UNIT 4 HEALTH MANAGEMENT INFORMATION SYSTEM

Structure

4.0 INTRODUCTION

Health Management Information System is an essential component of health care system. It forms a base upon which the health services can be moulded and improved upon. It deals with data related to health, their generation, transmission, output and finally the dissemination and feedback, to make full utilisation of such a system. It can range from a collection of data in a paper form and passing it on to the next level or in a modern world, a complex network of data collection, entry, software, internet, data analysis and reporting. For a health manager, understanding the importance of health information and ability to manage it becomes a vital function to bring about positive changes in health care.

4.1 OBJECTIVES

By the end of this unit, the learner should be able to:

- explain the concept of HMIS;
- enumerate the uses of HMIS;
- describe on the components of HMIS; and
- describe data errors and ways to ensure quality of data;

4.2 USES OF HEALTH MANAGEMENT INFORMATION SYSTEM (HMIS)

HMIS has many purposes, depending upon the level at which it is analysed and utilized. It helps to:

1) Make sense of the data that is collected for various programmes

2) Monitor and evaluate health services and programmes
3) Provide feedback to the health facilities about their own performance individually
4) Compare performance of neighbouring blocks, regions, states, etc.
5) Prepare reports for the block, district, state and country regarding health status and give a clear picture of progress
6) Implement corrective measures in the services and programmes to improve efficiency
7) Reveal the areas that are weak and focus on them for intervention and research.

4.3 COMPONENTS OF HMIS

After going through the uses of HMIS, let us now read in details about various components of HMIS as follows:

4.3.1 Data Elements

Data elements: The basic unit in HMIS is data, and data element is a record of a health event or a health related event. The number and nature of data elements collected at each level will vary. It depends upon the services provided by that level.

Each of these data elements will represent one aspect of health care e.g. institutional delivery, and a collection of these will represent one component of a health programme e.g. maternal health will be represented by place of delivery, antenatal care, postnatal care, complications after childbirth, etc. These data elements will be the ones that will feature in the facility's reports.

Table 4.1: Number of data elements at facility level formats

Section		Sub-Centre	Primary Health Centre	Community Health Centre/ Sub-divisional Hospital/ District Hospital
1	Antenatal care	8	9	10
2	Deliveries	9	5	5
3	Caesarean Section	-	1	1
4	Pregnancy Outcome	7	7	7
5	Complicated pregnancies	-	4	5
6	MTP	-	3	2
7	RTI/STI	-	3	3
8	Post natal care	2	3	3
9	Family planning	12	17	17
10	Child immunisation	28	27	28
11	Vitamin A	3	3	3
12	Childhood diseases	3	9	9
13	Other programmes	-	4	6
14	Patient Services	2	17	20
15	Lab Test	2	15	15
	Total	**76**	**127**	**134**

Data element need to be specific and well defined, or else it can lead to inaccurate data and wrong reporting. Following are the data elements and their brief details contained in the reporting format of a sub-centre shown in Table 4.1. It has three parts:

Part A. Reproductive and Child health (M1–M8)

Part B. Health Facility Services (M9–M10)

Part C. Mortality details (M11)

Table 4.2: Data elements in the reporting format of sub-centre

Part A. Reproductive and Child Health

	Data Elements
M1	**Antenatal Care Services (ANC)**
11.1	***Data Element :*** Total number of pregnant women Registered for ANC ***Data Element :*** Of which Number registered within first trimester **Data Source –** Antenatal Register / Pregnancy Register **New data element:** Number of Pregnancy test Kits used at SC level
2	***Data Element :*** New women registered under JSY **Data Source –** JSY Register
3	***Data Element :*** *Number of pregnant women received 3 ANC check ups* **Data Source –** Antenatal Register / Pregnancy Register
4 **4.1** **4.2**	***Number of pregnant women given*** ***Data Element :*** *TT1* ***Data Element :*** *TT-2 or Booster* **Data Source –** Antenatal Register / Pregnancy Register
5	***Data Element :*** *Total number of pregnant women given 100 IFA tablets* **Data Source –** Antenatal register / Pregnancy Register
6	***Pregnant women with Hypertension (BP>140/90)*** ***Data Element :*** *New cases detected at institution* **Data Source –** Antenatal Register / Pregnancy Register
7 **7.1**	**Pregnant women with Anaemia** **Data Element :** *Number having Hb level<11 g/dl (tested cases)* **Data Source –** Antenatal Register / Pregnancy Register / Laboratory Register
M2	**Deliveries**
8 **8.1**	***Deliveries conducted at Home*** *Number of Home Deliveries attended by:* a) ***Data Element :*** *SBA Trained (Doctor/Nurse/ANM)* b) ***Data Element:*** *Non SBA (TBA/Relatives/etc.)*
8.2	***Data Element :*** *Number of newborns visited within 24 hours of home delivery*
8.3	***Data Element :*** *Number of mothers paid JSY incentive for home deliveries* **Data source –** for 8.1–8.3 will be delivery register.

9 9.1	***Data Element :*** *Deliveries conducted at facility* ***Data Element :*** *Of which Number discharged under 48 hours of delivery* **Data Source –** Labour Room Register/Delivery Register
9.2	***Number of cases where JSY incentive paid to*** a) ***Data Element :*** *Mothers* b) ***Data Element :*** *ASHAs* c) ***Data Element :*** *ANM or AWW (only for HPS States)* **Data Source** – Pregnancy Register and JSY Register
M3	***Pregnancy Outcome and details of newborn***
	Definition: Pregnancy outcome, here (in the sub-Centre format), is the sum of live births, stillbirths, and spontaneous abortions.
10 10.1 10.2 10.3	***Pregnancy Outcomes (in number)*** ***Live Birth*** a) *Data Element : Male* b) *Data Element : Female* ***Data Element :*** *Still Birth* ***Data Element :*** *Abortion (spontaneous/induced)* **Data Source** – Pregnancy Register/Labour Room Register
11 11.1 11.2	***Details of Newborn children weighed*** ***Data Element :*** *Number of Newborns weighed at birth* ***Data Element :*** *Number of Newborns having weight less than 2.5 kg* **Data Source** – Pregnancy Register/ Labour Room Register
12	***Data Element :*** *Number of newborns breast fed within 1 hour* **Data Source** – Pregnancy Register/ Child Care Register
M4	**Postnatal care**
	First six-weeks period (42 days) after delivery is called post-partum postnatal period. However, information as required, against the respective data element is only to be reported.
13	***Data Element :*** *Women receiving post partum check-up within 48 hours after delivery* **Data Source –** Inpatient Register/Pregnancy Register
14	***Data Element :*** *Women getting a post partum check-up between 48 hours and 14 days* **Data Source –** Inpatient Register/Pregnancy Register
M5	**Family Planning**
	Family planning methods regulate the number and spacing of children in a family through use of contraceptives or other methods of birth control.
15 15.1	***Data Element :*** *Number of new IUD Insertions* ***Data Element :*** *At facility* **Data Source –** Family Planning Register

