Assessing the Quality of District Data for Improved Planning and Monitoring of Development Programmes

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FOREWORD

In a decentralized environment, planning, implementation and monitoring of development programmes are important functions. To help need-based planning and monitoring on specific indicators that influence the outcome and goals, quality data is an essential ingredient. The administrative system routinely generates data on programme implementation, which form the basis of reporting, monitoring and feedback. Although the data are generated at periodic intervals, the quality of data remains a matter of concern; furthermore, the statistical officers at the district level and below are not fully equipped to gauge the quality of data, in terms of coverage and consistency in reporting.

An attempt to simplify the processes of assessing the quality of data from the perspective of improved planning and tracking of feasible Millennium Development Goal (MDG) indicators at the district level have been worked out after a review of development data generated by various national flagship programmes in two districts each in Karnataka and Rajasthan with good and not-so-good data systems in the country. The present guide is an outcome of this study and the approaches proposed in the guide are pragmatic and can be easily comprehended by statistical officers through self-reading and a quick orientation.

The development of this guide was the vision of my predecessor, Mr. Nesim Tumkaya. This was later pursued by the former Deputy Representative, Dr. Marc Derveeuw. My colleagues, Mr. K.M. Sathyanarayana and Mr. Sanjay Kumar worked with zeal and passion, and made technical contributions as well. After technical vetting by an expert group comprising of demographers and statisticians, Prof. James and his team at the Population Research Center, Institute for Social and Economic Change, Bangalore, carried out this exercise and finalized the guide. I thank all of them for their valuable contributions in the development of this guide.

I am sure this guide will serve as a basic analytical tool for testing quality of data and enable planning and monitoring development programmes at the sub-national levels besides promoting evidence-based planning, monitoring and improvements in administrative data systems.

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This manual is the result of several consultations, discussions and workshops on deriving reliable statistics on a regular basis to monitor important development programmes at the sub-national levels.

UNFPA provided generous funding for this work and has contributed to the development of this guide. It is our duty to thank UNFPA Country Office and also the UN Convergence group for all its assistance and help.

This guide has undergone several rounds of revision and various discussions at different stages. Mr. Suraj Kumar, then representing the UN Resident Coordinator's Office, and Professors Arvind Pandey, Ladu Singh, S.C. Gulati, K.S. Natarajan and Dr. Biplab Dhak have provided critical and useful comments at various stages of its development. We thank them all for their timely and valuable contributions.

The guide has also been benefited, to a large extent, by the multidisciplinary environment at the Institute for Social and Economic Change (ISEC). Our Director, Prof. R.S. Deshpande and many members of faculty both within the Population Research Centre and in other centres have helped at various stages and have engaged with us in stimulating discussions. We are highly indebted to all of them for their contributions. We also thank Mr. Vasuki, Divya Raj and Sharmila for their administrative assistance.

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ABBREVIATIONS

ANC	:	Antenatal Care
AQ	:	Acceptable Quality
BPL	:	Below Poverty Line
CBR	:	Crude Birth Rate
CDR	:	Crude Death Rate
CMR	:	Child Mortality Rate
CRS	:	Civil Registration System
DISE	:	District Information System For Education
DLHS	:	District Level Household Survey
DPT	:	Diphtheria, Pertussis (Whooping Cough), Tetanus
GDP	:	Gross Domestic Product
GER	:	Gross Enrolment Ratio
Hb	:	Haemoglobin
HH	:	Households
HIV	:	Human Immunodeficiency Virus
HMIS	:	Health Management Information System
ICDS	:	Integrated Child Development Services
IMR	:	Infant Mortality Rate
MDG	:	Millennium Development Goals
NER	:	Net Enrolment Ratio
NUEPA	:	National University of Educational Planning and Administration
NREGA	:	National Rural Employment Guarantee Act
NSSO	:	National Sample Survey Organization
NV	:	Needs Validation
PD	:	Proportion of Deaths
PPP	:	Proportion of Population
SRS	:	Sample Registration System
TFR	:	Total Fertility Rate
UNFPA	:	United Nations Population Fund
UN	:	United Nations

INTRODUCTION

Effective monitoring of the performance of different development indicators and programmes necessitates the continuous inflow of reliable data and information. The monitoring of indicators helps us understand achievements and failures of different programmes. It helps us design programmes more efficiently and make necessary corrections for better results. This manual looks into the possibility of deriving reliable Millennium Development Goals (MDG) and Eleventh Five Year Plan indicators in India from routine statistical data brought out by respective departments.

In India, the information available on many development indicators is relatively poor. Reliable estimates of MDG indicators are, to some extent, available at the state level. However, with the decentralization of power, it is important that these indicators be produced regularly even at the district or sub-district level. The key governmental social development programmes are now controlled by district-level functionaries. The information available at the lower levels for regularly monitoring programmes is inadequate; often, decisions are based on intuitive thinking rather than on evidence.

Recently, the Government of India placed vital importance on generating reliable statistics on various sectors routinely. Several ministries now have online data systems available to the public. These data cover information at the district or even below the district level. The Health Management Information System (HMIS), an online system maintained by the Department of Health and Family Welfare of the Government of India (www.nrhm-mis.nic.in), the Civil Registration System (CRS) and the District Information System on Education (DISE), (www.dise.in), maintained by the National University of Educational Planning and Administration (NUEPA), are examples of such data. However, it is not certain how reliable these data are and with what confidence the estimates of indicators can be generated from such statistics. This necessitates undertaking a thorough validity check of the available data.

In this report, we analyze empirically the data available from various sources for the latest years on some selected MDG and related indicators that can be estimated at the district level. The emphasis is to understand the quality of data available at the district level and suggest measures to derive accurate estimates.

METHODOLOGY TO ASSESS THE QUALITY OF DATA

There are two types of errors in any data: coverage error and content error. Coverage error refers to the completeness of inclusion of events in the data system and content error refers to the accuracy of the characteristics recorded in the data system (Preston et al 2001). For example, in the case of registration of births and deaths or service statistics, if the returns are not sent from lower units to the place of data entry in time, there will be errors of coverage. There may also be coverage errors in terms of several cases not being reported. As against this, there is also the problem of double reporting of some events such as antenatal care (ANC) for women. A woman may be counted twice in ANC in some cases, if she shifts from one place to another during the course of her ANC. This typically takes place in India where a woman travels to her mother's place for delivery.

Content errors are further divided into two categories: errors and biases (Srinivasan 1998). Errors occur due to wrong reporting by the respondents unconsciously. This possibility is rather limited in the case of services statistics because an event is recorded as and when it occurs. Biases arise when there is deliberate misreporting. This possibility is high in the case of services statistics because the providers of data would like to show progress in the services they provide and as such try to 'over-report' the cases. Therefore, any method of assessment of the quality of data should examine coverage error and at least the bias part of the content errors in the data.

There are several methods to assess the quality of the data. Some commonly used approaches are described below.

2.1 Numerator analysis

The first important method to assess the quality of available administrative statistics is the numerator analysis. Many of the indicators used in monitoring are rates or ratios such as birth and death rates, and percentages receiving a particular service. In these cases, the denominators are populations at risk or eligible to receive a service and are often taken from population projections. On the other hand, the numerators are from registration or service statistics such as the number of births/deaths or the number who received a service. Therefore, an assessment of the quality of the numerator is essential before the rate or ratio is computed. The numbers of events are recorded over time, say monthly, and this generally shows a smooth time series. Any departures, such as abrupt peaks or troughs, suggest errors in data compilation unless justified. However, not all departures may be attributed to errors. For example, some programme campaigns may, in fact, result in sudden rises, and sometimes abandonment or suspension of a campaign may cause a dip; these could be

verified from programme administrators. Besides, numerators may be categorized and this distribution can be compared to a standard to assess the quality of data, especially the selective omission of some events. For instance, the sex ratio of births or deaths provides information on the quality of data on births and deaths and can be used to see if there is selective omission of males and females. The seasonality in events is also used as a measure of quality.

2.2 Range analysis

The major rationale behind the range analysis is that demographic events, service utilization, etc., will not vary substantially across districts of a particular state. The range of variation across districts within a state for most indicators falls in some expected range although it is difficult to precisely point out the range.

The following steps are used for the range analysis.

- Estimate the range within which administrative statistics are expected to lie, on the basis of reliable estimates of these parameters available at the district level within the state.
- This range is taken differently, depending upon the indicators considered for the analysis. For some events such as births and deaths, the best estimates of the minimum and the maximum values of the rate at the district level from the available reliable sources is considered as the range. In few other cases such as utilization of health services (ANC, immunization, etc.), the range falls within 90 per cent of the achievement of the best performing district when compared from some reliable source. It is to be noted here that the estimate of the best performing district should also be from the same reliable source to enable comparison.
- If the estimated number of events falls within the reliability range, it is considered to be acceptable quality (AQ); if not, it needs further validation (NV).

2.3. Indirect estimates

Whenever possible and when direct estimates do not provide good quality indicators, indirect estimates are used to derive district estimates with reliable quality. The rationale is that certain demographic indicators are structurally inter-related under regularity assumptions. Hence, if reliable information is available about some, the others can be computed on the basis of established relationships. For example, enumerated children below five years of age are survivors of births during the five-year period before enumeration, assuming that there is no migration. Therefore, one can use the information from the Census enumeration, to estimate the birth rate prior to the census.

This guide is broadly classified into five sections: I) Demographic and Health Statistics II) Nutrition III) Water Supply and Sanitation, IV) Education V) Employment and Poverty. Under each of these sections, we discuss major indicators that can be used for monitoring MDG and the Eleventh Five Year Plan targets.

ASSESSING QUALITY OF DEMOGRAPHIC AND HEALTH DATA

The major indicators relating to health and demography, according to the MDG and the Eleventh Five Year Plan, are presented in Table 1. HIV-related indicators, water supply and sanitation indicators, and nutritional indicators will be discussed later

Table 1: Demographic and Health Targets of the MDG and the Eleventh Five Year Plan

Millennium Development Goals			
Goals and Targets	**Indicators for Monitoring Progress**	**District Sources in India**	**Periodicity**
Target 4.A: Reduce the under-five mortality rate by two-thirds, between 1990 and 2015	4.1 Under-five mortality rate 4.2 Infant mortality rate (IMR)	Census DLHS CRS, HMIS	Decadal Five years Annual
	4.3 Proportion of 1-year-old children immunized against measles	DLHS HMIS	Five years Annual
Target 5.A: Reduce the maternal mortality ratio by three-quarters, between 1990 and 2015	5.1 Maternal mortality ratio 5.2 Proportion of births attended by skilled health personnel	HMIS DLHS HMIS	Annual Five years Annual
Target 5.B: Achieve universal access to reproductive health by 2015	5.3 Contraceptive prevalence rate 5.4 Adolescent birth rate 5.5 ANC coverage (at least one visit and at least four visits) 5.6 Unmet need for family planning	DLHS HMIS	Five years Annual
Target 6.C: Incidence of malaria and other major diseases halted by 2015 and reversal begun	6.1 Incidence and death rates associated with malaria 6.2 Proportion of children under 5 sleeping under insecticide-treated bed nets		

	6.3 Proportion of children under 5 with fever, who are treated with appropriate anti-malarial drugs 6.4 Incidence, prevalence and death rates associated with tuberculosis 6.5 Proportion of tuberculosis cases detected and cured under directly observed treatment short course	HMIS	Annual
Eleventh Five Year Plan Targets			
1.	Reduce IMR to 28 per 1000 live births	Census/DLHS HMIS/CRS	Decadal Five years Annual
2.	Reduce maternal mortality ratio to 1 per 1,000 live births	HMIS CRS	Annual
3.	Reduce total fertility rate (TFR) to 2.1	Census, DLHS HMIS, CRS	Decadal Five years Annual

Both the MDG and the Eleventh Five Year Plan targets discuss the impact and the outcome indicators rather than the output and the process indicators. From the above list, we have first tried to assess the quality of birth and death data available from CRS and HMIS. Thereafter, we will discuss other indicators such as the utilization of health services (in terms of ANC, place of delivery and immunization), which are also part of the MDG.

The data sources on births and death indicators at the district level, the type of indicator and the periodicity are given in Table 2.

