

MATERNITY CARE MONITORING — A MODEL INFORMATION TECHNOLOGY*

(A Review of 6,136 Cases Using the 801 Form)

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SUMMARY

While battling the immediate problems of delivery in India, improved methods of data collection, analysis and feedback are of paramount importance. With computer technology easily available, Maternity Care Monitoring (MCM), can be effectively utilised to improve the quality of care at hospitals. This paper shows MCM as a data collection tool used at the hospital level. MCM can act as an indicator for the improvement of health care services and for early interventions.

This is a pooled analysis of 6,136 maternity cases reported from 14 participating Centres of the Indian Fertility Research Programme. The primiparas were at a relatively lower risk than the grand multiparas, which formed the high-risk group. However, the incidence of fetal/neonatal complications was higher among the primiparas than the grand multiparas. The perinatal mortality rate for this series was 64.8 per 1000 deliveries. Women with fetal/neonatal loss had a lower educational level and received inadequate antenatal care compared to women with infants discharged alive. The incidence of fetal/neonatal complications was higher for fetus/neonates who died before discharge from hospital than for those infants who were discharged alive. Younger women had a lower incidence of puerperal complications and accepted contraceptive methods more easily than their older counterparts.

Introduction

The greatest need of today's problem

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of combating the steeping maternal and perinatal mortality rates is to try out approaches and methods which are functional, realistic and economic. While battling these immediate problems with the limited available resources, in India, improved methods of data collection, analysis and reporting are of paramount impor-

tance. These methods will act as indicators for the development of health care services.

At the request expressed by several developing countries, a standardised computer-generated system for monitoring maternity care at hospitals was developed by the Family Health International (FHI), formerly known as the International Fertility Research Programme. The International Federation for Family Health (IFFH), developed the Maternity Care Monitoring (MCM) 801 Register. It is compatible with the computer programme of the Maternity Record 903. The Perinatal Mortality and Morbidity Committee of the International Federation of Gynecology and Obstetrics has endorsed the Maternity Care Monitoring 801 Register.

With the fast development of computer technology in India, these facilities can be maximally utilised to store and process vital maternity related information to generate quick meaningful results.

The Maternity Record 903 for hospital use has been used in several hospitals in India and reported (Basu 1978; Bhatt *et al* 79; Pachauri and Jamshedji 1980).

However, at the primary health center and the traditional birth attendant levels of maternity care, where over 75 percent of the deliveries are conducted, the documentation systems are grossly inadequate if not absent. One pretest of the shorter version (801) of the Maternity Record was conducted at a primary health center in India (Bhatt and Pachuri 1980). Further, a pilot project was conducted by the India Fertility Research Programme (India FRP) in collaboration with the Federation of Obstetrics and Gynaecological Societies of India (FOGSI) using the 801 Maternity Record in the form of a Register. This paper reports the results of the Project.

Material and Methods

This is an analysis of 6,136 women delivered at fourteen district and semi district institutions in the states of Maharashtra, Gujarat, Kerala, Karnataka and Tamil Nadu, Table I shows the participating institutions, their locations and the number of cases included in this analysis.

TABLE I
Contributor, Name of Institution and Location of Fourteen Centers Participating in the MGM Project, December 1982 to October 1983

Contributor	Name of Institution	Location	No. of Cases
Dr. P. G. Asolkar	Matru Sewa Sangh	Nagpur	300
Dr. D. Bhavthankar	SRTR Medical College	Ambajogai	252
Dr. M. V. Chitale	Chitale Clinic	Solapur	288
Dr. R. A. Erinjery	St. Joseph's Hospital	Choondal	600
Dr. P. V. George	District Hospital	Cannanore	295
Dr. Nalgirkar A. J.	General Hospital	Solapur	600
Dr. V. R. Nair	Medical Hospital	Kottayam	300
Dr. Mary Philips	Pushpagiri Hospital	Tiruvella	597
Dr. G. Ramani	Father Muller Hospital	Mangalore	600
Dr. K. Rajagopalan	District Hospital	Palghat	204
Dr. Padma Rao	Kasturba Medical College & Hospital	Manipal	600
Dr. S. S. Santpur	Wanless Hospital	Miraj	600
Dr. I. Suresdran	Dr. Gopal Pillai's Jawahar Hospital	Nagercoil	300
Dr. J. B. Vora	Government Hospital	Morvi	600

Methodology

Fifty members of FOGSI from district and semi district areas were randomly selected to participate in the Project. Forty members expressed their willingness to participate of which fourteen centers reported data on 200 or more cases. Each Contributor was requested to record data on 300 cases on the MCM Register. The original copy of the Register sheet was mailed to the India FRP for analysis. The Project was initiated in December 1982 and was extended upto October 1983, since seven Contributors were willing to continue and the others had yet to complete reporting data on 300 cases (Table I).

