline in mortality and recent changes in fertility. The Indian population would, by and large, satisfy the approximately stable population criteria. To estimate the deaths in the open age interval, the Preston, Coale and other's method requires choice of a model from the four (West, South, North and East) families of model life tables. For this study, India's population was assumed to closely resemble the West family. This computational decision is based on a comparison, using an index of dissimilarity, of the age composition of Indian population with that of the respective model life table families.

showed substantial difference from the estimates for middle age groups, I have relied on lines fitted to the estimates for the middle age groups (20-24 to 50-54 years). The iterated population growth rate is then a by product of this estimation. Consistency of the iterated growth rate over a short period of time will be added evidence about validity of the assumptions about the population and reliability of the completeness estimate (Table-5).

Table-5: Completeness<sup>a</sup> of death registration by the Indian SRS from 1990-2007.

Iterated exponential growth rates ( <i>r</i> )					Year	Estimated completeness				
AP	MH	OR	UP	India		AP	MH	OR	UP	India
0.0160	0.0236	0.0223	0.0193	0.0219	1990	0.67	0.68	0.83	0.79	0.77
0.0186	0.0241	0.0217	0.0206	0.0223	1991	0.82	0.83	0.89	0.73	0.79
0.0166	0.0244	0.0224	0.0219	0.0253	1992	0.71	0.82	0.88	0.90	0.99
0.0191	0.0251	0.0226	0.0241	0.0243	1993	0.75	0.82	0.99	0.93	0.87
0.0237	0.0252	0.0223	0.0245	0.0245	1994	0.90	0.87	0.93	0.96	0.91
0.0243	0.0230	0.0228	0.0231	0.0251	1995	0.88	0.77	0.98	0.87	0.91
0.0217	0.0236	0.0206	0.0208	0.0247	1996	0.80	0.85	0.88	0.85	0.89
0.0159	0.0130	0.0194	0.0209	0.0243	1997	0.52	0.45	0.66	0.60	0.86
0.0210	0.0222	0.0212	0.0250	0.0255	1998	0.82	0.83	0.97	0.99	0.93
0.0211	0.0208	0.0200	0.0255	0.0227	1999	0.76	0.77	0.84	0.97	0.78
0.0206	0.0204	0.0212	0.0253	0.0223	2000	0.80	0.77	0.91	0.94	0.78
0.0186	0.0235	0.0223	0.0267	0.0236	2001	0.70	0.99	0.99	0.95	0.80
0.0208	0.0224	0.0215	0.0259	0.0236	2002	0.76	0.80	0.84	0.93	0.81
0.0212	0.0212	0.0245	0.0276	0.0256	2003	0.76	0.78	0.98	1.04	0.90
0.0208	0.0204	0.0198	0.0244	0.0242	2004	0.67	0.67	0.89	0.90	0.83
0.0226	0.0197	0.0182	0.0255	0.0245	2005	0.69	0.69	0.81	0.89	0.78
0.0226	0.0210	0.0208	0.0265	0.0245	2006	0.70	0.75	0.84	0.92	0.78
0.0179	0.0201	0.0214	0.0283	0.0244	2007	0.58	0.72	0.89	1.05	0.82

<sup>a</sup>Based on Preston and Coale and Brass Growth Balance methods for all persons (i.e. both females and males). Total population, age distribution of population, age specific death rates data taken from respective SRS Annual Reports.

<sup>b</sup>AP=Andhra Pradesh; MH=Maharashtra; OR=Orissa; UP=Uttar Pradesh; IN=All India

The completeness estimates presented in table-5 suggest that registration of deaths within sample areas, by the SRS has worsened during 1990s up until 2007. The all India estimate of SRS completeness range from 77% to 99%. Only in five out of 18 years, the SRS could achieve 90% or better completeness of registration. For six out 18 years, all India completeness of death registration by SRS was less than 80%. Significant interstate variations appear to exist. Estimates of four selected states show that completeness of death registration by SRS appear to have been better in case of Orissa and UP compared to Andhra Pradesh and Maharashtra. Completeness was less than 80% for 13 years in case of AP and 11 years in Maharashtra over the 18 year study period. Uttar Pradesh achieved 90% or more completeness for 10 years and Orissa did so for seven years.