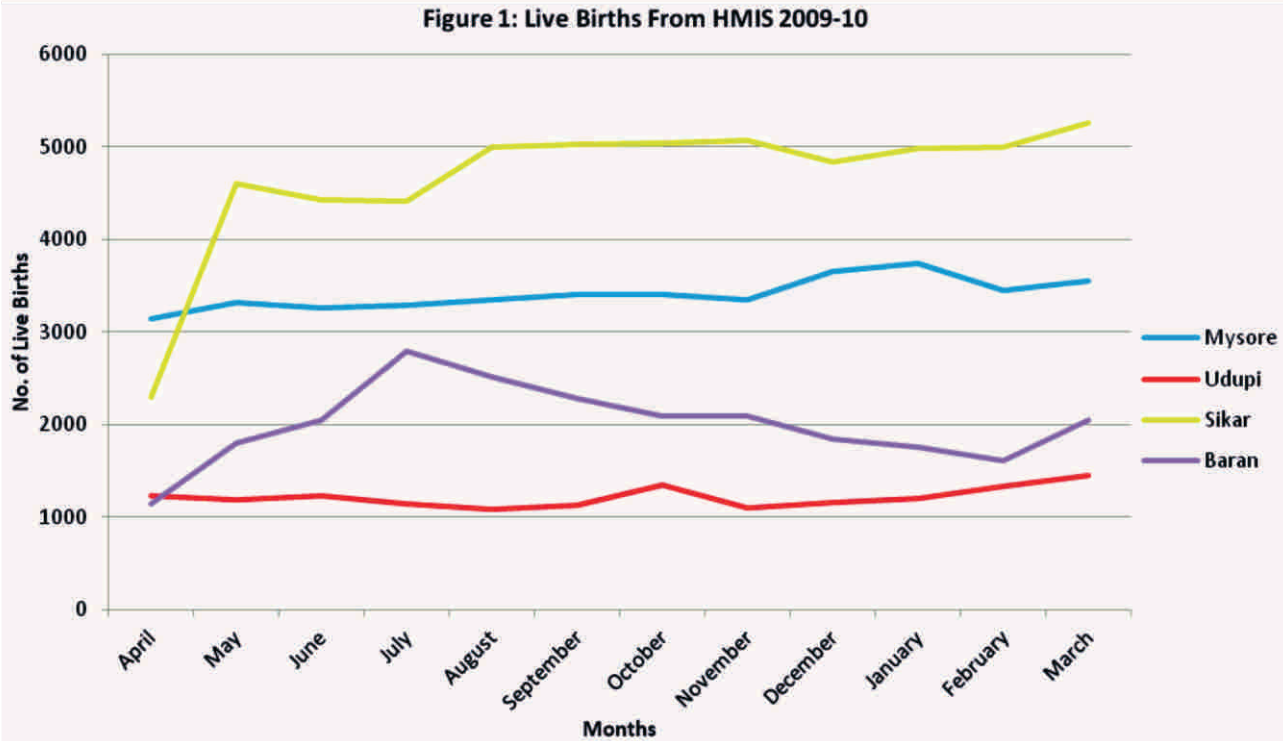
No.	Indicators	Type of Indicator	Sources of Data	Periodicity
1	Birth rate/TFR	Impact	(1) Census	Decadal
			(2) DLHS	Five years
			(3) HMIS (4) CRS	Annual
2	Contraceptive use	Outcome	(1) DLHS	Five years
			(2) HMIS	Annual
3	Teenage pregnancy	Outcome	(1) DLHS	Five years
			(2) CRS	Annual
4	Death rate	Impact	(1) HMIS (2) CRS	Annual
			(3) DLHS	Five years
5	IMR	Impact	(1) Census	Decadal
			(2) DLHS	Five years
			(3) HMIS and (4) CRS	Annual
6	Child mortality rate	Impact	(1) Census	Decadal
			(2) DLHS	Five years
			(3) HMIS and (4) CRS	Annual

3.1 Birth Rates/Total Fertility Rate

As a first step, we have undertaken the numerator analysis of data available from both HMIS and CRS. In this case, the number of births, which is the numerator, is obtained from HMIS or CRS for every month. Thus, the numerator analyses by examining the seasonality in the data can be undertaken.

3.1.1 Seasonality of live births from HMIS

Figure 1 presents the month-wise data on live births reported in HMIS for the four districts of Mysore and Udupi in Karnataka and Sikar and Baran in Rajasthan.



Sikar and Baran districts, to some extent, show a very low number of births in April. It may be because of not receiving birth returns for the month. This can be easily verified from the field. Baran district shows peaks in July and later in March; there seems to be no smooth pattern in month-wise data of Baran. It indicates poor quality of data reported by the system. Mysore and Udupi districts, on the other hand, show a smooth pattern. It appears that the Karnataka birth data are more reliable than those from the districts in Rajasthan.

3.1.2 Sex ratio at birth

Another method of assessing the quality of birth data is through the analysis of the sex ratio at birth. The sex ratio at birth, computed from various sources, is presented in Table 3.

Table 3: Analysis of the Sex Ratio at Birth

Districts	DHLS 3, 2007–08	Number of Male Births HMIS 2009-10	Number of Female Births HIMS 2009-10	Expected Range in Sex Ratio at Birth (M/F)	Sex Ratio HMIS 2009–10 (Males Per 100 Females)	No. of Male Births CRS 2007	No. of Female Births CRS 2007	CRS, 2007 (Males Per 100 Females)
(1)	(2)	(3)	(4)	(5)	(6) = (3)/(4)	(7)	(8)	(9) = (7/(8)
Mysore	96	21,053	19,863	103–108	106	24,205	25,404	95.3
Udupi	121	7,453	7,139	103–108	104	8,446	10,122	83.4
Sikar	114	28,649	27,308	103–108	105	39,842	30,946	129
Baran	113	13,144	10,888	103–108	121	13,062	10,954	112

The HMIS data, except for Baran, show the sex ratio at birth to be closer to the normal range than the CRS data. The relative under-reporting of female births seems to be less in the HMIS data as compared to the CRS data. However, it should be remembered that the sex ratio is also subject to considerable sampling fluctuations. For example, for a normal population sex ratio, even with 5,000 live births, the ratio can fall in the range between 100 to 112 males per 100 females. For 1,000 live births, the range is even wider, 94 to 120. Therefore, sex ratio as an indicator of the quality of data needs to be looked into cautiously.

Interestingly, the sex ratio at birth, derived from CRS for Karnataka districts, is favourable to females. The Karnataka government has introduced several policies to improve the sex ratio situation, including fixed deposits in a girl child's name. Perhaps, these have increased the registration of female births, resulting in the sex ratio at birth becoming favourable to females. Hence, it is important to understand the policy context when looking at the quality of data.

3.1.3 Range analysis

In the above analysis, only the numerator data is used for checking the quality of information. In range analysis, we also use the estimated denominator data based on the United Nations Population Fund, New Delhi and International Institute for Population Sciences, Mumbai (UNPFA-IIPS) projection method. Additionally, we locate a possible range from the available reliable estimates of indicators from the Census, DLHS, etc.

The regular data sources on births and birth rates at the district level are two: HMIS and CRS. However, the estimates of the fertility rate at the district levels are available from Census 2001 and DLHS surveys.

Process of Range Analysis

Step I: Compile the data from different sources. (1) Census—crude birth rate (CBR); the TFR for 2001 (2) DLHS (3) HMIS, the actual number of births for the latest year, that is, 2009–10 and (4) CRS for the latest available year, that is, 2007.

Step II: Estimate the population in each district for the year 2007 and 2009 from the projections given by UNFPA-IIPS.

Annual Growth Rate (r) = ln (P_1/P_0)/t

Where,

P_1 = Projected population for 2011

P_0 = Projected population for 2006

t = Time interval between the projected years

that is, (ln (Total population of 2011/Total population of 2006))/5

For example,

The Annual Growth Rate for Mysore = (ln (2924395/2789982))/5

= 0.009411 0

Estimated population for 2009: $P_t = P0e^{rt}$

Where,

P_t = Population at time t (where t = 2009)

P_o = Population for 2006

r = Growth rate

t = Years between P0 and Pt

Estimated population for 2009 for Mysore = (2789982) x (exp (0.009411 x 3))

= 2869870

Step III: Estimate the maximum and minimum CBR across districts of a state from the Census estimates, which is more reliable than other estimates.

Step IV: Estimate birth rate from HMIS and CRS data.

Example: Birth Rate of Mysore from HMIS = (B/P) x 1000, where B = Number of births in 2009–10 for Mysore from HMIS and P = Projected population for Mysore 2009.

(40916/2869870)*1000 = 14.3

Step V: Check whether the estimated birth rate from HMIS and CRS lies within the expected range.

Step VI: If this lies within a range, it is of acceptable quality (AQ) and can be used as such to monitor programmes; if not, there is need to validate the data further.

Note: In the following exercises, code AQ is used to denote data of 'acceptable quality' and code NV is used to suggest 'needs validation'.

The tabulation, based on Steps I to VI for the four districts, is given in Table 4.

Table 4: Assessment of the Quality of CBR from HMIS and CRS

Districts	CBR (Census 2001)	CBR (DHLS 3, 2007–08)	Range of CBR in the State (Census–2001)	No. of Births (HMIS 2009–10)	Estimated Population 2009	CBR (HMIS 2009–10)	Quality HMIS	No. of Births (CRS 2007)	Estimated Population (2007)	CBR (CRS 2007)	Quality CRS
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
State: Karnataka											
Mysore	18.9	14.77	15.0–27.4	40,916	28,69,870	14.3	NV	49,609	28,16,361	17.6	AQ
Udupi	15.0	11.64	15.0–27.4	14,592	11,28,481	12.9	NV	18,568	11,27,476	16.5	AQ
State: Rajasthan											
Sikar	29.5	17.10	27.1–40.0	55,957	25,75,411	21.7	NV	70788	2507687	28.2	AQ
Baran	31.3	18.72	27.1–40.0	24,032	11,59,246	20.7	NV	24016	1127798	21.3	NV

Note:

Column 7 = (Column 5/Column 6) * 1000 and Column 11 = (Column 9/Column 10) * 1000

Column 4: Lowest and highest district-level CBR from the Karnataka and Rajasthan based on 2001 Census.

Column 7 and 10: Projected population for 2007 and 2009, based on UNFPA-IIPS; because the projection is available only for 2006 and 2011, 2007 and 2009 population has to be interpolated using exponential growth rate for the period 2006–11.

The variation in birth rate within a state is considerable and, as a result, the range is also vast. The HMIS birth rate is higher than DLHS-3 estimates for all the districts except Mysore. The number of births recorded by CRS is higher than HMIS births, except for Baran district. Thus, the birth rate data from CRS can be used to monitor fertility trends, except for Baran district. The HMIS data seems to under-report births. It, therefore, seems that, except for Baran, the CRS provides relatively usable data to compute birth rates. However, for Baran, the direct method of computation does not seem to work.

3.1.4 Order of birth

An alternative method of assessing the fertility pattern of a district would be an analysis of the order of birth. In a situation of high fertility, the proportion of women with higher order births will also be much higher. On the contrary, in a situation of low fertility, with most women, who have one or two children, the proportion of births of order 3 and above will be very low.

The birth order data is available only from CRS. Birth order data are useful in the assessment of birth rate even when there is underestimation of birth rate. Using indirect methods, it is also possible to estimate birth rates and TFR from birth order statistics. Table 5 presents birth order data from CRS for the four selected districts.

Table 5: Birth Order from CRS 2007

Districts		Birth Order	
	1	2	3+
(1)	(2)	(3)	(4)
Mysore	46.99	44.25	8.76
Udupi	46.83	45.31	7.86
Sikar	38.77	32.49	28.74
Baran	33.78	32.76	33.46

This provides information on the levels of fertility in the selected districts. Whereas Udupi has the lowest 3+ order births, Baran has the highest percentage of births taking place in this category. Thus, CRS data on birth order is useful even when the quality of registration of birth data is poor.

3.1.5 Indirect estimation of fertility

Birth order data can be used to estimate TFR, using indirect methods. Mari Bhat (Bhat Method) has presented a regression method to estimate TFR from birth order data. Table 6 presents the estimated fertility rate, using the Bhat Method, and the estimates made by Guilmoto and Rajan (2002), using Census 2001 data.

Table 6: Indirect Estimates of Fertility Using Different Methods

Districts	Census 2001	CRS 2007
	Guilmoto and Rajan	Bhat
(1)	(2)	(3)
Mysore	2.1	1.6
Udupi	1.5	1.6
Sikar	3.9	2.4
Baran	4.0	2.7

Source: Guilmoto and Rajan (2002); The Bhat estimate has been calculated by the authors.

Guilmoto and Rajan (2002) have estimated fertility, using Census data, through the reverse survival method. The available Census data on 0–6 population has been 'reverse survived' to get fertility estimates for the period 1994–2001 period. Bhat estimated the TFR by regressing the TFR on the indicator of birth order, which he claimed to be appropriate under the situation of declining fertility. The equation given by Bhat is as follows:

TFR = 1 + exp {4.12* (B3+/B) – 0.87}
B3+ = Birth order 3+
B = Total births

Bhat's estimate, using the birth order, seems to provide a reasonably good estimate in deriving fertility rate. Hence, it is possible that wherever the HMIS and CRS data are of poor quality, estimates of fertility through the indirect method, using birth order statistics, give reliable measures of fertility although there seems to be some underestimation. However, for routine monitoring, birth order and indirect methods could provide useful information on the fertility changes.

3.2 Teenage Pregnancy

The CRS also provides data on births by the age of the mother. This will help in indicating births taking place in teenage mothers and older women. Table 7 presents data on the percentage of births by the age of the women from DLHS-3 and CRS.