16	***Data Element :*** *Number of IUD removals* **Data Source –** Family Planning Register
17	***Data Element :*** *Number of oral pills cycles distributed* **Data Source –** Family Planning Register/ Inventory Register
18	***Data Element :*** *Number of condom pieces distributed* **Data Source –** Family Planning Register/ Inventory Register
19	***Data Element :*** *Number of centchroman (weekly) pills given* **Data Source –** Family Planning Register/Inventory Register
20	***Data Element :*** *Number of emergency contraceptive pills distributed* **Data Source –** Family Planning Register/Inventory Register
21	***Quality in sterilisation services***
21.1	***Number of complications following sterilisation*** a) ***Data Element:*** *Male* b) ***Data Element :*** *Female* **Data Source –** Family Planning Register/OPD Register
21.2	***Number of failures following sterilisation*** a) ***Data Element :*** *Male* b) ***Data Element :*** *Female*
21.3	***Number of deaths following sterilisation*** **Guidelines** a) ***Data Element :*** *Male* b) ***Data Element:*** *Female* **Data Source –** Family Planning Register/OPD Register
M6	**Child Immunisation**
22	***Number of Infants 0 to 11 months old who received the following:*** **Data Source –** Immunisation Register
22.1	***Data Element:*** *BCG*
22.2	***Data Element:*** *Pentavalent 1*
22.3	***Data Element:*** *Pentavalent 2*
22.4	***Data Element:*** *Pentavalent 3*
22.5	***Data Element:*** *OPV 0 (Birth Dose)*
22.6	***Data Element :*** *OPV1*
22.7	***Data Element :*** *OPV2*
22.8	***Data Element :*** *OPV3*
22.9	***Data Element :*** *Hepatitis-B1*
22.10	***Data Element:*** *Hepatitis-B2*
22.11	***Data Element*** : *Hepatitis-B3*
22.12	***Data Element :*** *Measles*
22.1	***New data element:*** *Measles 2nd dose and Hepatitis B0* ***Data Element*****:** *Total number of children aged between 9 and 11 months who have been fully immunised (Child given one dose of BCG, three dosages of DPT i.e., DPT 1,2,3; three dosages of polio i.e,. OPV 1,2,3 and a dosage of Measles)* **Data Source –** Immunisation Register

23	***Data Element :*** *Number of children more than 16 months who received the following*
23.1	***Data Element :*** *DPT Booster*
23.2	***Data Element :*** *OPV Booster*
23.3	***Data Element :*** *Measles, Mumps, Rubella (MMR) Vaccine* **Data Source –** Immunisation Register
24	***Immunisation Status***
24.1	**Total number of children aged between 12 and 23 months who have been fully immunised** *(Child given one dose of BCG, three dosages of DPT i.e,. DPT 1,2,3; three dosages of polio i.e., OPV 1,2,3 and a dosage of Measles)* during the month. **Data Source – Immunisation Register** a) ***Data Element :*** *Male* b) ***Data Element :*** *Female*
24.2	***Data Element :*** *Children more than 5 years given DT5*
24.3	***Data Element:*** *Children more than 10 years given TT10*
24.4	***Data Element*** **:** *Children more than 16 years given TT16*
24.5	***Data Element*** **:** *Adverse Event Following Immunisation (AEFI)* a) ***Data Element*** **:** *Abscess* b) ***Data Element :*** *Death* c) ***Data Element :*** *Others* **Data Source for 24.2-24.5 –** Immunisation Register/OPD Register IPD Register
25	***Number of immunisation sessions during the month:***
25.1	***Data Element :*** *Planned*
25.2	***Data Element :*** *Held*
25.3	***Data Element :*** *Number of sessions where ASHAs were present* **Data Source for 25 –** Immunisation Planning Register
26	***Data Element:*** *Others* [Japanese Encephalitis (JE) etc. Please Specify] **Data Source –** Immunisation Planning Register
M7	**Number of Vitamin A doses**
27	***Administered between 9 months and 5 years*** **Data Source –** Immunisation Register
M8	**Number of cases of childhood diseases reported during the month (0-5 years)**
	Guideline: Sub-Centres will only report those cases that report to SC or are treated at home.
28	***Data Element :*** *Measles* **Data Source –** OPD Register/IPD Register
29	***Data Element :*** *Diarrhoea and dehydration* **Data Source –** OPD Register/IPD Register

30	***Data Element :*** *Malaria* **Data Source –** OPD Register/IPD Register/Lab Register

Part B. Health Facility Services

M9	**Patient services**
31	**Data Element:** Number of Aanganwadi centers reported to have conducted VHNDs during the month **Data Source** –VHND Register
32 32.1	**Outpatient** **Data Element :** OPD Attendance (All) **Data Source** – OPD Register
M10	**Laboratory Testing**
33 33.1 33.2	**Lab Tests** **Data Element:** Number of Hb tests conducted **Data Element:** Of which number having Hb< 7 gm **Data Source** – Lab Register

Part C. Mortality details

	This section deals with compiling data on deaths by major causes.The probable cause of death is to be reported against ONE and ONLY ONE major cause. In certain cases, death may have occurred due to multiple reasons or reasons unknown. In such cases, the information of the deceased is to be captured by the nearest probable cause of death. Deaths occurring at home are to be reported in the Health sub-centre Form.
M 11	***Number of deaths reported at sub-centre or at home during the month***
34	***Data Element:*** *Infant deaths within 24 hrs of birth* **Data Source –** Death Register
35 35.1 35.2 35.3 35.4	***Infants deaths up to 4 weeks by cause*** **Up to 1 week of Birth** Total infant deaths up to 1 week of birth during the reporting month. **Between 1week and 4 weeks of birth** Total infant deaths between 1 week and 4 weeks of birth during the reporting month. ***Data Element:*** *Sepsis* ***Data Element:*** *Asphyxia* ***Data Element:*** *Low Birth Weight (LBW) for children up to 4 weeks of age only* ***Data Element:*** *Others* **Data Source –** Death Register
36	***Infant / child deaths up to 5 years by cause*** **Between 1 month and 11 months** Total infant/child deaths between 1 and 11 months of birth during the reporting month.

	Between 1 year and 5 years Total child deaths between 1 and 5 years of birth during the reporting month.
36.1	***Data Element:*** *Pneumonia*
36.2	***Data Element:*** *Diarrhoea*
36.3	***Data Element:*** *Fever related*
36.4	***Data Element:*** *Measles*
36.5	***Data Element:*** *Others*
	Data Source – Death Register
37	***Adolescents and adults deaths by cause*** ***6-14 Yrs:*** Total adolescent deaths between 6 and 14 years of age during the reporting month. ***15-55 Yrs:*** Total adolescent/adult deaths between 15-55 years of age during the reporting month. ***Above 55 yrs:*** Total adult deaths above 55 years of age during the reporting month.
37.1-	Causes of death in adolescents and adults
37.7	
37.9	***Maternal*** Death of a pregnant woman from any cause related to or aggravated by pregnancy or its management, but not from accidental or incidental causes, during antenatal period, labour or up to 6 weeks after pregnancy. a) Data Element: Abortion b) Data Element: Obstructed/prolonged labour c) Data Element: Severe hypertension/fits d) Data Element: Bleeding e) Data Element: High fever f) Data Element: Other causes (including causes not known)
37.10	Data Element: Trauma/accidents/burn cases
37.11	Data Element: Suicide
37.12	Data Element: Animal bites and stings
37.13	Other Diseases a) Data Element: Known acute disease b) Data Element: Known chronic disease c) Data Element: Causes not known
	Data Source – Death Register

In addition to the above, PHCs/CHCs/SDH/DH will have data elements related to more components according to the services provided at those facilities. Data elements related to these components will be available in their reporting formats:

- Number of caesarean sections done at the facility
- Number of spontaneous and Induced abortion
- Number of cases of pregnant women with Obstetric Complications and attended at Public facilities

- Complicated pregnancies treated at the facility, IV antibiotics, IV anti-hypertensive's and IV oxytocis
- Postnatal care maternal complications
- Medical termination of pregnancy performed
- RTI/STD treated
- Sterilisations done; male and female
- In laboratory, more investigations will feature like Widal's, HIV, etc
- Availability of sick newborn and child care unit
- Presence of Rogi Kalyan Samitis, Ambulance, patient transportation, etc.