## **Overall quality and usefulness of the Indian SRS:**

The Assessment framework for vital statistics developed by the Monitoring of Vital Events (MoVE) writing group of the Health Metrics Network (HMN) in the World Health Organization (WHO) includes many aspects affecting usefulness of vital statistics, in addition to completeness of registration (Mahapatra et al, 2007). I examine characteristics of the Indian SRS along these dimensions, based on available data and my personal experience in accessing and using the SRS.

### **Accuracy**

Coverage, completeness and incidence of missing data are three key contributors to accuracy of estimates produced by any statistical system. Although, the SRS covers about 0.6% of India's population, its representative character allows for estimation of vital statistics for the country and major states. Completeness of registration of events has been, by and large, around 90% or more upto 1980s. Interstate differences also narrowed down by mid 1980s. However, completeness appears to have worsened during the 1990s and after. Interstate differences in completeness appear to have widened also. The annual reports describe system of gathering and reporting of data. But no specific information is reported about missing data. It is generally believed that missing data in SRS is rare. However, it will be useful to start documentation of missing data elements, such as age, sex of vital events. The annual reports should include a table showing the number of births and deaths for which age or sex information was not available, and how the events were treated through the tabulation process. In case there is no missing data, the report should make a positive mention of the fact.

### **Relevance**

Routine tabulations by the SRS are adequate (See table-3). Population composition and age specific death rates are available in five year age groups. Distribution of live births, by mothers' age, birth –order and - interval, are provided in a consistent format over the years. However, the SRS cannot provide small area statistics at the district and sub-district level. State level estimates are available only for major states. Recently, SRS sample size has been increased to allow for IMR estimates by NSSO natural divisions, which are usually a group of districts within a state. But the sample size will have to increase enormously, if district level estimates are to be produced.

## **Comparability**

Definition of terms, administrative guidelines and data collection methods of the SRS are consistent over time, allowing for comparability of over time. Similarly, uniform definition of terms, administrative guidelines and data collection methods across the country, makes the SRS statistics comparable across space.

## **Timeliness**

Timeliness has two important sub-dimensions, namely, (a) promptness (production time), and (b) regularity. The SRS Annual Reports do not show their publication date, to allow for direct computation of production time. However, publication date can be inferred from the date shown in the preface written by the Registrar General, India for each report. The actual publication date would be later than this date. For example; preface of 1999 report is dated Jan 2002. The report was published in 2003 as can be inferred from the printing date shown on the back cover. Thus the actual production time would be more than what is estimated here, at least by about six months. The median production time from inception of SRS till production of latest annual report (2007) is about 2½ years. The production time was 6½ years in the 1970s, 2½ years during 1980s, 2 years during 1990s and about 22 months for the years 2000 - 07.

The SRS brings out a half yearly bulletin which is published in April and October, usually within about six to nine months. For example, as of Jan 2010, the latest SRS Bulletin available at the RGI website, is for October, 2009. The bulletins contain selected aggregate vital statistics such as infant mortality, birth and death rates by rural, urban area but no disaggregation by age or sex. However, sometimes, scheduled issues of the bulletin may not be released at all. For example; no bulletin is listed at the RGI website for October 2005, and April, 2007-09.

Regularity in publication can be measured by the standard deviation of production time. If the production is very regular the standard deviation of production time would tend to be zero. On the other hand, if publication is irregular, the variance of the production time will increase. The standard deviation of production time from inception till the 2007 report is about 32 months. If we ignore the 1970s, when SRS started, the standard deviation of production time improves substantially. The standard deviation was about 5 months in 1980s, two months in 1990s, and seven months for the period 2000-07. Although, production of SRS Annual reports has been mostly regular, there is some scope for further improvements. For example; in the recent past, two annual reports were lumped in a single year, 1997 & 98 published in 2000, 2001 & 02 reports published in 2004, 2004 & 05 reports released in 2006. No report was released in 2001 to 2003. The SRS tabulation and production calendar should be streamlined for release of an annual report every year.