Table 7: Percentage of Births by the Age of Women in CRS 2007

Districts	DHLS-3, 2007–08	Births by the Age of Women in CRS 2007			
	15–19	15–19	20–24	25–29	30+
(1)	(2)	(3)	(4)	(5)	(6)
Mysore	20.3	6.12	51.5	33.8	8.7
Udupi	3.2	0.90	31.2	55.7	12.2
Sikar	13.0	7.91	48.4	31.7	11.9
Baran	12.2	2.72	44.7	37.8	14.9

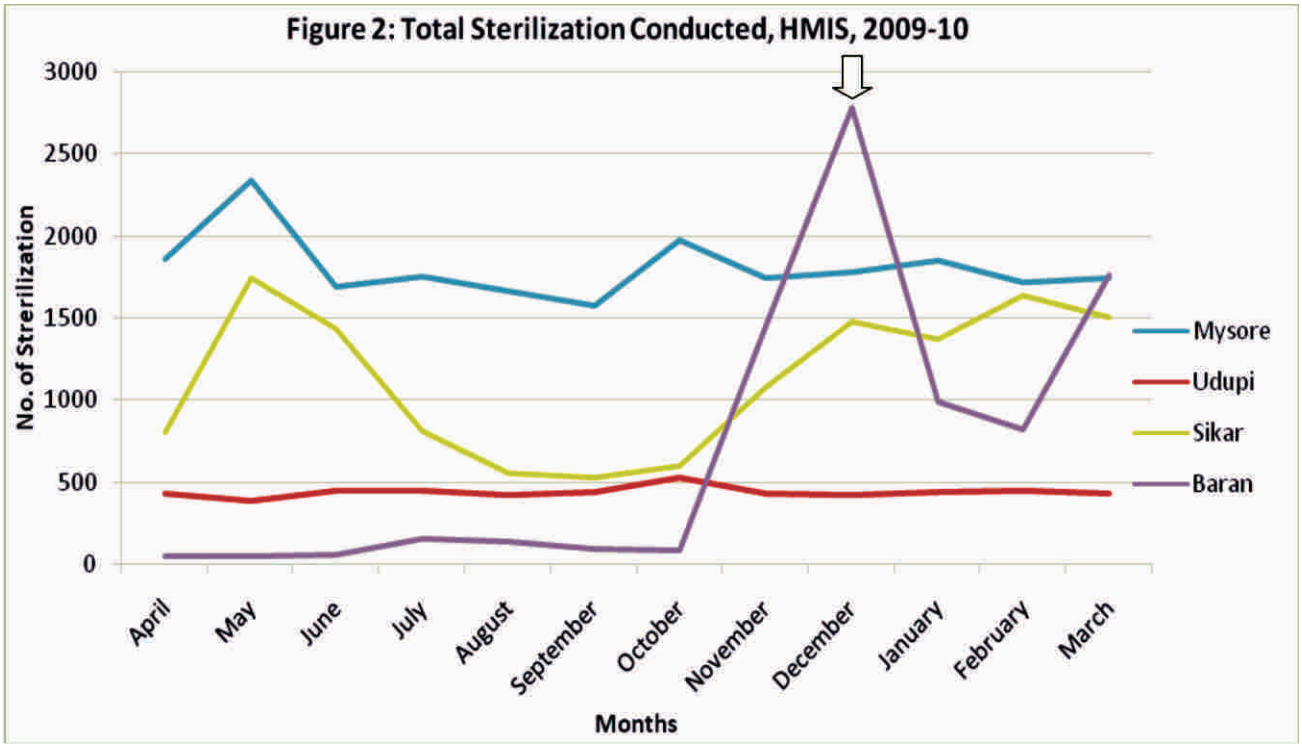
It appears that the estimated level of teenage pregnancy (15- to 19-year-old mothers) is higher in DLHS-3 than recorded in the CRS. The age registered in CRS may be of poor quality because it is merely reported at the time of registration. The survey makes an effort to obtain as accurate an age as possible. In addition, it may be possible that the births at younger ages taking place for the poor sections of the population go unreported, leading to relatively less percentage of births among the 15–19 age group. Because most registrars are aware of the legal minimum age at marriage, they may also record a higher age at birth purposely, to avoid any future complications. Hence, DLHS-3 estimates would be better to understand teenage pregnancy than the CRS data. With DLHS-3 data not available on a continuous basis, regular monitoring of teenage pregnancy seems to be difficult.

3.3. Contraceptive Use

The data on contraceptive use is available from DLHS and HMIS. The data from HMIS is limited to the number of users of a particular method for a specific year. The survey data (DLHS-2, DLHS-3), on the other hand, give information on the percentage of couples using different methods. As sterilization constitutes the dominant method in India, we have checked the quality of data on the use of sterilization provided by HMIS.

3.3.1 Seasonality in the use of sterilization

Figure 2 presents month-wise data on sterilization for the selected four districts during 2009–10.



The month-wise data shows wide fluctuation for Baran and Sikar and mild fluctuation in some months in Mysore. Udupi, on the contrary, shows a smooth curve depicting better quality data. It appears that Baran did not report sterilization events till about October because the number of

sterilizations recorded is very low. But the peak in November is also very high, raising questions about the quality of data. It is possible to have such peaks in sterilization if there are some special efforts such as sterilization camps held during a particular month. Hence, it is necessary to check the dates of camps before concluding on the quality of data.

3.4 Deaths/Death Rates

The data on deaths are available, both from HMIS and CRS, on a regular basis. The HMIS data provide total number of deaths whereas the CRS provides its sex composition at the district level. But deaths by age are not provided in either the CRS reports or HMIS. However, we have collected age-wise deaths from CRS for these four districts, by special request. In order to find out the quality of data, we have attempted the numerator analysis first.

3.4.1 Sex Ratio of Deaths

Table 8 presents the sex ratio of deaths from CRS. The sex-wise data on deaths are available only from CRS and the data presented show that the sex ratio (F/M) is less than 100 in all the districts, as expected. In some districts, however, the ratio is as low as in the 50s, indicating that female deaths go unregistered in many cases; therefore, even CRS data on deaths is incomplete and needs improvement.

Table 8: Sex Ratio at Deaths from CRS

Districts	No. of Deaths Male	No. of Deaths Female	Sex Ratio at Deaths, CRS 2007 (F/M)
Mysore	11,329	6,960	61.44
Udupi	6,582	4,178	63.48
Sikar	8,642	4,755	55.03
Baran	3,011	1,678	55.73

3.4.2 Range analysis

Process of Range Analysis

Step I: Compile the data from different sources. (1) DLHS (2) HMIS, the actual number of deaths for the latest year 2009–10 and (3) CRS for the latest available year 2007.

Step II: Estimate the population for each district for 2007 and 2009 from the projections given by UNFPA-IIPS.

Step III: Estimate the maximum and minimum crude death rates (CDR) across the states of India from the Sample Registration System (SRS).

Step IV: Estimate the death rate (CDR) for each of the states, using HMIS and CRS data.
CDR 2009–10 from HMIS = (Deaths from HMIS 2009–10/Population 2009)*1000.
CDR for 2007 from CRS = (Deaths from CRS 2007/Population 2007)*1000.

Step V: Check whether the computed death rate from HMIS and CRS lies within the maximum and minimum CDR for the states derived from SRS.

Step VI: If this lies within the range, it is AQ and can be used as such to monitor programmes; if not, it cannot be used to monitor the programmes and efforts should be made to improve the coverage and quality of data.

The tabulation, based on above steps, for the four districts is given in Table 9.

Table 9: Assessment of the Quality of CDR from HMIS and CRS

Districts	CDR (DLHS-3 2007–08)	Range of CDR* in the State	No. of Deaths (HMIS 2009–10)	Estimated Population 2009	CBR (HMIS 2009–10)	Quality HMIS	No. of Deaths (CRS 2007)	Estimated Population (2007)	CDR (CRS 2007)	Quality CRS
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
State: Karnataka										
Mysore	8.65	4.8–9.2	7,268	28,69,870	2.53	NV	18,289	28,16,361	6.5	AQ
Udupi	6.71	4.8–9.2	3,961	11,28,481	3.51	NV	10,760	11,27,476	9.5	AQ
State: Rajasthan										
Sikar	5.55	4.8–9.2	909	25,75,411	0.35	NV	13,397	25,07,687	5.3	AQ
Baran	7.15	4.8–9.2	173	11,59,246	0.15	NV	4,689	11,27,798	4.2	NV

** Taken from the SRS, State CDR range for the year 2007*

Note:

Column 6: (Total number of deaths from HMIS for 2009–10/Projected population for the year 2009) x 1000
Column 10: (Total number of deaths from CRS for 2007/Projected population for the year 2007) x 1000
Column 5 and 10: Projected population for the years 2007 and 2009, using UNFPA-IIPS projection.

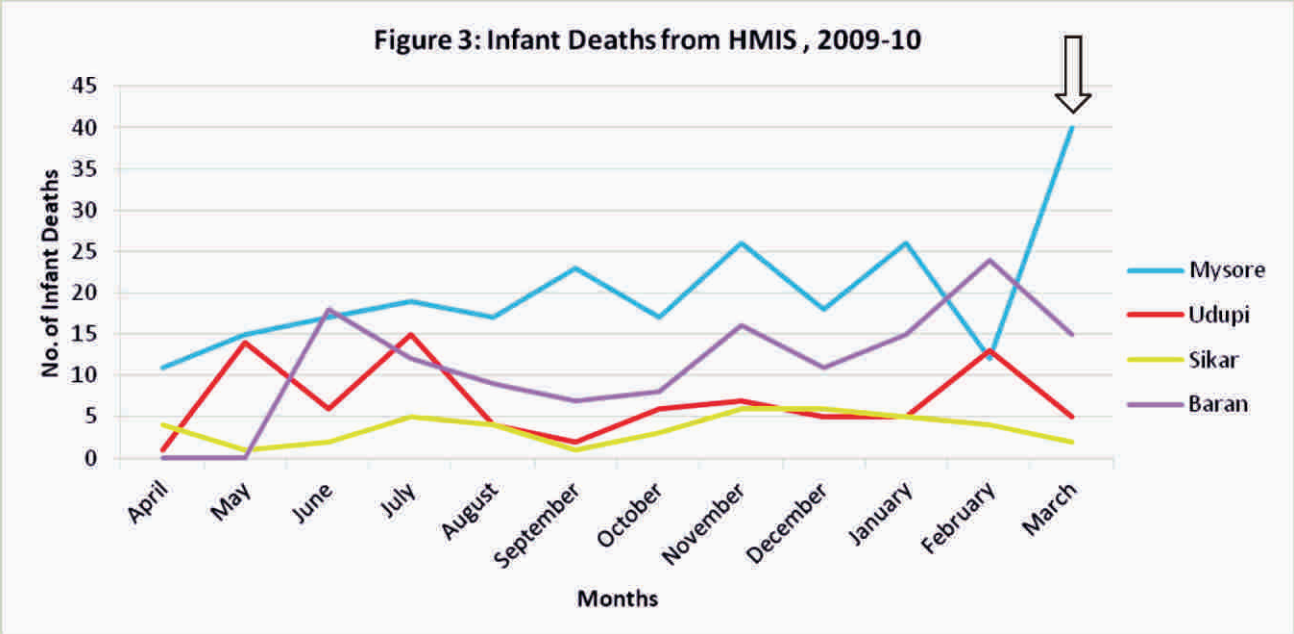
Currently, the data available from HMIS on deaths are of poor quality. Perhaps, the capture of overall deaths in HMIS is still very poor. It seems, however, that the CRS data are of relatively good quality to estimate the death rates for all the selected districts. In both, Udupi and Sikar, the estimated deaths are even higher than the expected range of deaths, indicating good quality of information from the CRS.

3.5 Infant Deaths/Infant Mortality Rates

The data sources on infant deaths and IMR at the district level for the latest available years are four: Census 2001, DLHS, HMIS and CRS.

3.5.1 Seasonality in infant deaths

The month-wise distribution of infant deaths as reported in the HMIS is presented in Figure 3. Most districts show fluctuations, indicating poor quality of infant mortality data in all the districts. However, some fluctuations are expected, given the fact that the number of deaths is low in a month for a district. Such fluctuations are common when the number of events is comparatively less.



There seems to be a clear outlier for the month of March for the district of Mysore. This needs to be verified from the records. It may be due to data entry mistakes or reporting errors.

3.5.2 Range analysis

Process of Range Analysis

Step I: Compile the data from (1) Census—the IMRs for 2001 (2) DLHS (3) HMIS–the actual number of infant deaths for 2009–10 (4) CRS—the number of registered infant deaths for the latest available year (2007).

Step II: Estimate the number of births for each districts for the years 2009 and 2007. Birth estimates are done by multiplying the projected population 2009 given by UNFPA-IIPS by the Census-based estimates of birth rates for 2001.
For example: For Mysore, the population for the year 2009 is 28,69,870 and the birth rate from 2001 = 18.9. Hence, the number of births in 2009–10 = 2869870 x (18.9/1000) = 54,241.

Step III: Estimate the maximum and minimum IMRs across the districts of a state from the Census estimates.

Step IV: Estimate the IMR from HMIS and CRS. For example, the IMR of Mysore from HMIS 2009–10 = (Infant deaths 2009–10/No. of births 2009) x 1000 = 241/54241 x 1000 = 4.44.

Step V: Check whether the estimated IMRs in HMIS and CRS lie within the anticipated range.

Step VI: If this lies within the range, it is AQ and can be used as such to monitor programmes; if not, it cannot be used to monitor programmes, and efforts should be made to improve the coverage and quality of data.

The tabulation based on above steps is presented in Table 10. It seems that the infant mortality reporting by the HMIS and CRS is of poor quality. It is possible that because Udupi and Mysore are the two good performing districts in Karnataka, the IMR would have declined even below the lower bounds of Census 2001. Thus, CRS might provide more accurate estimates for the state. The HMIS reporting is definitely poor. For Rajasthan district, it appears that both the CRS and HMIS are of very poor quality and not usable.