4.3.2 Recording and Reporting Formats

Recording

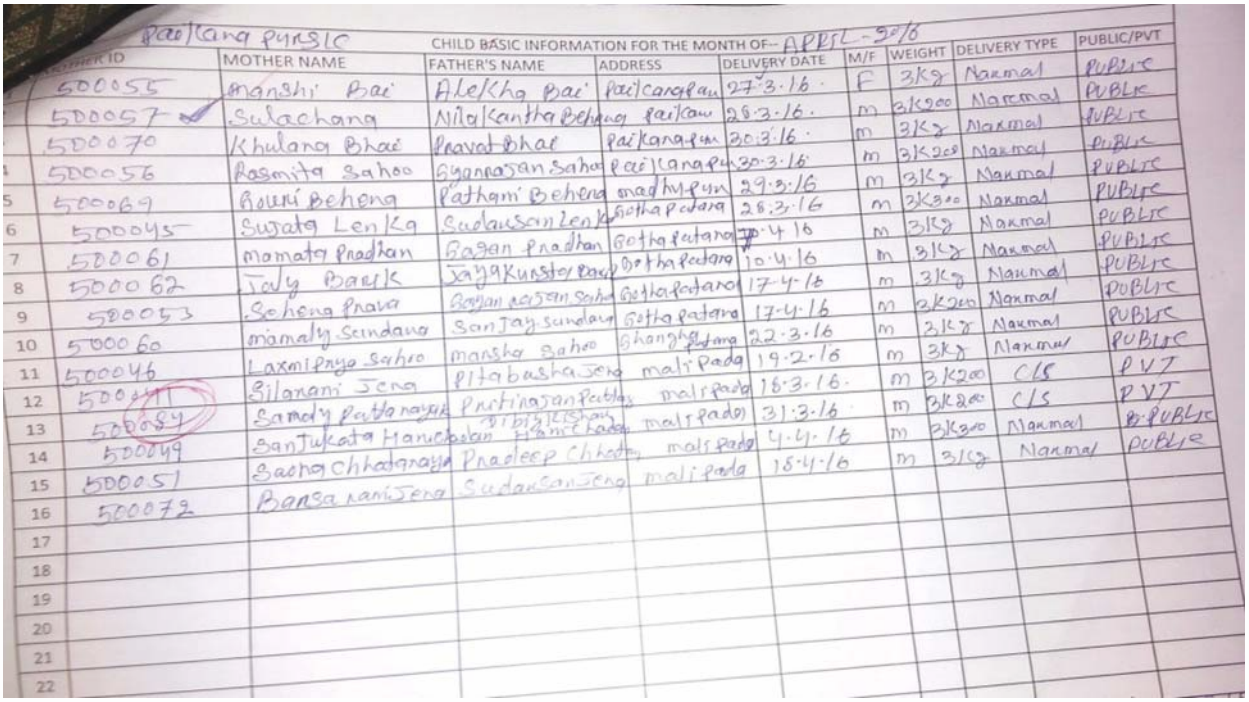
Data is recorded at the health facilities in various registers and data formats. At sub-centre level, an ANM and male health worker maintain a number of registers:

Registers in sub-centre:

1) Eligible Couple Register including Contraception
2) Maternal and Child Health Register:
   a) Antenatal, intra-natal, postnatal
   b) Under-five register:
      i) Immunisation
      ii) Growth monitoring
3) Births and Deaths Register
4) Drug Register
5) Equipment Furniture and other accessories Register
6) Communicable diseases/ Epidemic Register
7) Passive surveillance register for malaria cases
8) Register for records pertaining to Janani Suraksha Yojana
9) Register for maintenance of accounts including untied funds
10) Register for water quality and sanitation
11) Minor ailments Register
12) Records/registers as per various National Health Programme guidelines (NLEP, RNTCP, NVBDCP, etc.)

At PHC and above, there will be more registers, according to the services they provide and the facilities they have like MTP register, Operation theatre register, In patient register, etc.

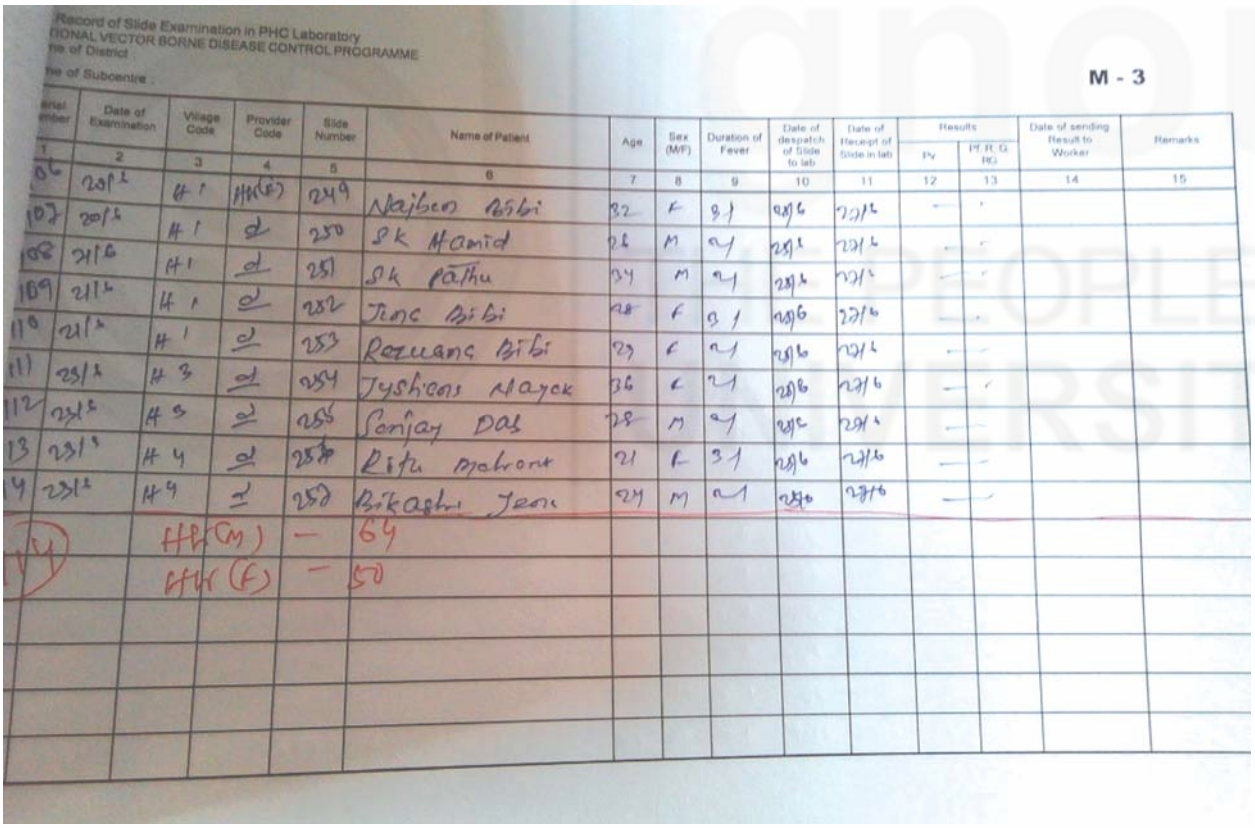
Recording of cases is done as line list in standard formats shown in Fig.4.1 and Fig. 4.2. This will have the details of each individual case. It can be reported as such from lower level facility as they will have limited number of cases. Information for the reporting formats will be derived from the line lists.