## **Accessibility**

Accessibility of SRS reports can be characterised by its performance in terms of (a) the media of publication, (b) availability of metadata, and (c) the quality of user service. Annual reports are available in print form only. The half yearly bulletins are available in print as well as portable document format (pdf) files through the Internet since April 1999. But SRS data sets are not released, although the RGI has made significant progress in other areas of its operation, for example, release of census data sets through CD Rom. The annual reports could also be released in pdf file format over the internet.

From 1987, the SRS annual reports included a "Glossary" at the end of the report, containing definition of the various statistics provided in the reports. From 1996, the "Glossary" was moved to the front pages of the report and relabelled as "Definitions". The first chapter of each annual report give details of basic structure, sample design, system of data collection and definition of terms. However, specific metadata are difficult to find. The population figures in statement- A or 1 are not available by sex. From 1993 the RGI is rounding the population figures to nearest 000. This reduces scope for consistency checks and indirect estimation of the accuracy of SRS statistics. Hence, population count should be reported by age sex groups, as it is, without any rounding. The second annual report (RGI, 1971) carried information about the number of reporting units from out of the total sample units. However, this information has been dropped from subsequent reports. It will be desirable to reintroduce this information, as it will be relevant, even if reports from all sample units are received. A positive statement of such a fact will provide data users the required input for assessment of data quality. Hence the SRS Annual Report should include a table similar to the "% of monthly returns received" in the "Vital Statistics of India Based on Civil Registration System", published by the RGI.

User service, needs further improvement. The sale counter at RGI's head office in Delhi delivers reports across the counter and also responds to requests over post. Regional sale counters in state capitals do not usually stock all publications. There is scope to improve responsiveness by outsourcing distribution and sale functions to private agencies. The RGI Library at RK Puram Delhi does not have a reference set of all SRS publications. The indexing, cataloguing and retrieval services of the RGI library needs to improve. A comprehensive list of publications such as (a) SRS annual reports, (b) SRS bulletins, (c) SRS analytical studies, (d) occasional papers, and (e) SRS mimeographs and working papers, released by the RGI from inception of the SRS, and updated from time to time will be helpful.

## **Summary and recommendations:**

Overall the Indian SRS has been a reliable and trusted source of fertility and mortality statistics for the whole country and major states. Half yearly bulletins containing aggregate vital statistics are usually available quickly. SRS Annual reports containing detailed statistical tables and some analysis are released after a production time lag of about two years. Definition of statistical concepts and data gathering process are consistent over time and uniformly implemented all over the country. After initial difficulties during the 1970s, the SRS achieved 90% and better completeness of registration during the 1980s. Both direct and indirect evaluations during this period contributed to consolidation of the system. These old evaluations continue to be cited as evidence of completeness of registration of vital events by the SRS. There is evidence to suggest that completeness of registration might have deteriorated during the 1990s and after. Significant interstate differences appear to have emerged. Hence, evaluation studies at regular intervals should be built into the system. Both direct and indirect estimation of completeness should be taken up. A pluralistic evaluation framework consisting of in-house evaluations by the RGI and studies by independent researchers is very much required. There is also scope to improve the metadata content of SRS annual reports by expanding the statement of populations to include details by sex, reporting of the population figures to the last digit, and incorporating standard tables on incidence of missing data. There is further scope to improve accessibility of SRS by publication of the annual reports in portable document format, and eventual publication of the SRS data sets in appropriate electronic database formats. User service may be improved by outsourcing the publication and distribution functions and identifying a network of libraries to act as vital statistics document repositories.

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