Table 10: Assessment of the Quality of IMR from HMIS and CRS

Districts	IMR (Census 2001)	IMR (DHLS 3, 2007–08)	Range of IMR Besed on Census	No. of Infant Deaths HMIS 2009–10	Estimated Births 2009-10	IMR (HMIS 2009–10)	Quality HMIS	No. of Infant Deaths (CRS 2007)	Estimated Briths (2007)	IMR (CRS 2007)	Quality of CRS
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
State: Karnataka											
Mysore	54	26.75	32–76	241	54,241	4.44	NV	1,471	53,229	30.56	NV
Udupi	32	3.90	32–76	83	16,927	4.90	NV	377	16,912	21.05	NV
State: Rajasthan											
Sikar	55	43.79	52–105	43	75,975	0.57	NV	195	73,977	2.46	NV
Baran	85	91.25	52–105	135	36,284	3.72	NV	99	35,300	5.48	NV

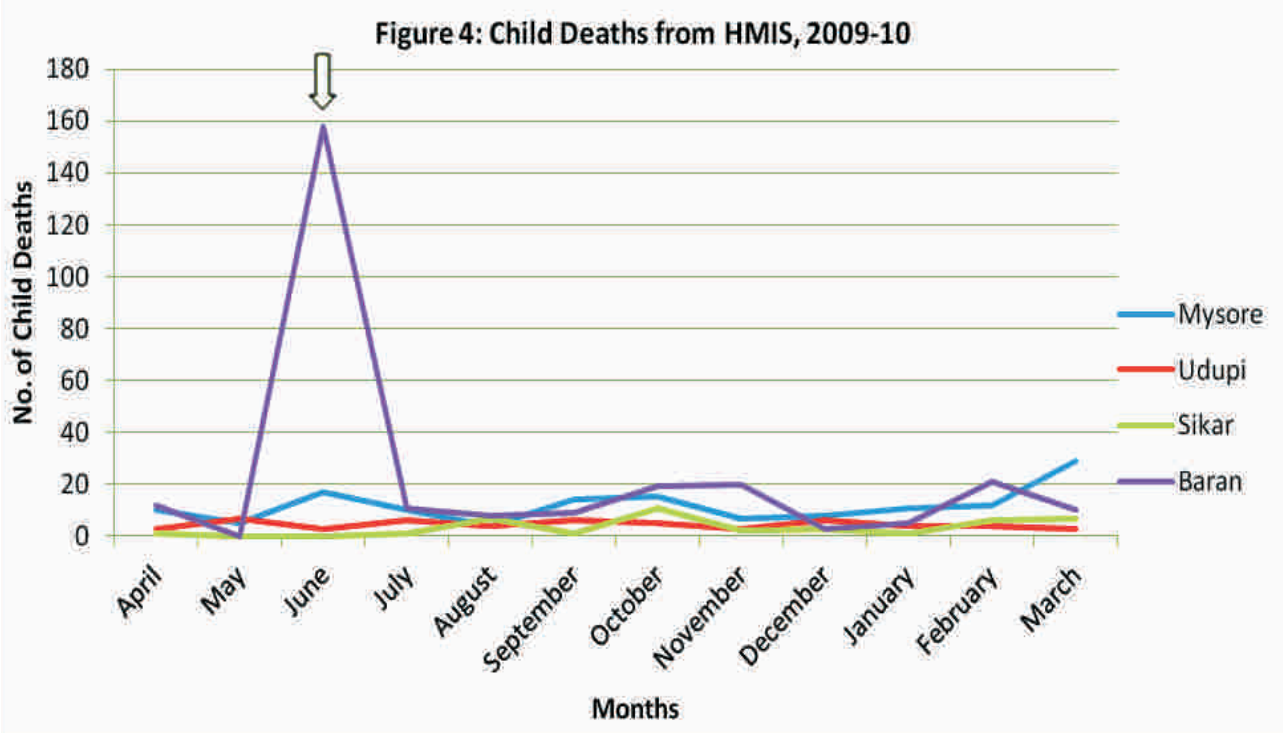
Note:

Column 3: Lowest and highest district-level IMR from the Karnataka and Rajasthan based on 2001 census.
The CRS and the HMIS IMR has been estimated (column 7 and 11) by dividing corresponding infant deaths (Column 5 and 9) by the number of live births (Columns 6 and 10).
Columns 6 and 10 are estimated by multiplying 2001 district-level CBR by the corresponding population.

3.6 Child Mortality

3.6.1 Seasonality in child mortality

The month-wise distribution of child deaths is presented in Figure 4. No serious fluctuations in the data are observed, except for Baran. However, given the small number of events in each month, some fluctuations cannot be ruled out in such data.



Nevertheless, there seems to be a clear outlier for the month of June for Baran district. This needs to be verified from the records. It may be due to data entry mistakes or reporting errors.

3.6.2 Range analysis

The data sources on child mortality at the district level for the latest available years are four: Census 2001, DLHS -3, HMIS and CRS.

Process of Range Analysis

Step I: Compile the data from different sources. (1) Census—child mortality rates for 2001 (2) DLHS-3 for 2007–08 (3) HMIS, the actual number of child deaths for the latest year, that is, 2009–10 and (4) CRS for the latest available year, that is, 2007.

Step II: Estimate the number of births for each district for the years 2009 and 2007 from the projections for each district given by UNFPA-IIPS for the years 2009 and 2007.
Estimate no. of Births = Projected Population * Census 2001 Birth Rate.

Step III: Estimate the maximum and minimum child mortality rates across districts of a state from the Census estimates.

Step IV: Estimate the child mortality rate from HMIS and CRS. Child mortality from HMIS for the year 2009 = (Child deaths from HMIS for 2009–10/Estimated births for 2009–10) x 1000.
For example, for Mysore, the child mortality for 2009–10 was 142 and number of estimated births for 2009 was 54,241. Therefore, the child mortality rate (CMR) = (142/54241) x 1000.

Step V: Check whether the estimated CMR falls within the anticipated range.

Step VI: If this lies within the range, it is AQ and can be used as such to monitor programmes; if not it cannot be used to monitor programmes, and efforts should be made to improve the coverage and quality of data.

The tabulation, based on the above for the four districts, is given in Table 11. As in the case of IMR, the HMIS data on child deaths are also of poor quality. The CRS deaths are far higher than that recorded by HMIS. DLHS-3 also shows wide variation in child mortality across districts. As such, it looks as if infant and child mortality data available from the CRS and HMIS are of poor quality even in good districts and may not provide reliable estimates.

All these indicate that, at present, the data available both from the CRS and HMIS regarding infant and child mortality are of poor quality and difficult to use for regular monitoring. Perhaps, an alternative would be to use health service utilization indicators. We will discuss these later.

Table 11: Assessment of the Quality of CMR Estimates from HMIS and CRS

Districts	CMR (Census 2001)	CMR (DHLS 3, 2007–08)	Range of CMR in the state Census 2011	No. of Child Deaths HMIS 2009–10	Estimated Births 2009-10	CMR (HMIS 2009-10	Quality of HMIS	No. of Child Deaths (CRS 2007)	Estimated Briths (2007)	IMR (CRS 2007)	Quality of CRS
(1)	(2)	(4)	(5)	(8)	(6)		(10)	(9)	(10)		(11)
State: Karnataka											
Mysore	74	26.75	41–109	142	54,241	2.6	NV	1,351	53,229	25.4	NV
Udupi	41	15.68	41–109	54	16,927	3.2	NV	335	16,912	19.8	NV
State: Rajasthan											
Sikar	74	54.74	70–161	40	75,975	0.5	NV	234	73,977	3.2	NV
Baran	125	121.67	70–161	276	36,284	7.6	NV	195	35,300	5.5	NV

3.7 Life Tables

The CRS data collects information on age at death but does not publish this data at the district level. We have gathered this data from the CRS office of Karnataka and Rajasthan, in order to assess how far it can be used to compute life tables at the district level. We have constructed life tables using MortPack software for males and females separately for all four districts (Table 12).

The life expectancy figures directly estimated from CRS is relatively high due to underestimates of deaths, particularly at younger ages. The estimated life expectancy for females in all the districts is abnormally high. This indicates that the female deaths are relatively more under-reported compared to male deaths. Therefore, it is not advisable to use the life tables computed directly from CRS age-specific death rate.

3.7.1 Indirect estimates of life expectancy

In order to overcome deficiency in the direct estimates of the life tables from the CRS, we tried to compute life expectancy figures, using the regression approach. The life expectancy figures available at the state level from the SRS are used to generate the constant and the slope coefficient. The independent variables used for the study are IMR and percentage of deaths 10 and above. Percentage of deaths 10 and above is usually found to be a good indicator in the event of underestimation of deaths (UN Manual IV). Thus state-level life expectancy figures available from the SRS for 2001–05 were regressed, with the IMR and percentage of deaths at 10 and above for the same period. Table 12 presents the life expectancy figures estimated by the direct method and the indirect method for each of the districts under study.

Table 12: Direct and Indirect Estimates of Life Expectancy at Birth from CRS 2007

Districts	Direct Estimation* e_0^0		Indirect Estimation**
	Male	Female	e_0^0
Mysore	78.94	84.83	69.60
Udupi	75.46	90.48	71.54
Sikar	81.63	83.85	75.22
Baran	78.20	80.59	74.65

Note: * Direct estimation of life expectancy at births is using MORTPAK IV software.

** The indirect estimate of life expectancy at birth is obtained, using the regression method. It is found that there is a strong association among life expectancy at birth, IMR and proportion of 10+ deaths (PD). The equation used for estimating life expectancy at birth (e_0^0) = 74.01 + 0.017 x PD – 0.197 x IMR. With R^2 = 78 per cent.

The indirect estimation of life expectancy provides reasonably good estimates for Karnataka districts but not for Rajasthan districts. This is because the CRS data for Rajasthan is of much poorer quality than that of Karnataka. Therefore, when the CRS data is of a reasonable quality, both direct and indirect estimates of life expectancy at the district level are feasible. But when the underestimation of deaths, particularly of infant mortality, is serious, even indirect estimates are not of acceptable quality.

3.8 Reproductive and Child Health

Most mortality indicators, particularly the infant and child mortality, computed both from CRS and HMIS, provide poor quality data. Therefore, an alternative method of monitoring health programmes would be to look into the service delivery or access to services. Data are available from HMIS. We have used the following indicators for this purpose and presented these in Table 13.

The indicators are selected mainly with the HMIS data in mind because it is the only source of annual information available, which can be used for monitoring programmes. The quality of HMIS is assessed to some extent, using the DLHS data.

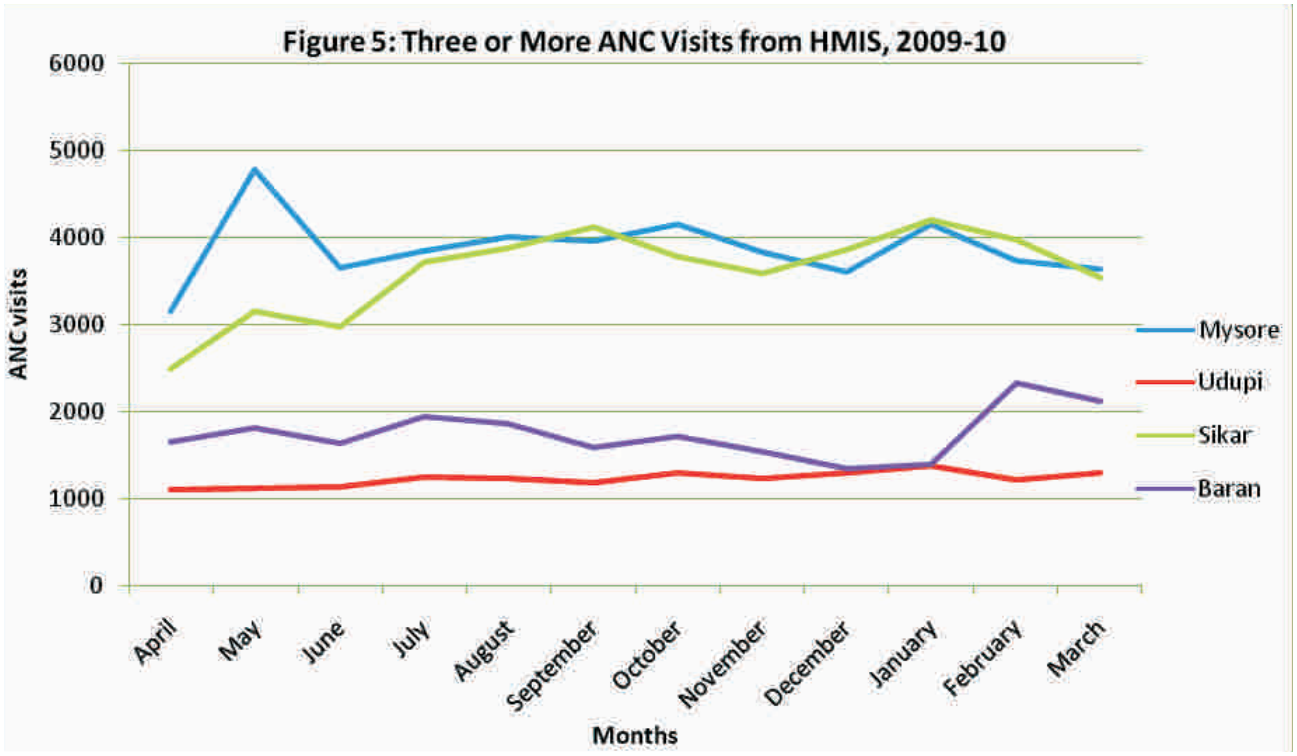
Table 13: Sources of Data on Reproductive and Child Health Indicators: Type and Periodicity

No.	Indicators	Type of Indicator	Sources of Data	Periodicity
1	Received full ANC	Outcome	(1) DLHS	5 years
			(2) HMIS	Annual
2	ANC registered in 1st trimester	Outcome	(1) DLHS	5 years
			(2) HMIS	Annual
3	Institutional delivery	Outcome	(1) DLHS	5 years
			(2) HMIS	Annual
4	Full immunization	Outcome	(1)DLHS	5 years
			(2) HMIS	Annual
5	Acceptance of DPT 3	Outcome	(1) DLHS	5 years

3.8.1 Received at least three ANC care

3.8.1.1 Seasonality in three or more ANC visits

In order to find out instances of over-reporting, we plotted the month-wise data on women, who received 3 or more ANC visits, in the four districts. These are presented in Figure 5.