Criteria and Definition

Standard criteria and definitions were used. All women who were admitted to and subsequently delivered at the center were included. Cases of false labour, molar pregnancy, induced abortion and spontaneous (fetus weighing less than 500 grams) were excluded. The duration of pregnancy was estimated in completed weeks from the onset of the last normal menstrual period to the day of delivery. For estimating the fetal/neonatal mortality rates, stillborn infants weighing 100 grams or more and early neonatal deaths of infants upto the time of discharge from hospital were included. Maternal death was recorded upto the woman's discharge from hospital. Only the primary puerperal and fetal/neonatal complications were recorded.

The critical ratio and chi square statistical tests of significance were done using the p value of 0.05. (The critical ratio test was used to obtain the difference between the means and the chi square test was use for comparing data of two groups).

Results

Sociodemographic Characteristics

While nine percent of the women, in this series, were teenagers, the majority (72.6%) were between 20 to 29 years of age. The average woman was 25.7 years of age (Table II).

Over half of the women had had 1-4 live births. Forty percent were primiparas and 3.9 percent cases had 3 or more live births (Table II).

The mean education of the women in this series was 6.2 completed school years. About 25 percent of the women had no formal school education. While 57.4 percent women were school dropouts, only 18.5 percent women completed their school education (Table II).

Past Obstetric History

Of the 3,811 women experiencing previous pregnancy, 6.4 percent had had at least one stillbirth and 12.9 percent had at least one infant loss (Table III).

The last pregnancy was terminated in a stillbirth for 1.8 and abortions for 6.8 percent women. Of the women who continued their last pregnancy to term, the children were still living for 89.9 percent women, 6.8 percent had an infant loss and 3.4 percent had stillbirths (Table III).

Parity Correlates

The mean educational level decreased with increase in parity. These differences were statistically significant (Table IV & Fig. 1).

The antenatal care received by the grand multiparas (mean-2.8) was significantly lower than the primiparas (mean-4.2) and multiparas (mean-4.0) (Table IV & Fig. 1). No antenatal care was received by 23.8, 22.8 and 44.2 percent of the

TABLE II

*Sociodemographic Characteristics of 6,136 Women Delivered at Fourteen Centers in India,
December 1982 to October 1983*

Characteristic	Number	Per cent
Age (Completed years)		
< 19	533	9.0
20 - 29	4455	72.6
30 - 39	1089	17.7
40 +	39	0.6
Mean		25.7
Parity		
0 (Primiparas)	2453	40.0
1 - 4 (Multiparas)	3441	56.1
5+ (Grand multiparas)	242	3.9
Mean		1.6
Education (School year completed)		
0	1483	24.2
1 - 6	300	21.2
7 - 10	2219	36.2
11 - 12	590	9.6
13 - 14	226	3.7
15 +	318	5.2
Mean		6.2

TABLE III
Past Obstetric History

Event	Number	Per cent
Number of Stillbirths		
0	3566	93.6
1	207	5.4
2	30	0.8
3+	8	0.2
Mean		0.1
Number of Infant Deaths		
0	3318	87.1
1	378	9.9
2	71	1.9
3+	44	1.1
Mean		0.1
Outcome of Last Pregnancy		
Not previously pregnant	2325	37.9
Live birth, full term, still living	2989	48.7
Live birth, full term, deceased	188	3.1
Live birth, premature, still living	24	0.4
Live birth, premature, deceased	39	0.6
Stillbirth	113	1.8
Induced abortion	38	0.6
Spontaneous abortion	402	6.5
Other	18	0.3