CHILD BASIC INFORMATION FOR THE MONTH OF- APRIL - 2016

Sl.	ID	MOTHER NAME	FATHER'S NAME	ADDRESS	DELIVERY DATE	M/F	WEIGHT	DELIVERY TYPE	PUBLIC/PVT
1	500055	Manshi Bai	Alekha Bai	Paikanapau	27.3.16	F	3Kg	Normal	PUBLIC
2	500057	Sulochana	Nilakantha Behera	Paikana	28.3.16	m	3K200	Normal	PUBLIC
3	500070	Khulana Bhoi	Pravat Bhoi	Paikanapau	30.3.16	m	3Kg	Normal	PUBLIC
4	500056	Rasmita Sahoo	Gyanarsan Sahoo	Paikanapau	30.3.16	m	3K200	Normal	PUBLIC
5	500069	Bouri Behera	Pathani Behera	madhupur	29.3.16	m	3Kg	Normal	PUBLIC
6	500045	Sujata Lenka	Sudarsan Lenka	Gotha Patara	28.3.16	m	3K300	Normal	PUBLIC
7	500061	Mamata Pradhan	Bagan Pradhan	Gotha Patara	7.4.16	m	3Kg	Normal	PUBLIC
8	500062	Jaly Barik	Jaya Kuntey Barik	Gotha Patara	10.4.16	m	3Kg	Normal	PUBLIC
9	500053	Sohena Prava	Bagan Sahoo Sahu	Gotha Patara	17.4.16	m	3K200	Normal	PUBLIC
10	500060	Mamaly Sundara	Sanjay Sundara	Gotha Patara	22.3.16	m	3Kg	Normal	PUBLIC
11	500046	Laxmipriya Sahoo	Mansha Sahoo	Ghanghpatang	19.2.16	m	3Kg	Normal	PUBLIC
12	500041	Silanani Jena	Pitabasha Jena	mali Pada	16.3.16	m	3K200	C/S	PVT
13	500084	Samaly Pattanayak	Purtinasan Patra	mali pada	31.3.16	m	3K200	C/S	PVT
14	500049	Sanjukata Hanuparan	Pitabasha Jena	mali pada	4.4.16	m	3K300	Normal	PUBLIC
15	500051	Sachachhatarayan	Pradeep Chhotray	mali pada	15.4.16	m	3Kg	Normal	PUBLIC
16	500072	Bansa Rani Jena	Sudarsan Jena	mali pada					

Fig. 4.1: Line list of delivery cases



Record of Slide Examination in PHC Laboratory
TIONAL VECTOR BORNE DISEASE CONTROL PROGRAMME

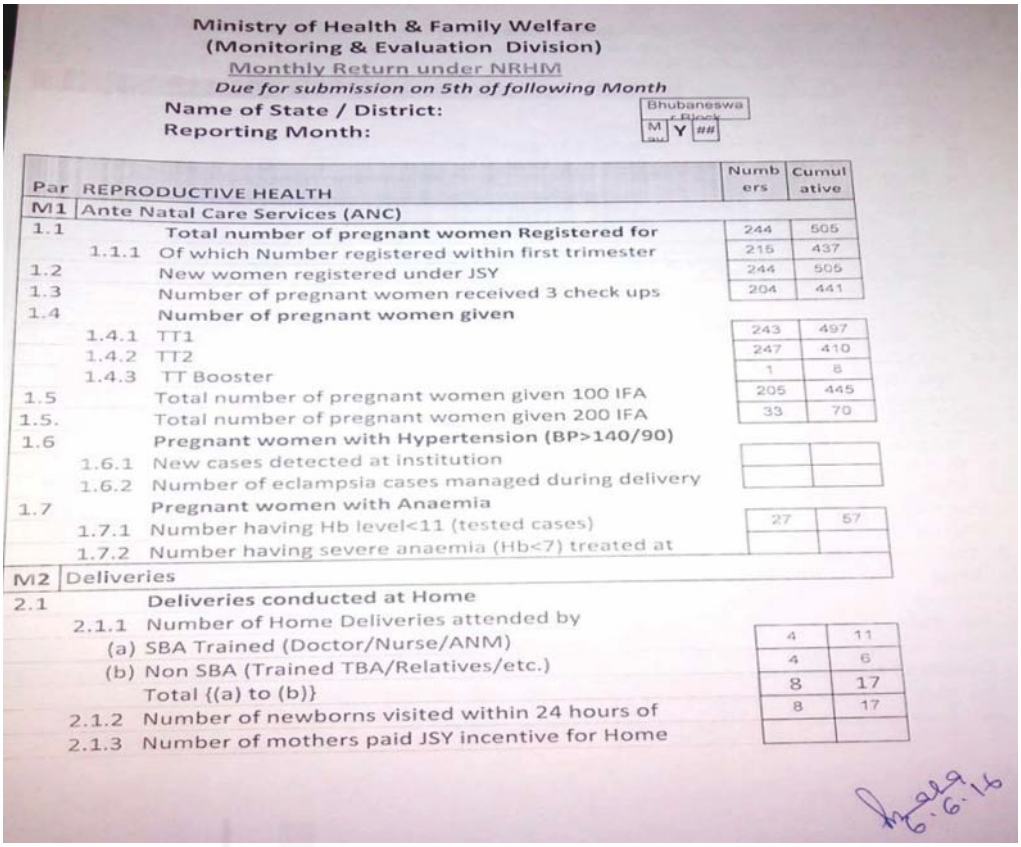
M - 3

Serial Number	Date of Examination	Village Code	Provider Code	Slide Number	Name of Patient	Age	Sex (M/F)	Duration of Fever	Date of despatch of Slide to lab	Date of Receipt of Slide in lab	Results		Date of sending Result to Worker	Remarks
											Pv	P.F. G PG		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
06	20/4	H1	HH(F)	249	Najben Bibi	32	F	8 y	23/6	23/6	—	—		
107	20/4	H1	d	250	SK Hamid	26	M	2 y	23/6	23/6	—	—		
108	21/6	H1	d	251	SK Pathu	34	M	2 y	23/6	23/6	—	—		
109	21/4	H1	d	252	Jane Bibi	28	F	8 y	23/6	23/6	—	—		
110	21/4	H1	d	253	Rezuane Bibi	23	F	2 y	23/6	23/6	—	—		
111	23/4	H3	d	254	Jyshiens Mayek	36	F	2 y	23/6	23/6	—	—		
112	23/4	H3	d	255	Sanjay Das	28	M	2 y	23/6	23/6	—	—		
113	23/4	H4	d	256	Ritu Mahant	21	F	3 y	23/6	23/6	—	—		
114	23/4	H4	d	257	Bikash Jena	24	M	2 y	23/6	23/6	—	—		
14		HH(M)	—	64										
		HH(F)	—	50										

Fig.4.2: Line list of fever cases whose slides were taken for malaria test

Reporting formats

The reporting formats of different facilities will contain data elements relevant to that level. The number and nature of data elements will vary depending upon the facility. Fig. 4.3 shows monthly reporting format for the health facility.