The Baran data show an unusual jump towards the end of the financial year, clearly depicting the over-reporting of events. The Udupi and Mysore data show more of a smooth curve, except for one month in Mysore. The Sikar data present rapid increase in the early months. It is possible that for the first few months, all the reporting units may not have provided data in Sikar, leading to low values over the initial months. This needs to be verified from the concerned department.

3.8.1.2 Range analysis

The data sources on three ANC visits or more at the district level for the latest available years are DLHS and HMIS.

Process for Range Analysis

Step I: Compile the data from different sources. (1) DLHS and (2) HMIS for the latest available period.

Step II: Estimate the number of pregnancies in each district for 2009 from the district-level projections by UNFPA-IIPS. This is estimated as the projected population multiplied by the birth rate from Census 2001. Usually, it is necessary to add an additional percentage to the birth rate to estimate pregnancy to the tune of 2 to 3 per cent because 2 to 3 per cent will be still births. However, because we use the 2001 birth rate, this can be avoided; moreover, the birth rate would have declined and, as such, this takes care of the additional factor.

Step III: Find the highest proportion of 3 or more ANC visits across districts of a state from DLHS-3.

Step IV: Estimate 90 per cent of the reported district-level 3 or more ANC visits from DLHS-3 as the lower limit and the highest proportion of 3 or more ANC visit across districts of the state from DLHS-3 as the upper limit of the range.

Step V: Check whether the estimated proportion of 3 or more ANC visits from HMIS lies within the above range.

Step VI: If this lies within the expected range, it is AQ and can be used as such to monitor programmes; if not, it cannot be used to monitor programmes, and efforts should be made to improve the coverage and quality of data.

The tabulation, based on the above steps, for four districts is presented in Table 14.

Table 14: Assessment of the Quality of Data or 3 or More ANC Visits from HMIS 2009–10

District	DHLS-3 (2007–08)	No. of 3 or More ANC Visits (HMIS 2009–10	Estimated Pregnancies 2009	Percentage of 3 or More ANC visits (HMIS 2009-10)	Lower Limit of the Range (90% of DLHS-3)	Upper Limit of the Range Highest 3 or more ANC visits (DHLS-3)	Quality of HMIS
(1)	(2)	(3)	(4)	(5) = (3)/(4)	(6) = (2) x 0.9	(7)	(8)
State: Karnataka							
Mysore	91.7	46,541	54,241	86.6	82.5	98.2	AQ
Udupi	96.5	14,640	16,927	86.5	86.9	98.2	AQ
State: Rajasthan							
Sikar	33.4	43,354	75,975	57.8	30.1	47.0	NV
Baran	37.5	20,903	36,284	58.4	33.8	47.0	NV

The table shows that, for Udupi and Mysore, the HMIS data falls within the range and can be directly used for monitoring programmes. However, for Sikar and Baran, the number of 3 or more ANC visits, according to the HMIS, is far higher than the expected proportion, based on even the highest recorded 3 or more ANC visits in any district of the respective states, according to DLHS-3. Thus, there may be over-reporting of ANC cases in Rajasthan districts. This makes the ANC data of poor quality in Rajasthan districts. Perhaps, it is important to verify the data especially for peaks in some months in Rajasthan districts from district officials.

3.8.2 Registration for ANC in the first trimester

This indicator provides information on the quality of services provided by the health facility in a particular district. Even when there is under-reporting or over-reporting of the number of cases registered for ANC, this indicator is useful in monitoring the quality of services.

3.8.2.1 Range analysis

The data sources on first trimester registration for ANC at the district level for the latest available years are two: DLHS and HMIS.

Process for Range Analysis

Step I: Compile the data from different sources. (1) DLHS and (2) HMIS for the latest available period.

Step II: Calculate the proportion of first trimester registration, using the HMIS 2009–10 data. The percentage of first trimester registration for 2009–10 from HMIS = (Number of women registered for ANC in the first trimester for 2009–10 from HMIS/Total number of women registered for ANC for the year 2009–10 from HMIS) x 100.

Step III: Estimate 90 per cent of the reported district-level, first trimester registration for ANC as the lower limit and the highest proportion of first trimester ANC across districts of the state from DLHS-3 as the upper limit of the range.

Step IV: Check whether the estimated proportion of first trimester registration from HMIS lies within the above range.

Step V: If this lies within the expected range, it is AQ and can be used as such to monitor programmes; if not, it cannot be used to monitor programmes, and efforts should be made to improve the coverage and quality of data.

Table 15 presents the assessment of the quality of the first trimester registration drawn from HMIS data for 2009–10.

Table 15: Assessment of the Quality of Data on First Trimester Registration of Pregnancy from HMIS 2009–10

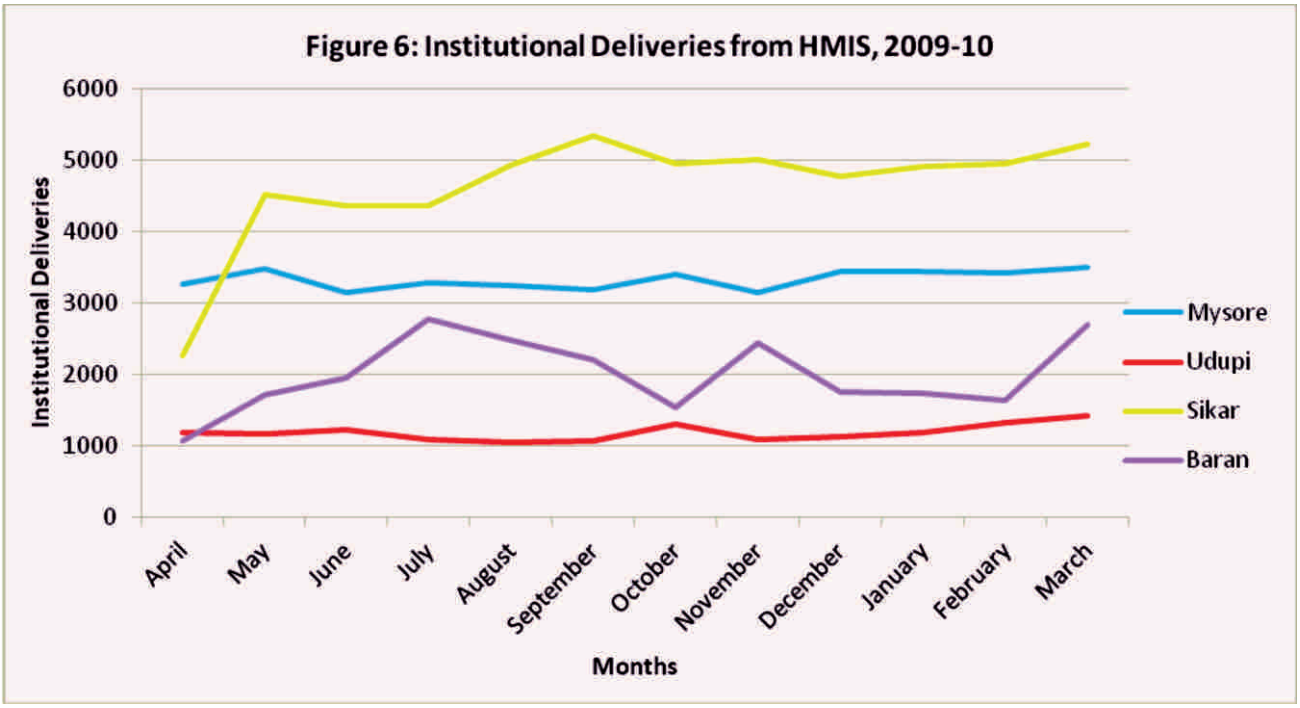
District	DHLS-3 (2007–08)	No. of ANCs Registered in the First Quarter (HMIS 2009-10)	No. of Pregnant Women Registered for ANC (HIMS 2009-10)	Percentage of ANC Registered in the First Trimester (HMIS 2009-10)	Lower Limit of the Range (90% of DLHS-3)	Highest Percentage Trimester ANC in the State from DLHS-3	Quality of HMIS 2009-10
(1)	(2)	(3)	(4)	(5) = (3)/(4)	(6) = (2)*0.9	(7)	(8)
State: Karnataka							
Mysore	84.6	40,218	47,100	85.4	76.1	95.56	AQ
Udupi	91.0	10,101	15,878	63.6	81.9	95.56	NV
State: Rajasthan							
Sikar	46.1	34,514	76,443	45.1	41.5	72.46	NV
Baran	47.0	24,778	26,995	91.8	42.3	72.46	NV

The Mysore district data falls within the expected range whereas for Udupi and Sikar, the estimated first trimester registration is far lower than the expected range. On the contrary, for Baran, the estimated rate is far higher than the expected range. It is possible that the expected estimated figure is less than the expected range because the HMIS data does not capture the registrations within the private sector. The DLHS-3, on the contrary, covers all the registrations, irrespective of the type of facility. However, over-reporting of the first trimester registration in Baran needs careful validation and there is a need to verify this data for accuracy.

3.8.3 Institutional delivery

3.8.3.1 Seasonality in institutional delivery

Figure 6 presents the month-wise data on institutional delivery.



According to the figure, both Baran and Sikar district have a tendency to over-report events at the end of the financial year. As such, both Baran and Sikar data on institutional delivery available from HMIS are suspect. However, the data from Mysore and Udupi seem to be of good quality, according to this assessment. The data for the first month (April) for Sikar needs verification because it seems all the units have not reported the events. There are also fluctuations in the Baran data, necessitating further investigation.

3.8.3.2 Range analysis

The data sources on institutional delivery at the district level for the latest available years are DLHS and HMIS.

Process for Range Analysis

Step I: Compile the data from different sources. (1) DLHS (2) HMIS

Step II: Estimate the number of pregnancies for each district for 2009 from the district-level projections by UNFPA-IIPS.
Number of Estimated Pregnancies = Projected Population 2009* Census 2001 Birth Rate.

Step III: Estimate the percentage of institutional deliveries from HMIS. The percentage of institutional deliveries from HMIS 2009–10 = (Number of Institutional deliveries from HMIS 2009–10/Estimated births for the year 2009) x 100.

Step IV: Estimate 90 per cent of the reported district-level institutional deliveries, based on DLHS-3, as the lower limit and the highest proportion of institutional deliveries across districts of the state as the upper limit of the range.

Step V: Check whether the estimated proportion of institutional deliveries in HMIS lies within the anticipated range.

Step VI: If this lies within the expected range, it is AQ and can be used as such to monitor programmes; if not, it cannot be used to monitor programmes, and efforts should be made to improve the coverage and quality of data.

The tabulation, based on above steps for the four districts, is presented in Table 16.

Table 16: Assessment of the Quality of Data on Institutional Deliveries from HMIS 2009–10

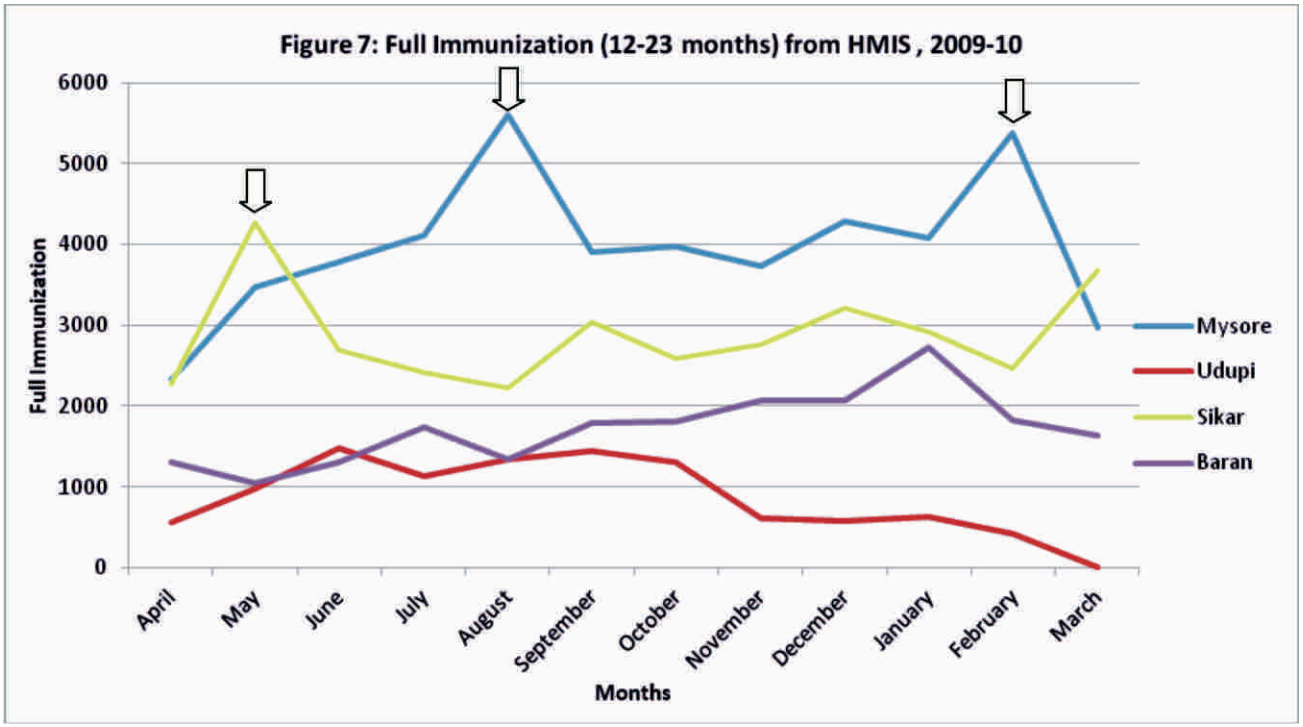
District	DHLS-3 (2007-08)	Total No. of Institutional Deliveries (HMIS 2009 10)	Estimated Pregnancies (2009)	Percentage of Institutional Deliveries (HIMS 2009-10)	Lower Limit of the Range (90% of DLHS-3)	Upper Limit of the Range Highest Level of Institutional Deliveries in the State (DLHS-3)	Quality of HIMS 2009-10
(1)	(2)	(3)	(4)	(5) = (3)/(4)	(6) = (2) * 0.9	(7)	(8)
State: Karnataka							
Mysore	79.6	39,945	54,241	73.6	71.6	96.0	AQ
Udupi	94.3	14,296	16,927	84.5	84.9	96.0	AQ
State: Rajasthan							
Sikar	59.7	55,566	75,975	73.1	53.7	65.0	NV
Baran	58.4	23,991	36,284	66.1	52.6	65.0	NV