TABLE IV
Parity Correlates

Correlate	P A R I T Y					
	0 N=2453 No.		1-4 N=3441 No.		5+ N=242 No.	
		%		%		%
Education						
0	442	18.0	898	26.1	143	59.1
1 - 6	419	17.1	821	23.9	60	24.8
7 - 10	1003	40.9	1182	34.3	34	14.0
11 - 12	299	12.2	288	8.4	3	1.2
13 - 14	117	4.8	108	3.1	1	0.4
15+	173	7.0	144	4.2	1	0.4
Mean		7.2		5.8		2.3
Number of Antenatal Visits						
0	583	23.8	785	22.8	107	44.2
1 - 3	483	19.7	876	25.4	51	21.1
4 - 7	842	34.3	1040	30.2	43	17.8
8+	545	22.2	740	21.5	41	16.9
Mean		4.2		4.0		2.8
Gestational Age (Weeks)						
≤ 35	173	7.1	221	6.4	21	8.7
36 - 37	472	19.2	833	24.2	106	43.8
38 - 39	806	32.9	998	29.0	55	22.7
40 - 41	979	40.0	1349	39.2	60	24.8
42 +	23	0.9	40	1.2	0	0.0
Mean		38.2		38.1		37.2
Birthweight (Grams)*						
≤ 1999	174	7.1	192	5.6	24	9.9
2000 - 2499	442	18.1	532	15.5	24	9.9
2500 - 2999	1081	44.1	1451	42.2	90	37.2
3000 +	753	30.7	1263	36.7	104	43.0
Mean		2860.1		2955.7		2980.9
Fetal Neonatal Complications						
Total	239	9.7	207	6.0	15	6.2
Fetal Neonatal Death						
Total	167	6.8	205	6.0	30	12.4
Puerperal Complications						
Total	123	5.0	149	4.3	15	6.2

* Known cases only are included.

primiparas, multiparas and grand multiparas respectively (Table IV).

The mean gestational age (in weeks) for women with no previous pregnancy (38.2) and those with 1.4 live births (38.1) was similar. However, the mean gestational age for the grand multiparas (37.2) was lower than the primiparas and the multiparas (Table IV).

The mean birthweight increased with increase in parity. The difference was significantly lower for the primiparas (2860.1 grams) than for the multi (2955.7 grams) and multiparas (2980.9 grams) (Table IV & Fig. 1).

The incidence of fetal/neonatal complications was significantly higher for the primiparas (9.7%) than for the multiparas

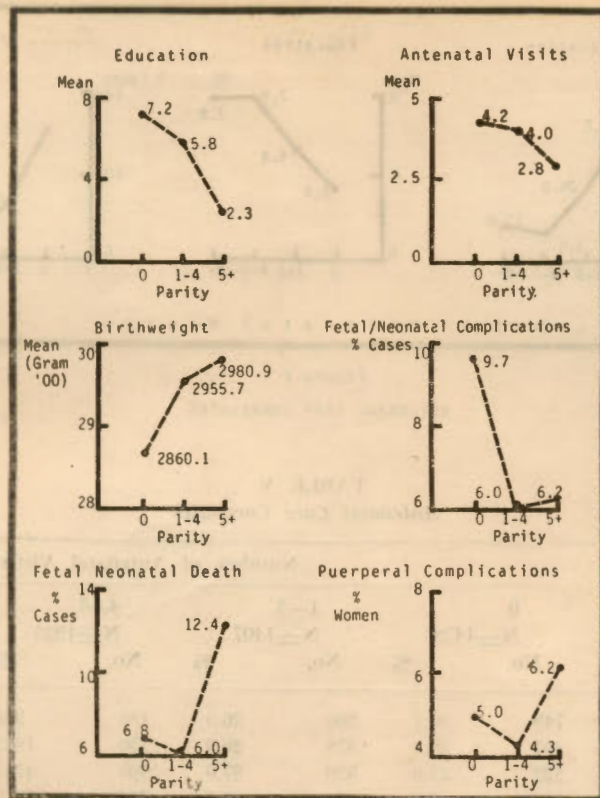


Figure 1

PARITY CORRELATES

(6.0%) and the grand multiparas (6.2%). Fetal/neonatal death among the grand multiparas (12.4%) was two times more than that of primiparas (6.8%) and multiparas (6.0%). The multiparas (4.3%) had a lower incidence of primary puerperal complications than the primiparas (5.0%) and grand multiparas (6.2%) (Table IV & Fig. 1).