Ministry of Health & Family Welfare
(Monitoring & Evaluation Division)
Monthly Return under NRHM
Due for submission on 5th of following Month
Name of State / District: Bhubaneswa r Block
Reporting Month: M Y ##

Par	REPRODUCTIVE HEALTH	Numbers	Cumulative
M1	Ante Natal Care Services (ANC)		
1.1	Total number of pregnant women Registered for	244	505
1.1.1	Of which Number registered within first trimester	215	437
1.2	New women registered under JSY	244	505
1.3	Number of pregnant women received 3 check ups	204	441
1.4	Number of pregnant women given		
1.4.1	TT1	243	497
1.4.2	TT2	247	410
1.4.3	TT Booster	1	8
1.5	Total number of pregnant women given 100 IFA	205	445
1.5.	Total number of pregnant women given 200 IFA	33	70
1.6	Pregnant women with Hypertension (BP>140/90)		
1.6.1	New cases detected at institution		
1.6.2	Number of eclampsia cases managed during delivery		
1.7	Pregnant women with Anaemia		
1.7.1	Number having Hb level<11 (tested cases)	27	57
1.7.2	Number having severe anaemia (Hb<7) treated at		
M2	Deliveries		
2.1	Deliveries conducted at Home		
2.1.1	Number of Home Deliveries attended by		
	(a) SBA Trained (Doctor/Nurse/ANM)	4	11
	(b) Non SBA (Trained TBA/Relatives/etc.)	4	6
	Total {(a) to (b)}	8	17
2.1.2	Number of newborns visited within 24 hours of	8	17
2.1.3	Number of mothers paid JSY incentive for Home		

6.6.16

Fig. 4.3: Monthly reporting format for the health facility

Other reporting formats

- National vector borne disease control programme
- Integrated Disease Surveillance Programmes
- Revised National Tuberculosis Control Programme (RNTCP) Fig.4.4

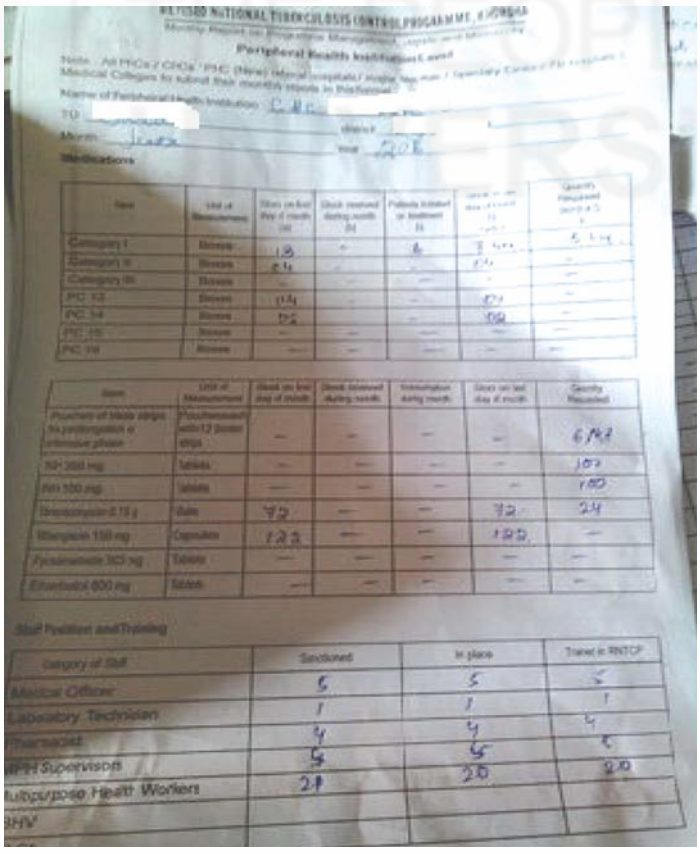


Fig. 4.4: Reporting format for RNTCP

4.3.3 Data Compilation

Compilation of data happens at three levels: you have read in Block 1, Unit 2 about healthcare delivery system in detail.

First level Compilation is at Block PHC where the Block Data Manager makes the "Block Monthly Consolidated Report" from data obtained from its own PHC as well as other PHCs and Sub-centres.

Second level Compilation is at District level where the District Data Manager will make the "District Monthly Consolidated Report" after data from all institutions within its limits, both private and public send their respective reports. This report will be electronically uploaded on the central Web Portal. Where ever State HMIS application is functional one copy of the entire database will be stored in the State HMIS application.

Third level Compilation will be at State level where monthly, quarterly and annual reports of the state will be prepared. Aggregation will be carried out by accessing all District consolidated reports and all State specific data entry that was done at the State level (quarterly, FMR, annually). 'State Aggregated Report' will be uploaded on the Web Portal, and a copy of the same will be available in the State specific HMIS application running on the State server.

4.3.4 Data Flow

Data is transmitted either in line list format, if there is limited number to report, or more commonly in a reporting format, where it is aggregated. At sub-centre level, reporting format is filled and sent to the PHC. At the PHC, data from all the sub-centres under them are collated and added to their own PHC data. This report is then sent to Block PHC, where they receive and combine reports of all the PHCs and their own. Block PHC will have a Block Data Manager (BDM) who will be responsible for collecting,

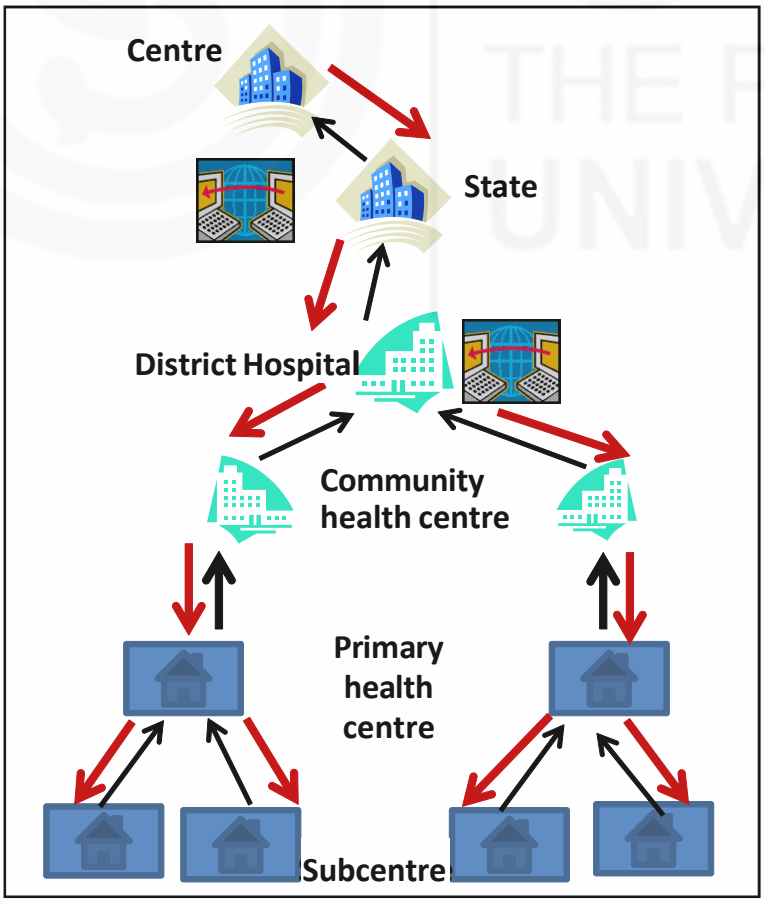


Fig. 4.5: Transmission of information from sub-centre to central level

checking data quality and preparation of the block report. The block will send their report to District headquarter, which will also receive reports from sub-district hospitals, private practitioners and nursing homes, public and private sector hospitals present in the district. District will have District Data Manager (DDM), who will ensure the collation, quality and transmission of data of the whole district including the district hospital.