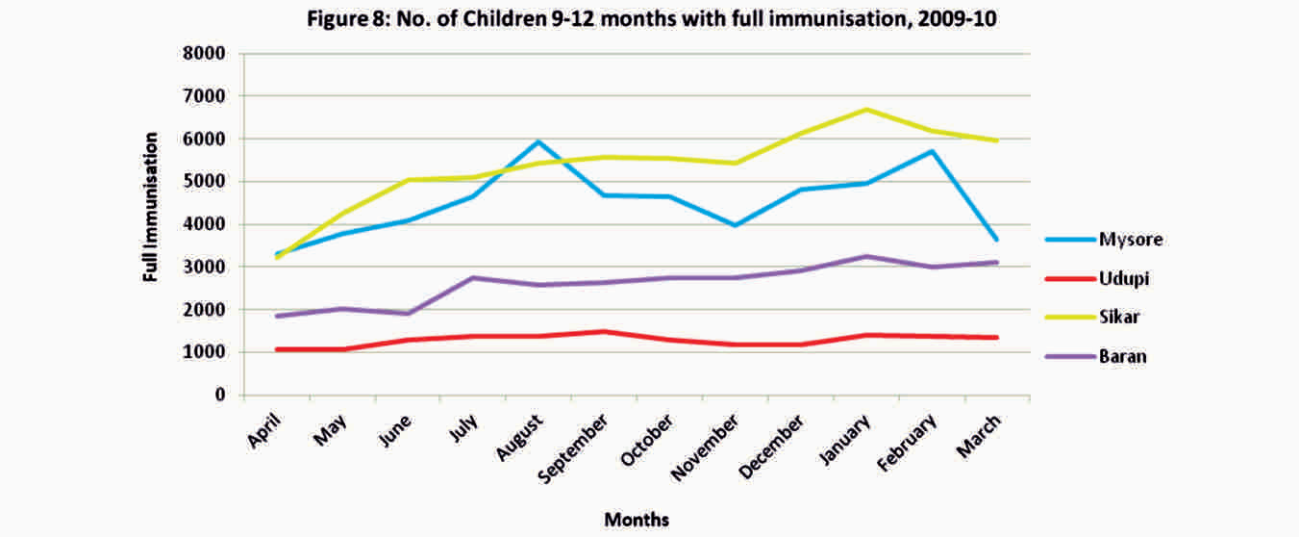
According to the table, the data on institutional deliveries from HMIS is reliable only for Mysore; the Udupi estimates are also only 0.4 per cent outside the range. But the Sikar and Baran data seem to be over-estimates because, with regard to ANC care, the data show fluctuations; some peaks and troughs need to be verified before computing rates.

3.8.4 Full immunization (12–23 months age children)

3.8.4.1 Seasonality in full immunization

The monthly data on full immunization is presented in Figure 7. All the districts show considerable fluctuation in full immunization of children between 12 and 23 months, derived from HMIS. On the other hand, we have also checked the quality of information provided in the HMIS on full immunization for children in the age range 12-23 months. The data seem to be of better quality than that provided for the 12- to 23-month range. Figure 8 presents the month-wise data on full immunization for children between 9 and 12 months.





The HMIS data cannot capture immunization at 12–23 months effectively because it necessitates information on the tracking of children at each immunization. The HMIS record is merely a compilation of the services provided for each immunization. As such, the data on full immunization at 9–12 months may be of better quality compared to the data at 12–23 months. We do not expect even special camps will lead to such peaks and troughs in full immunization although it is possible to have such fluctuations for specific immunization such as DPT, polio or measles in specific months. Therefore, it is apparent that there have been reporting problems, which need to be verified, particularly in Mysore and Sikar.

3.8.4.2 Range analysis

The data sources on full immunization at the district level for the latest available years are DLHS and HMIS.

Process for Range Analysis

Step I: Compile the data from different sources. (1) DLHS and (2) HMIS about the actual number of full immunizations for 2009–10.

Step II: Estimate the number of births for each district in the year 2009 from the district-level projections by UNFPA-IIPS. Number of Estimated Births = Projected Population in 2009 * Census 2001 Birth Rate.

Step III: Estimate the rate of full immunization, using both 9–11 months data and 12–23 months data from HMIS 2009–10.

Step IV: Estimate 90 per cent of the reported district-level, full immunizations, based on DLHS-3, as the lower limit and the highest proportion of full immunization across districts of the state as the upper limit of the range.

Step V: Check whether the recorded number of full immunizations in HMIS lies within the anticipated range.

Step VI: If this lies within expected range, it is AQ and can be used as such to monitor programmes; if not, it cannot be used to monitor programmes, and efforts should be made to improve the coverage and quality of data.

The tabulation, based on above steps, for the four districts are given in Table 17.

Table 17: Assessment of the Quality of Data on Full Immunization of Children from HMIS, 2009–10

District	Percentage of Full Immunization (12–23 months) DHLS 3 2007-08	No. of Full Immunizations (12–23 months) HIMS 2009-10	No. of Full Immunizations (9–11 months) HIMS 2009-10	Estimated Live Births 2009	Percentage of Full Immunizations (12–23 months) HIMS 2009-10	Percentage of Full Immunizations (9–11 months) HIMS 2009-10	Lower Limit of the Range (90% of DLHS-3)	Upper Limit of the Range Highest Level of Institutional Deliveries in the State (DLHS 3)	Quality HMIS (9-11 Months)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
State: Karnataka									
Mysore	91.1	47,608	54,198	54,241	87.8	99.9	82.0	96.1	NV
Udupi	86.8	10,484	15,396	16,927	61.9	91.0	78.1	96.1	AQ
State: Rajasthan									
Sikar	46.5	34,517	64,541	75,975	45.4	85.0	41.9	87.4	AQ
Baran	48.0	20,643	31,484	36,284	56.9	86.8	43.2	87.4	AQ

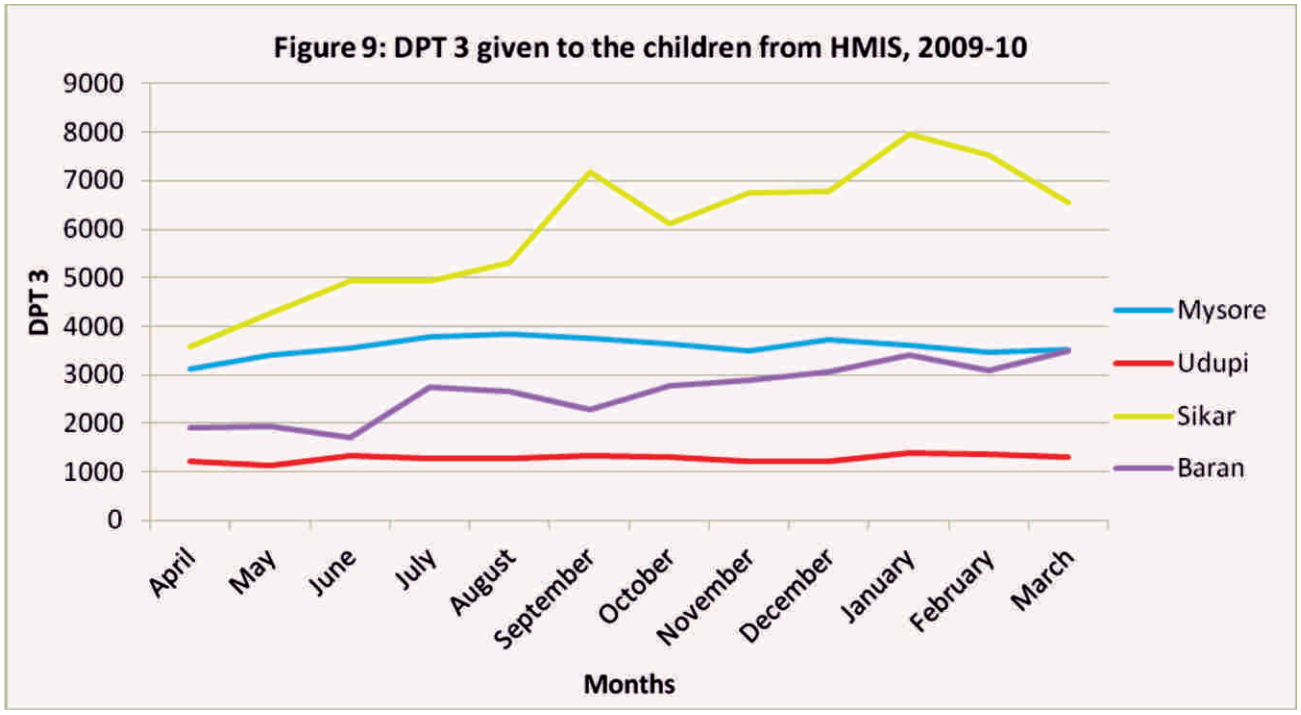
The table on full immunization shows that the data for 9–11 months are reliable, except for Mysore. On the other hand, for most districts, the estimates for 12–23 months full immunization are outside the range. It has been observed from the numerator analysis that the Mysore data on full immunization has considerable fluctuations, which need verification.

3.8.5 Acceptance of DPT 3

The HMIS data recorded at the sub-centre level often does not have a tracking system for children. As such, the capturing of full immunization is difficult and often has limitations. An alternative method of assessing full immunization is to consider data on the acceptance of DPT 3 or measles. It is often observed, however, that the DPT 3 dose may be a better indicator because those who accept DPT 3 are expected to have had all other doses of immunization as well.

3.8.5.1 Seasonality in DPT 3 given to children

We have also looked into the month-wise trend in DPT 3 for the four districts. Figure 9 presents the month-wise data on DPT 3 acceptors.



The month-wise DPT 3 acceptance data from Sikar and Baran show wide fluctuations whereas Udupi and Mysore depict a nearly neat curve. There is need to verify the data from Sikar because it shows peaks and troughs in some months. But it may be pointed out that for immunization of a particular dose, such peaks are possible if there had been any special efforts on the part of service providers to augment utilization of DPT through camps or other measures. Therefore, it is important to identify the reasons for such peaks and troughs before concluding on the quality of the data.

3.8.5.2 Range analysis

The data sources on DPT 3 at the district level for the latest available years are DLHS and HMIS.

Process for Range Analysis

Step I: Compile the data from DLHS and HMIS on DPT 3 acceptance for the latest available year.

Step II: Estimate the number of births in 2009 for each district from the district-level projections by UNFPA-IIPS.
Number of Estimated Births = Projected Population in 2009 * Census 2001 Birth Rate.

Step III: Estimate the rate of acceptance of DPT 3, using HMIS 2009–10 data.

Step IV: Estimate 90 per cent of the reported district-level DPT 3 acceptance, based on DLHS-3, as the lower limit and the highest proportion of DPT 3 acceptance across districts of the state as the upper limit of the range.

Step V: Check whether the recorded number of DPT 3 in HMIS lies within the anticipated range.

Step VI: If this lies within the expected range, it is AQ and can be used as such to monitor programmes; if not, it cannot be used to monitor programmes, and efforts should be made to improve the coverage and quality of data.

The tabulation, based on the above steps, for the four districts are presented in Table 18.

Table 18: Assessment of the Quality of DPT 3 Acceptors from HMIS, 2009–10

District	Percentage of DPT 3 (DHLS-3 2007–08)	HMIS (2009–10)	Estimated Live Births 2009	DPT 3 (HMIS 2009–10)	Lower Limit of the Range (90% of DLHS-3)	Upper Limit of the Range (Highest Level of DPT-3 Acceptance in the State) DLHS-3	Quality HMIS
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
State: Karnataka							
Mysore	97.5	42,965	54,241	79.2	87.8	99.2	NV
Udupi	86.6	15,383	16,927	90.9	77.9	99.2	AQ
State: Rajasthan							
Sikar	56.9	71,865	75,975	94.6	51.2	95.5	AQ
Baran	54.4	31,907	36,284	87.9	49.0	95.5	AQ

The pattern observed in full immunization is also found in DPT 3. The data from Mysore do not come in the expected range whereas all other districts fall in the anticipated range. However, it has already been pointed out that the Sikar data necessitates verification, given the fact that there has been considerable fluctuation over months.