The report will be sent as hard copy from the sub-centre level and at most PHC level. However, most of the blocks will have online data entering and reporting system, which will be operated by the BDM and they will send the signed hard copy of the report as well as enter the data in the system, which can be accessed by the district.

This flow of data from the lowest level of health care institution to the central level is done through specific formats developed for the purpose as shown in Table 4.3.

Table 4.3: Reporting formats for different levels

A	Reporting forms from State & UTs to GOI (These forms are to be sent to GOI)			
1)	**NRHM/GOI/1/A**	Annual Consolidated	30th April	
2)	**NRHM/GOI/2/Q**	Quarterly Consolidated	20th of month following the quarter	State Govt to GOI
3)	**NRHM/GOI/3/M**	Monthly consolidated	20th of following month	
B	Reporting forms within State Govt. (These are not to be sent to GOI)			
4)	**NRHM/SG/1/A**	Annual	15th April	Internal for state govt.
5)	**NRHM/SG/2/Q**	Quarterly	20th of month following the quarter	
C	Reporting forms within Districts (these are to be sent to the state govt.)			
6)	**NRHM/DHQ/1/A**	Annual	5th April	District to state govt.
7)	**NRHM/DHQ/2/Q**	Quarterly	10th of month following the quarter	
8)	**NRHM/DHQ/3/M**	Monthly	10th of following month	
D	Facility reporting forms within Districts (These forms are to be sent to district headquarter)			
9)	**NRHM/DH-SDH-CHC/3/M** (The forms are the same for DH, SDH, CHC and can be used interchangeably)	Monthly	5th of the following month	District hospital to district headquarter
10)	**NRHM/PHC/3/M**	Monthly	5th of the following month	PHC to district headquarter
11)	**NRHM/HSC/3/M**	Monthly	5th of the following month	Health sub-centre to district headquarter

4.3.5 Logistics and Technology

In India, till few years back, all data were being exclusively dealt with as only hard copies in the form of reporting formats and written reports. However, Government of India in the last has now established an electronic HMIS Portal in 2008 under National Health Mission (NHM), which manages data related to maternal and child health.

Health Management Information System (HMIS) Portal

The HMIS portal is envisaged as a "Single Window" for all public health data for the Ministry of Health and Family Welfare. The MOHFW initially rolled out the HMIS up to the District Level and now being expanded to the Sub District/Block level facility wise data entry. Over 630 Districts are reporting their monthly performance on a regular basis. eHMIS is most efficient for data transfer because it is network based and without physical movement, data is easily transmitted. However, it requires both hardware, software and network for it to function efficiently.

Hardware- Computers are needed at all levels with eHMIS with minimum specifications i.e. intel Pentium, 254 MBRAM, 20 GB hard disk space, explorer 6 and above. Along with computers, its peripherals like printers and UPS and modem will be needed.

Software- MOHFW has developed a software, which has two domains. One is public domain and any body can access it. Other is the secured domain, which can be accessed only by authorised health workers/personnel with log in ID and password. User operability depends upon the extent of access each level requires. At every level, the operator can access the formats that need to be filled at their level. So long as entered data is in draft mode, the operator can edit the entry. Once the form is submitted, then it will no longer be accessible for editing, though they can see what they had submitted. Only their facility data will be available to them. In District level, they will be able to see and extract data of all the CHCs under them as well as enter their own facility data. The principle of editing and access remains the same; after submission, it won't be editable.