3.9 Nutrition

The target set for improving the nutritional status in the MDG as well as in the Eleventh Five Year Plan is presented here in Table 19.

Table 19: MDG and Eleventh Five Year Plan Targets on Nutritional Status

MDG Target on Nutrition			
Goals and Targets	**Indicators for Monitoring Progress**	**Data Sources**	**Periodicity**
Target 1.C: Halve the proportion of people, who suffer from hunger, between 1990 and 2015.	1.1 Prevalence of underweight children under five years of age 1.2 Proportion of population below the minimum level of dietary energy consumption	DLHS-2 HMIS NA	Only collected once annually
Eleventh Five Year Plan Target on Nutrition			
4.	Reduce malnutrition among children of age group 0–3 to half its present level.		
5.	Reduce anaemia among women and girls by 50% by the end of the Plan.		

Data on district-level nutritional status is hard to get. DLHS-3 too has not collected information on nutritional status. As such, it is difficult to get information on nutritional levels although both the MDG and the Eleventh Five Year Plan have kept specific targets for nutritional improvements. HMIS provides some information on the nutritional level of children and pregnant woman. Table 20 presents the information available from HMIS.

Table 20: Nutritional Information Available from HMIS, 2009–10

Districts	No. of Pregnant Women Registered for ANC	No. of Women with Hb Levels <11 (Tested Cases)	No. of Women with Severe Anaemia (Hb <7) Treated at Institutions	Per Cent of Women with < 11 Hb	Per Cent of Women with < 7 Hb	No. of Live Births	No. of Newborns Weighed at Birth	No. of Newborns Less than 2.5 kg in Weight	Per Cent of Newborns Weighed	Per cent of Newborns < 2.5 kg
Mysore	50,601	18,329	2,023	36.2	4.0	40,916	39,267	7952	96.0	20.3
Udupi	16,837	8,040	91	47.8	0.5	14,592	14,562	706	99.8	4.8
Sikar	72,899	12,727	1,274	17.5	1.7	55,957	53,531	7365	95.7	13.8
Baran	33,615	6,123	308	18.2	0.9	24,032	21,295	4745	88.6	22.3

It is difficult to come to a conclusion about the quality of this information because there are no other sources of information currently available to find out the prevailing nutritional status in these districts. However, considering the anaemia level in pregnant women, it is clear that, except for Udupi, there is serious underestimation of the prevailing anaemia level.

Yet another source of data for nutritional status is the ICDS data. However, ICDS data is not available online, as in the case of HMIS; nevertheless, it is possible to obtain data for the districts from the respective states. ICDS provides information on children having moderately malnourished (Grade I and Grade II) and severely malnourished children (Grade III and IV) among those weighed by the ICDS programme. However, there is also difficulty in judging the quality of this data because no comparable information exists from other sources.

Therefore, it is important to compile these data from both HMIS and ICDS and make efforts to improve its quality by providing the estimates to the authorities at the district level and finding out the obvious discrepancies' across districts such as Udupi, one of the developed districts with highest level of malnourishment, compared to Baran or Sikar, which are poorer districts.

ASSESSING QUALITY OF SELECT DEVELOPMENT SECTORS DATA

4.1 Water Supply and Sanitation

The MDG for ensuring water supply and sanitation are presented in Table 21. The Eleventh Five Year Plan does not have any target on water supply and sanitation.

Table 21: MDG Indicators on Water Supply and Sanitation

MDG			
Goals and Targets	**Indicators for Monitoring Progress**	**Sources of Data**	**Periodicity**
Target 7.C: Halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation	7.1 Proportion of population using an improved drinking water source	Census DLHS	Decadal Five years
	7.2 Proportion of population using an improved sanitation facility	Census DLHS Rural Development Ministry	Decadal Five years Annual

The information on these indicators is available from DLHS-3 and also from the 2001 Census at the district level. Table 22 presents the data available from DLHS-3 and 2001 Census on these two indicators.

Table 22: Percentage of Households with Access to Pipe Water and Toilet Facilities

District	DLHS -3		2001 Census	
	Use Piped Drinking Water	**Have Access to Toilet Facilities**	**Use Piped Drinking Water**	**Have Access to Toilet Facilities**
Mysore	85.2	48.2	95.19	44.13
Udupi	21.0	76.9	19.51	56.29
Sikar	44.6	38.8	50.88	31.81
Baran	15.3	14.2	17.48	16.38

Census data and DLHS provide good information on the availability of safe drinking water and toilet facilities in households across districts. It is observed from the table that the availability of piped water is poor in Udupi. But this may be due to safe water being available in wells in these regions because the houses are located at a distance from each other. However, Udupi has the highest percentage of households with toilet facilities, both according to DLHS-3 and the Census data.

For regular monitoring of this programme, the Department of Drinking Water and Sanitation under the Ministry of Rural Development provides information on sanitation facilities at the household level. Table 23 presents data on toilet facilities among rural households. It is an ongoing programme and provides up-to-date data on households with toilet facilities. However, the figures available from this online data system are far lower than the estimates available in the Census or DLHS-3 for the whole district. At the same time, this provides a unique opportunity to monitor the progress of the work.

Table 23: Percentage of Rural Households with Toilet Facilities till August 2010

District	Total Households	Households with Toilets	Per Cent with Toilets
Mysore	304,720	1,11,635	36.64
Udupi	182,454	1,05,547	57.85
Sikar	1,58,767	634	0.40
Baran	3,22,586	68,377	21.20

Source: Ministry of Rural Development

4.2 Education

The MDG and the Eleventh Five Year Plan targets on education are presented in Table 24.

Table 24: MDG and Eleventh Five Year Plan Indicators of Education

MDG Targets for Educational Achievements			
Goals and Targets	**Indicators for Monitoring Progress**	**Sources of Data**	**Periodicity**
Target 2.A: Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling	2.1 Net enrolment ratio in primary education	DLHS DISE	5 years Annual
	2.2 Proportion of pupils starting grade 1 who reach the last grade of primary school	NA	NA
	2.3 Literacy rate of 15–24 year - olds, women and men	Census	Decadal

Target 3.A: Eliminate gender disparity in primary and secondary education, preferably by 2005, and in all levels of education no later than 2015	3.1 Ratio of girls to boys in primary, secondary and	DISE	Annual

Eleventh Five Year Plan Education Target	
1.	Reduce dropout rates of children from elementary school from 52.2% in 2003–04 to 20% by 2011–12.
2.	Develop minimum standards of educational attainment in elementary school, and by regular testing monitor effectiveness of education to ensure quality.
3.	Increase literacy rate for children of 7 years or above to 85%.
4.	Lower gender gap in literacy to 10 percentage points.
5.	Increase the percentage of each cohort going to higher education from the present 10% to 15% by the end of the plan.

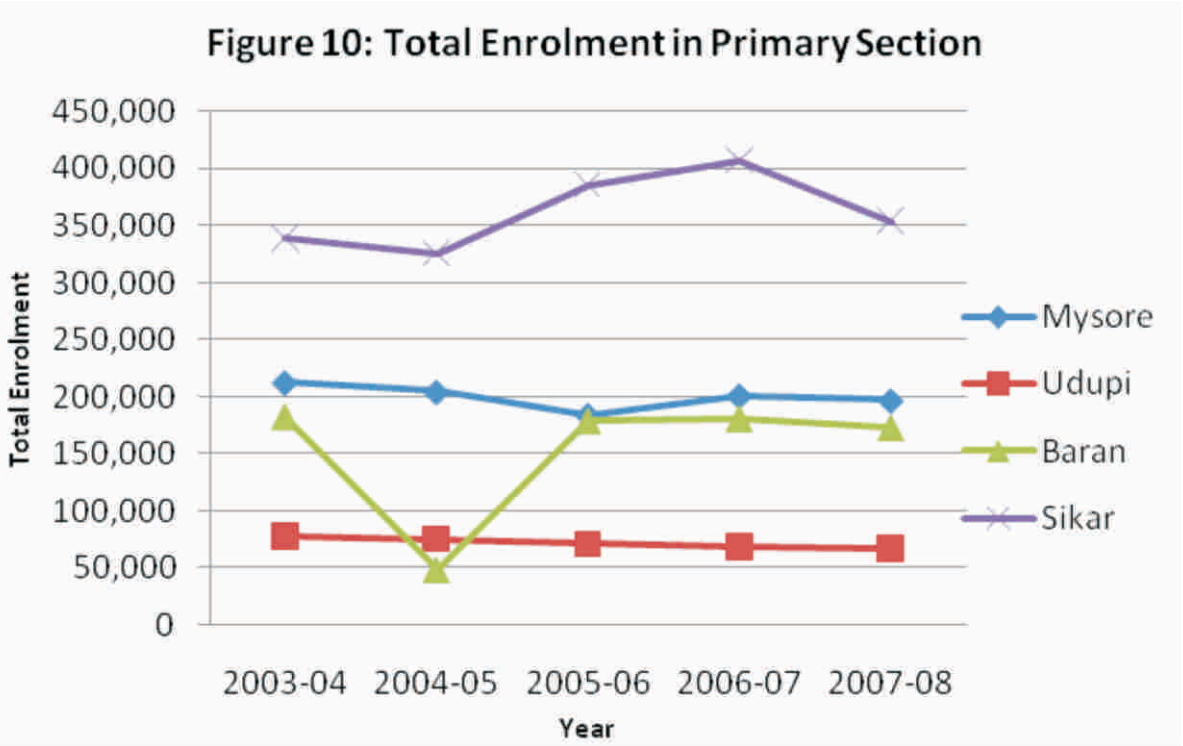
The following indicators (Table 25) are selected for measuring educational statistics at the district level. The major source of data available for monitoring educational statistics is DISE. There are no comparable surveys to check the quality of DISE data for many indicators. For whatever data available, we tried to compute comparable data so as to assess the quality of DISE data. In addition, the trend in the enrolment at different levels has also been looked into as a consistency check.

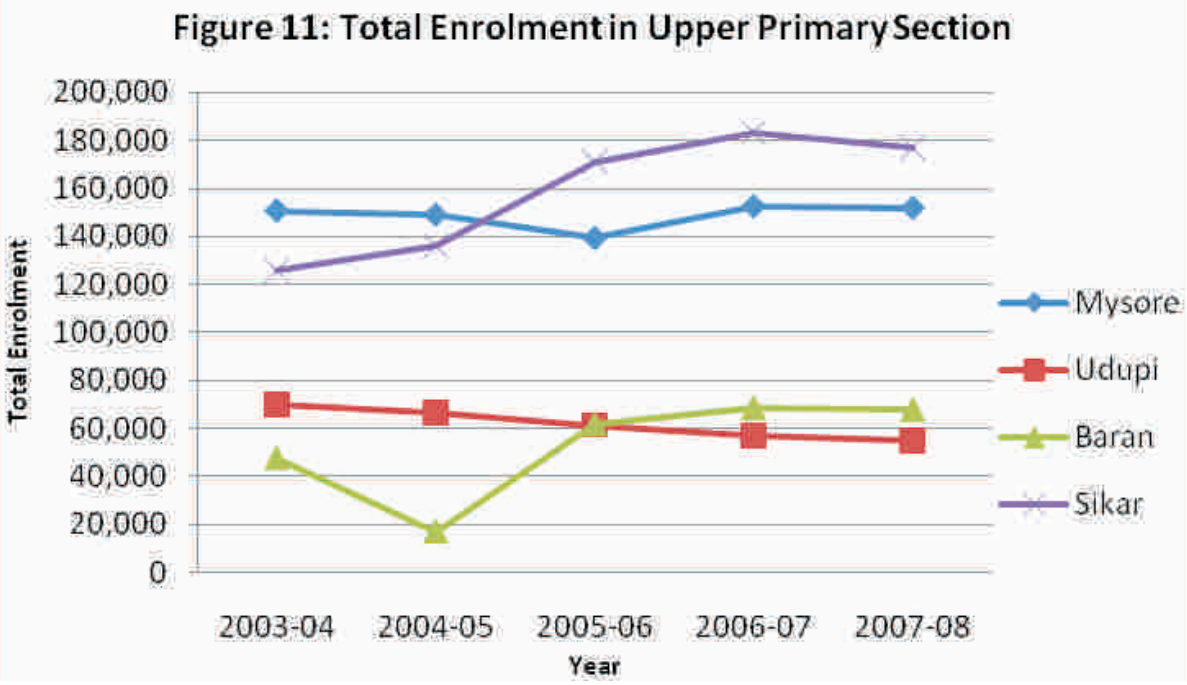
Table 25: Sources of Data for Educational Indicators

No.	Indicators	Type of Indicator	Sources of Data	Periodicity
1	School enrolment 6–14	Impact	(1) DLHS	5 years
			(2) DISE	AnnuaL
2	Literacy rate	Impact	Census	Decadal
3	Number of schools per village		DISE	Annual
4	Number of schools per lakh population		DISE	Annual
5	Number of teachers per lakh population		DISE	Annual
6	Pupil-teacher ratio—Primary		DISE	Annual
7	Pupil-teacher ratio—Upper Primary		DISE	Annual
8	NER—Primary		DISE	Annual
9	NER—Upper Primary		DISE	Annual

4.2.1 Trends in enrolment

To assess the quality of data available from DISE, we have also computed the yearly trends in the actual number of enrolment at the primary and upper primary levels (Figure 10 and 11).