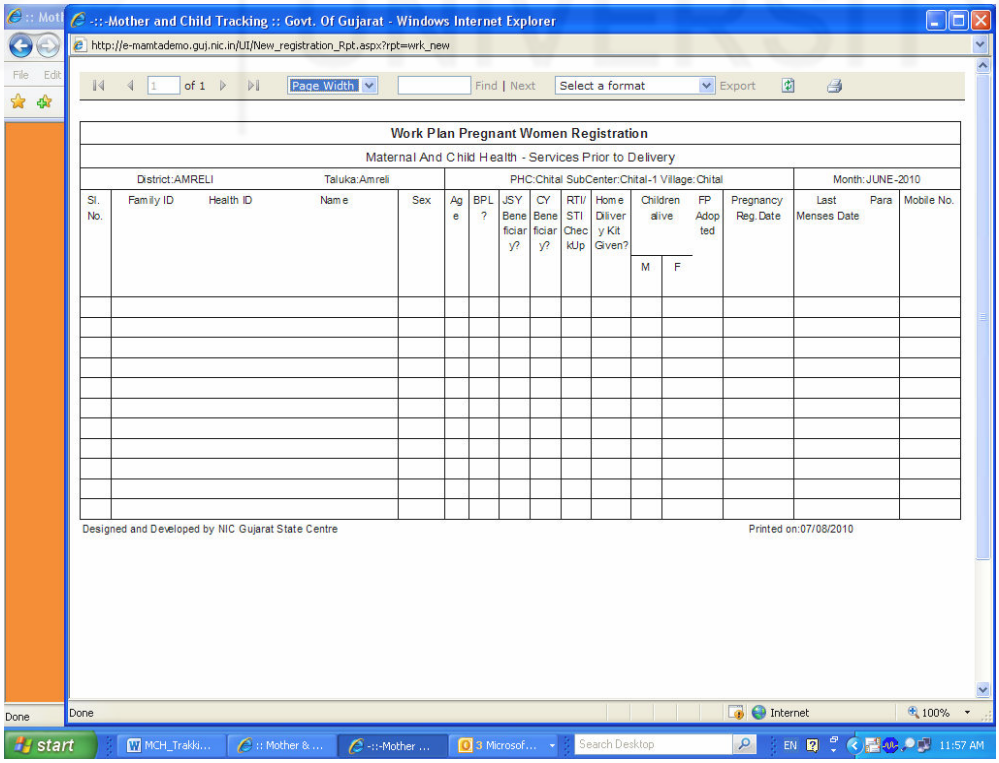
Mother and Child Health Tracking System

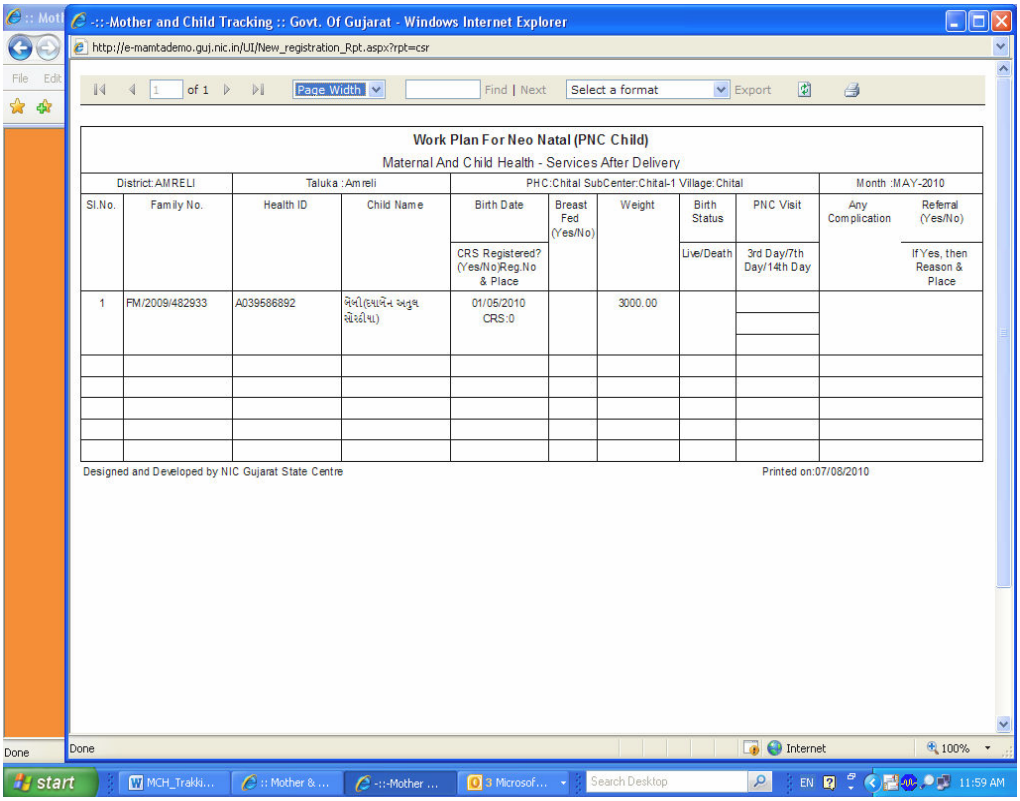
One special component of this eHMIS is the Mother and Child Health Tracking System (MTCS). Tracking of Pregnant mothers and children has been recognised as a priority area for providing effective healthcare services to this group. As a major initiative in this regard, the Mother and Child Tracking system (MCH) is name based pregnant mother and child tracking system. It is a management tool to reduce MMR/IMR/TFR and track the health service delivery at the individual level.

MCH is a generic system which aims to provide information of different health services received at the individual level, by monitoring all the encounters that an individual undergoes in his/her health programme. This system aims to help the service provider (health worker or Doctor) by categorising various health services the individual person has to get (with due date) and missed services. It also provides for effective monitoring of different health services drilling down to the individual patient information.

MCTS also has components of work plans for various functions like

- Registration of pregnant mothers
- ANC service
- Delivery service
- Postnatal care visits
- Child Immunisation
- Child Care
- Adolescents
- Family Planning





4.3.6 Analysis of Data and Indicators

Data analysis can be done at every stage. An ANM can analyse the data in her area and use it to bring about changes in her activities. Medical officer in the PHC and other staff including supervisors can use data from their areas, provide feedback and amend their own activities to be more efficient or effective.

Example of data analysis:

If there are 16 deliveries in an ANM's area in the past year and if the delivery register shows that, three of them were home deliveries; then institutional delivery in her area is only 81.3%, which should be actually 100%.

$$\textit{Institutional delivery (\%)} = \frac{\textit{No of deliveries in institutions x 100}}{\textit{Total no of deliveries 16}} = 13 \times 100 = 81.3\%$$

She can go back to those cases and inquire into reasons for home delivery, and try to tackle those reasons either at her own level or have it brought to the attention of the PHC/CHC depending upon the reasons.

This measure of percentage of institutional delivery is called an '**Indicator**'. When data are compiled, like number of pregnant women registered for antenatal care, it has limited meaning unless, it's accompanied by a denominator. If an ANM says she has 16 pregnant women registered with her, it will have limited value because, there is no idea of how many pregnant women are there and of them how many have registered. Even though, this number will be useful in planning her activities and stock supply, as for its representativeness about health and service for pregnant women, it does not convey much. Hence, this data needs to be converted to an indicator.

An indicator is a measure which denotes the health status, service delivery or efficiency of operations according to how it is calculated. Indicators helps one to know :

- how healthy a population group is,
- what is the quality of service provided, and

- how efficient an activity is
- finding the vulnerable groups which are affected, place that are most affected as well as time when certain health problems occur.

These can help in planning of services and allocation of resources.

Example of indicators:

Antenatal coverage

1) **Percentage of pregnant women registered** = $\frac{\text{no of pregnancies registered}}{\text{Total no of pregnancies}}$ x100

2) **Percentage of pregnant women registered in first trimester = no of pregnancies registered in 1st trimester / Total no of pregnancies x100**

Indicators can be calculated for TT dose, IFA tablet, place of delivery (institutional), postnatal care, etc.

Immunisation coverage

3) **Immunisation coverage= no of 9–11 months old children fully immunised total no of children in the same age group x 100**

Coverage for each individual vaccine can be calculated and also percentage of children getting adverse effects following immunisation.

Services

4) **Percentage of children with diarrhoea treated with ORS= no of children with diarrhoea treated with ORS/total no of children with diarrhoea x 100**

5) **Percentage of children with pneumonia treated with antibiotic= no of children with pneumonia treated with antibiotic/total no of children with pneumonia x 100**

Mortality rates

6) **Maternal Mortality Ratio= no of women dying during pregnancy, delivery and postpartum/total no of live births x 100,000**

7) **Infant mortality rate = no of children dying within one year of birth/total no of livebirths x 1000**

These are some of the indicators that health workers can use in their own areas too. Indicators can be used to compare performances and health status of different sub-centres and PHC areas or blocks. State will use it to compare different Districts and at national level, they will compare different states.

These indicators should be the driving points for providing feedbacks and planning ahead by strengthening the weak areas and services.

4.3.7 Feedback

Feedback should be an integral part of HMIS, inbuilt and robust. Without feedback, data collection, aggregation, flow and analysis will be in vain except for few uses. It is essential that feedback of HMIS information flows in the opposite direction of data flow from every level.

Primary health centres should give feedback to their sub-centres. Clock PHCs should give feedback to all other PHCs and District should give feedback to all blocks, CHCs

and hospitals. State should give feedback to the Districts and centre should give feedback to the states.

Feedback can be given in the form of

- Written reports
- In monthly/quarterly meetings
- In annual review meetings

Every year, Ministry of Health and Family Welfare, Govt of India as well as the States publish their annual report from 1st April of previous year to 31st March. This can also be utilised as also a form of feedback.

4.4 DATA QUALITY

Data quality is an important factor which determines whether it can be used effectively for planning and management of services. Quality is measured in three different aspects of completeness, timeliness and accuracy:

A) **Completeness**

For data to be of good quality, it has to be complete. Completion can be seen in two ways:

1) Facility wise completion: Of the total facilities both private and public existing in an area, what percentage are sending their reports and they are included in the District report?

2) Number of data elements reported among total data elements in a reporting format.

The forms have to be assessed for zeros and blanks. If there is repeated omission of certain elements, reason has to be ascertained and if needed, amended.

B) **Timeliness**

For data to be useful, it has to be reported timely. Delayed reports will hinder accurate assessment and action. There is enough time given for the facilities to submit data after the month ends i.e. earliest being 5th of next month or 20th in case of quarterly report. They should be sent on time. Assessment of the district will also include timeliness of reporting and will affect functioning and status of District.

C) **Accuracy**

Data should measure what it is supposed to measure and if it does that, then it is said to be accurate. It means that accurate data will be correct and useful. If data is incorrect for any reason, it will lead to false interpretation and actions that might be harmful for population/facility health and service provision.