The trends in enrolment again reveal considerable fluctuation in the case of Sikar and for one year in Baran. On the other hand, the districts in Karnataka show rather a smooth curve, indicating better quality of data in Karnataka districts. The same pattern was observed even in the case of health service data. Hence, it is important to verify the Baran and Sikar data, to find out the reasons for the sudden jump from one year to other.

4.2.2 Range analysis

The data sources on school enrolment 6–14 at the district level for the latest available years are two. (1) DLHS-3 (2) DISE.

Step I: Compile the data from different sources. (1) DLHS-3 2006-07 and (2) DISE the actual number of school enrolment 6–14 for 2008–09.

Step II: Estimate the number of children of 6–14 years for each district for the year 2008 from the district-level projection by UNFPA-IIPS.

Step III: Estimate the maximum number of school enrolment across districts of a state from the DLHS-3.

Step IV: Estimate the expected enrolment, within 20 per cent from the maximum, from the estimated population of 6–14 years in the district for the year 2008.

Step V: Check whether the recorded number of enrolments in DISE lies within the 20 per cent from the maximum.

Step VI: If this lies within 20 per cent from the maximum, it is AQ and can be used as such to monitor programmes; if not, it cannot be used to monitor programmes, and efforts should be made to improve the coverage and the quality of data.

The tabulation, based on above steps, for the four districts is presented in Table 26

Table 26: Assessment of the Quality of School Enrolment among Children Aged 6–14

Districts	Sex	% School Enrolment Ratio (DHLS-3, 2007–08)	Total School Enrolment (DISE 2007–08)	Projected 6–14 Population 2008	% School Enrolment Ratio (DISE 2007–08)	Lower Limit of the Range 80% of DLHS-3	Upper Limit of the Range Highest Level of Total Enrolment in the State from DLHS-3	Quality DISE
(1)	(2)	(3)	(4)	(5)	(6) = (4)/(5)	(7)	(8)	(10)
Mysore	Female	99.3	1,75,751	2,16,279	81.3	79.4	100	AQ
	Male	100.0	1,81,061	2,20,228	82.2	80.0	100	AQ
Udupi	Female	100.0	61,128	76,371	80.0	80.0	100	AQ
	Male	100.0	64,490	78,577	82.1	80.0	100	AQ
Sikar	Female	99.2	2,44,330	2,70,532	90.31	79.4	99.6	AQ
	Male	99.9	2,86,264	2,98,611	95.87	79.9	100	AQ
Baran	Female	96.8	1,08,466	1,17,008	92.70	77.4	99.6	AQ
	Male	98.4	1,31,987	1,31,391	100.45	78.7	100	NV

The table shows that the enrolment data available from DISE are of a reasonable quality in these selected districts because all are above 20 per cent from the expected level. Only in the case of male data in Baran is the enrolment slightly more than the maximum expected. However, the estimated enrolment ratio from DISE for Karnataka districts is far lower than the estimates available from DLHS-3 data. This can also be because of the denominator used in computing the enrolment ratio in the case of DISE data as the district-level projected 6–14 population is used as the denominator. On the whole, DISE data seem to be a good source of information in the educational sector to monitor the progress.

4.2.3 Other educational indicators

The DISE data also provide many other important indicators that can be used for monitoring educational statistics. These are provided in Table 27. Although it is difficult to assess the quality of these data precisely, some of these indicators provide an idea on the problems in the data sets.

Table 27: Education Related Indicators by Sources of Data

Indicators	Data		Name of Districts			
	Sources		Mysore	Udupi	Sikar	Baran
Literacy rate	Census (2001)	Male	70.9	88.2	85.2	76.9
		Female	55.8	75.2	56.7	42.2
		Total	63.48	81.2	70.9	59.5
GER—Primary	DISE (2007-8)		95.0	77.3	115.6	126.4
GER—Upper Primary	DISE (2007–8)		66.8	59.2	94.5	80.9
NER—Primary	DISE (2007–8)		83.6	68.7	80.3	100
NER—Upper Primary	DISE (2007–8)		51.6	47	65	56.4
Number of schools per village	DISE (2007–8)		1.54	3.71	3.72	2.06
Number of schools per lakh population	DISE (2007-8)		94.2	86.1	185.7	210.4
Number of teachers per lakh population	DISE (2007-8)		474.3	415.6	738.8	853.9
Pupil-teacher ratio—Primary	DISE (2007–8)		22	20	26	29
Pupil-teacher ratio-Upper Primary	DISE (2007–8)		31	29	27	28

Note:
DISE denotes 'District Information System of Education'. GER denotes Gross Enrolment Ratio
NER denotes Net Enrolment Ratio

The GER of Sikar and Baran is over 100 and that of Mysore and Udupi is unrealistically low. The NER, which is a better indicator, is also considerably low in the case of Udupi and Mysore, as compared to the two Rajasthan districts. This is unrealistic, given the nature of development in these states and the selected districts. Hence, comparison across states, using this data, may be difficult for these indicators.

4.3 Employment and Poverty

The MDG and the Eleventh Five Year Plan targets on education are presented in Table 28.

Table 28: MDG and Eleventh Five Year Plan Indicators on Poverty and Employment

MDG Targets on Poverty and Hunger			
Goals and Targets	**Indicators for Monitoring Progress**	**Sources of Data**	**Periodicity**
Target 1.A: Halve, between 1990 and 2015, the proportion of people whose income is less than one dollar a day	1.3 Proportion of population below $1 (PPP) per day[i] 1.4 Poverty gap ratio 1.5 Share of poorest quintile in national consumption	NA NSSO NA	Five years
Target 1.B: Achieve full and productive employment and decent work for all, including women and young people	1.6 Growth rate of GDP per person employed 1.7 Employment-to-population ratio 1.8 Proportion of employed people living below $1 (PPP) per day 1.9 Proportion of own-account and contributing family workers in total employment	NA NA NA NA	Annual

Eleventh Five Year Plan Poverty and Income	
1.	Accelerate GDP growth from 8 to 10% and then maintain at 10% in the 12th Plan in order to double per capita income by 2016–17
2.	Increase agricultural GDP growth rate to 4% per year to ensure a broader spread of benefits
3.	Create 70 million new work opportunities
4.	Reduce educated unemployment to below 5%.
5.	Raise real wage rate of unskilled workers by 20 per cent
6.	Reduce the headcount ratio of consumption poverty by 10 percentage points

Employment and poverty data at the district level are not routinely available. The employment data at the district level comes only from the decadal census. The poverty data by NSSO is available only at the state level. But estimates of poverty at the district level from NSSO have been computed by independent researchers. The percentage of households with BPL cards at the district level is also available from different sources. The attempt here is to look at the available information on employment and poverty in relation to the NREGA data, to understand the quality of data from MG-NREGA. Table 29 presents the possible indicators that can be used to monitor the programmes at the district level on employment and poverty.

Table 29: Sources of Data for Employment and Poverty

No.	Indicators	Type of Indicator	Sources of Data	Periodicity
1	Per cent of households holding BPL cards	Impact	(1) DLHS-3	5 years
2	Workforce participation		Census	Decadal
3	Percentage of main workers		Census	Decadal
4	Percentage of marginal workers		Census	Decadal
5	Percentage of non workers		Census	Decadal
6	Percentage of households with houses in good physical condition		Census	Decadal
7	Percentage of households with houses in livable conditions		Census	Decadal
8	Percentage of households living in dilapidated houses		Census	Decadal
9	Percentage of households registered for job under MG-NREGA		www.nrega.nic.in	Monthly

10	Percentage of people registered for jobs under MG-NREGA		www.nrega.nic.in	Monthly
11	Percentage of job cards issued		www.nrega.nic.in	Monthly
12	Percentage of households demanding			
	employment under MG-NREGA		www.nrega.nic.in	Monthly
13	Percentage of persons demanding employment under MG-NREGA		www.nrega.nic.in	Monthly
14	Percentage of households provided employment under MG-NREGA		www.nrega.nic.in	Monthly
15	Percentage of persons provided employment under MG-NREGA		www.nrega.nic.in	Monthly

4.3.1 Poverty BPL cards/Per cent poor

Table 30: Population Below the Poverty Line (BPL) and BPL card holders along with demand for NREGA

District	Percentage of Poor NSSO 2004-05	Percentage of BPL Households (BPL Survey)	Percentage of BPL cards (DHLS-3 2007-08)	Estimated Population 2008	Estimated Number of Households	Expected BPL Household	Expected Poor Household	Households Demanding Employment under MG-NREGA 2008–09	Households Provided Employment MG-NREGA 2008–09
(1)	(2)	(3)	(4)	(5)	(6) = (5)/5	(7) = (6)*(4)	(8)=(6)*(2)	(9)	(10)
Mysore	14.2	40.2	66.0	28,42,989	568598	3,75,275	80,741	13,032	12,682
Udupi	0.0	47.7	54.0	11,27,979	225596	1,21,822	0	1,584	1,508
Sikar	10.5	8.4	10.0	25,41,324	508265	50,827	53,368	1,45,029	144,834
Baran	6.5	28.7	26.0	11,43,414	228683	59,458	14,864	89,048	88,968

According to this table, there is no relationship between the number of poor households or those with BPL cards to that of the demand for NREGA. This could be because of the problems in the poverty estimates as well. The number of BPL cardholders is significantly higher in Karnataka districts than Rajasthan districts, indicating that most of the card holders may not come under BPL in Karnataka whereas the deserving households may not have received BPL cards in Rajasthan. The NSSO-based poverty estimates also provide some conflicting results with the highest percentage of population BPL being observed in Mysore among these selected four districts.

Table 31: Ratio of Households and Persons Provided Employment under MG-NREGA, 2008–09

District	No. of Registered Households under MG-NREGA	No. of Registered Persons under MG-NREGA	No. of Households Provided Employment under MG-NREGA	No. of persons Provided Employment under MG-NREGA	No. of Households that Demanded Employment under MG-NREGA	Ratio of Households Provided Employment to Households Registered	Ratio of Persons Provided Employment to Total Registered
(1)	(2)	(3)	(4)	(5)	(6)	(7) = (4)/(2)	(8) = (5)/(3)
Mysore	1,51,642	3,84,917	12,682	23,428	13,063	8.4	6.1
Udupi	31,886	60,452	1,508	2,061	1,584	4.7	3.4
Sikar	2,87,441	5,76,546	1,45,047	1,94,361	1,45,052	50.5	33.7
Baran	2,03,715	5,89,056	1,33,994	1,35,855	134047	65.8	23.1

According to the available data, less than 10 per cent of the households registered are provided employment in Karnataka districts and the ratio is around 50 per cent in the case of Rajasthan districts. Perhaps, it shows that there has been no serious demand for jobs in Karnataka districts, in line with the poverty situation of these districts. The households that demanded employment and the employment provided remained nearly the same in all these districts.

SUMMARY AND CONCLUSIONS

(a) There are simple techniques available now or that can be innovated, specific to a programme, to assess the quality of data on service statistics such as HMIS, CRS and DISE. We have illustrated a few using mostly administrative statistics data. The principles underlying these techniques are described in the section on methodology and the examples in specific situations in later sections. Essentially, the approach is to compare service statistics figures with data from other sources on an ongoing basis and studying monthly or seasonal trends in the figures reported, to identify unusual peaks and troughs.

(b) It is observed that administrative statistics can be a useful source of information to measure demographic indicators at the district level. However, many of the indicators currently available are of varied quality in different districts. Whereas most of the statistics, except the mortality figures, are good for two selected districts of Karnataka, it was not the case with Rajasthan districts. Indirect methods provide relief for the poor quality districts but this is not possible for all the MDG or Eleventh Five Year Plan indicators.

(c) The CRS on births and deaths can be a good potential source of information, to estimate several important indicators at the district or sub-district levels. At present, however, the data available from the CRS at the district level are highly limited. For instance, the data on the age of death and birth order are not published at the district level. Hence, it is necessary that CRS make necessary changes to get all the information gathered at the district level, which may be useful for monitoring.

(d) For reproductive and child health indicators, the HMIS is the only important and useful source for monitoring. Strengthening HMIS will provide good quality data on many indicators that can be monitored at the district level. This necessitates continuous assessment of the quality of data both in coverage and content and for making necessary corrections.

(e) When the quality of data using events reported in a year or a month is adjudged to be of 'poor' quality, the first administrative step to be taken is to ensure that data from all the reporting units are included in the data set. In many situations, the reported data are

deficient in coverage such as in the CRS and some variables of HMIS. Coverage errors or gaps in reporting should be corrected first.

(f) For water supply, sanitation and education, there are currently online management information systems. Whereas DISE provides an excellent information base for educational statistics at the district level, the information available on water supply, sanitation, etc., from the source is scanty. Perhaps, revitalizing the data system would provide the programme managers an excellent tool to effectively monitor the programme.

(g) If the quality of data on the basis of monthly trends is good (no unusual peaks or troughs) but the overall numbers are deficient, this implies definitely under-reporting or missing data from one or more reporting units. This is one of the reasons that, for almost every variable, we have included the analysis of monthly trends with evaluation of overall rates or number of events.

(h) There is need to set up regular on-going centres for evaluation and assessment of administrative statistics at the state level.

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UNFPA, the United Nations Population Fund, is an international development agency that promotes the right of every woman, man and child to enjoy a life of health and equal opportunity. UNFPA supports countries in using population data for policies and programmes to reduce poverty and to ensure that every pregnancy is wanted, every birth is safe, every young person is free of HIV/AIDS, and every girl and woman is treated with dignity and respect.

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