Error in data could arise due to :

1) Gaps in understanding of data definitions and data collection methods

2) Data recording and data entry errors

3) Systemic errors- Logical errors embedded in the system due to which these errors remain unless underlying systemic issues are corrected

4) Misreporting

Data entry errors can be reduced by

1) **Visual scanning or eye balling:** This is just scanning of the document for any major deviation from the normal. It may be in the form of missing values, abnormal figure or calculation mistakes. For e.g. age of an antenatal mother written as 60 years.

	PHC A	PHC B	PHC C	PHC D
Total ANC registration	281	328	491	267
Early ANC registration	90	100	214	95
ANC Third visits	211	309	425	186
ANC given TTI	247	295	424	250
ANC given TT2 or Booster	277	305	425	231
ANC given 100 IFA	276	296	438	253
ANC moderately anemic < 11 gm	68	67	114	51
ANC having Hypertension-New cases	20	76	15	4711

Very High

One can easily see from the above Table that 4711 is an exceptionally large figure, which is not appropriate for a PHC.

2) **Performing validation checks:** Validation is performed by comparing values of 2 (or more) data elements that are related . One (or more) data elements are placed on left side and other data element(s) are placed on right side with an operator separating both sides e.g. 'Early ANC registration' is a part of 'ANC registration' and it can equal to 'ANC registration' or it will be less than or equal to 'ANC registration' but it cannot be greater than 'ANC registration'. This rule can be expressed as:

Validation rule	Left side	Operator	Right side
Early ANC registration is less than or equal to total ANC registration	Early ANC registration	< (less than or equal to)	Total ANC registration

It is important to note that violation of a validation rule does not always indicate error. Sometimes inconsistent/unexpected values may be due to management issues like availability of vaccines or medicines in stock, disease outbreak, etc. Violation of validation rule indicates that one has to enquire and check/verify data until satisfactory answer is not found.

Validation tools that can be used regularly in these aspects:

a) Number of low birth weights cannot be more than number of deliveries

b) Number of BCG given cannot be more than number of live births; unless there are children born outside the area who have come only for immunisation

c) Number of family planning users should be less than total eligible couples

d) Number of women receiving postnatal care should not be more than total deliveries

3) **Identification of statistical outliers:** Outliers are those values that in statistical terms live above or below 2 standard deviations. If any such figures stand out, they need to be checked for their accuracy. It need not be an error always. Figures may exceed 2 SD if there is an outbreak and large number of cases are reported.

Systemic errors can arise due to many reasons and unless the system fault leading to the error is corrected, it will continue. Some of the reasons for such systemic errors are:

Problem 1: Errors due to multiple registers or poorly designed registers

Sometimes, when there are too many registers to handle, ANMs may record certain data in their personal diaries and when they eventually have to fill the register format, they realise that they missed something out and that element will be missing. This can be corrected by discouraging personal diaries for official use.

Problem 2: Misinterpretation of Data Elements

In ANC care, instead of number of women given 100 IFA tablets, some health workers may write number of tablets given. Some may visit a woman who has delivered the baby after 6 weeks and still write postnatal visit done. This can only be achieved by proper training in data elements and supportive supervision.

Problem 3: Consistency of terms used

This means the same terms being used in more than one form or in the recording register/format as well as the reporting format. Newborns being breastfed within first hour of birth needs to be reported in the reporting format but it is missing element from the records. In such cases, the health workers have to compare and add or amend the element in question.

Problem 4: Computation problem

At times, there might be problem compilation. For e.g.in order to calculate the number of children fully immunised the health worker will add up all the children receiving vaccine in the previous month irrespective of their actual immunisation status. Instead she should have taken only those 9–11 months old children who have received all vaccines till measles vaccine. This should be corrected by proper training and supportive supervision.

Problem 5: Problem in data aggregation/ Compilation

At times, simple errors of calculation like addition can lead to such situations where it becomes unreliable. One can clearly see in the table below that there is gross discrepancy between the block total and district total when they should be same as district total is addition of all blocks. Visual scanning can spot such errors.

REPRODUCTIVE AND CHILD HEALTH							
Antenatal Care Services	**Block A**	**Block B**	**Block C**	**Block D**	**Block E**	**Block Total**	**District Report**
Total number of pregnant woman registered for ANC	387	457	2114	2076	2586	7620	11110
Of which number registered within first trimester	20	288	2142	1636	1202	5288	5288
New women registered under JSY	0	401	169	1765	1588	3923	5445
Number of pregnant women received 3 ANC check ups	2984	239	1357	1679	124	6383	6383

Check Your Progress 1

1) What do you mean by data element?

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2) List three parts of data element.

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3) What are data elements involved in assessing immunisation coverage?

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4) List the registers maintained at sub-centres.

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5) What are the aspects of data quality? What methods can be used to detect data entry errors?

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4.5 LET US SUM UP

HMIS is an important component of a health system. It is vital that all the health functionaries at various levels have a clear understanding of the data management in terms of recording, aggregation, reporting flow and feedback. This module dwells heavily on data elements, which is the building block for HMIS. If data elements have error, this will be passed on to every level. The unit also focuses on identification of errors in data and how to ensure quality of data. Understanding of indicators and their use will help to identify the areas of strength and weaknesses, and the area's own performance vis-á-vis others in their vicinity and beyond. How data flows, in which format its reported, how the MCTS works, etc will all aid in improving efficiency and planning of health activities.

4.6 MODEL ANSWERS

Check Your Progress 1

1) Data element is a record of a health event or a health related event.

2) The Three parts of data element are:

   Part A. Reproductive and Child health (M1–M8)

   Part B. Health Facility Services (M9–M10)

   Part C. Mortality details (M11)

3) Data elements involved in assessing immunisation coverage are:

   Child Immunisation

   Number of Infants 0 to 11 months old who received the following:

   Data Source – Immunisation Register

   Data Element: BCG
   Data Element: Pentavalent 1
   Data Element: Pentavalent 2
   Data Element: Pentavalent 3
   Data Element: OPV 0 (Birth Dose)
   Data Element : OPV 1
   Data Element : OPV 2
   Data Element : OPV 3
   Data Element : Hepatitis - B 1
   Data Element: Hepatitis - B 2
   Data Element : Hepatitis - B 3
   Data Element : Measles

   New data element: Measles 2nd dose and Hepatitis B0

   Data Element : Total number of children aged between 9 and 11 months who have been fully immunised (Child given one dose of BCG, three dosages of DPT i.e., DPT 1,2,3; three dosages of polio i.e,. OPV 1,2,3 and a dosage of Measles)

   Data Source – Immunisation Register

4) ***Registers in sub-centre:***

   1) Eligible Couple Register including Contraception

   2) Maternal and Child Health Register

   a) Antenatal, intra-natal, postnatal

   b) Under-five register:

      i) Immunisation

      ii) Growth monitoring

   3) Births and Deaths Register

4) Drug Register

5) Equipment Furniture and other accessories Register

6) Communicable diseases/ Epidemic Register

7) Passive surveillance register for malaria cases

8) Register for records pertaining to Janani Suraksha Yojana

9) Register for maintenance of accounts including untied funds

10) Register for water quality and sanitation

11) Minor ailments Register

12) Records/registers as per various National Health Programme guidelines

(NLEP, RNTCP, NVBDCP, etc.)

5) The aspects of data quality are:

A) **Completeness**

For data to be of good quality, it has to be complete. Completion can be seen in two ways:

a) Facility wise completion: Of the total facilities both private and public existing in an area, what percentage are sending their reports and they are included in the district report?

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- Data recording and data entry errors
- Systemic errors- Logical errors embedded in the system due to which these errors remain unless underlying systemic issues are corrected
- Misreporting

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