Antenatal Care

The mean number of antenatal visits in this analysis was 3.8. There was a significant increase in the women's mean level of education and increase in the number of antenatal visits (4+). While half of the

women in this series, who had received no antenatal care had no formal education, only 9.6 percent women with 4 to 7 antenatal visits had no formal education (Table V & Fig. 2). Women with more than seven antenatal visits could be an indication of an antenatal condition.

The perinatal mortality rate for women with no antenatal care (15.3%) was about five times higher than for those women receiving antenatal mortality rate (2.4%) (Table V & Fig. 2).

Maternal Correlates

There was no significant difference in the mean gestational age of women in the

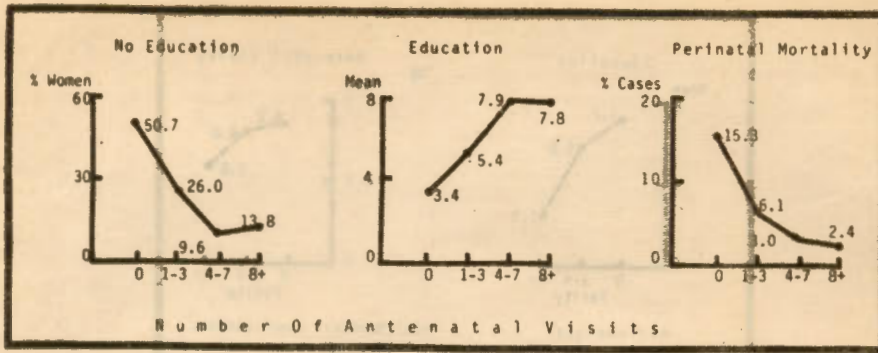


Figure 2
ANTENATAL CARE CORRELATES

TABLE V
Antenatal Care Correlates

Education	Number of Antenatal Visits							
	0		1-3		4-7		8+	
	No.	%	No.	%	No.	%	No.	%
0	749	50.7	366	26.0	185	9.6	183	13.8
1-6	307	20.8	378	26.9	350	18.2	265	20.0
7-10	322	21.8	520	37.0	905	47.0	472	35.6
11-12	58	3.9	76	5.4	261	13.5	195	14.7
13-14	19	1.3	23	1.6	107	5.5	77	5.8
15+	23	1.6			117	6.1	134	10.1
Mean	3.4		5.4		7.9		7.8	
Perinatal Mortality	227	15.3	86	6.1	57	3.0	32	2.4

different age groups. Women below 20 and above 39 years of age had a shorter gestational period than those between 20 to 39 years of age (Table VI).

The incidence of puerperal morbidity was significantly higher for women above 39 years of age than for women below 39 years. No significant differences were found among the other age groups (Table VI).

In this analysis, less than half (40.9%) of the women did not plan to adopt a contraceptive method for family planning. While the IUD was more acceptable to

younger women (22.1%), female sterilisation was more acceptable to women between 30-39 years of age (33.7%). For teenage women, female sterilisation (6.3%) was more the method of choice than orals/injectables (4.5%). (Table VI).

Correlates of Pregnancy Outcome

There was no significant difference in the mean parity for women with infants discharged alive (1.6) and for those women with fetal/neonatal loss (1.4). Mean education was significantly lower for women with fetal/neonatal loss (2.7)

TABLE VI
Maternal Correlates

Correlate	Maternal							
	≤ 19 N=553		20-29 N=4455		30-39 N=1089		40+ N=39	
	No.	%	No.	%	No.	%	No.	%
Gestational Age (Weeks)								
≤ 35	50	9.0	283	6.3	74	6.8	8	20.5
36 - 37	146	26.4	981	22.0	271	24.9	13	33.3
38 - 39	184	33.3	1367	30.7	300	27.5	8	20.5
40 - 41	169	30.6	1770	39.7	439	40.3	10	25.6
42 +	4	0.7	54	1.2	5	0.5	0	0.0
Mean	37.6		38.2		38.1		36.1	
Puerperal Complications								
Total	25	4.5	195	4.4	56	5.1	7	17.9
Contraceptive Method								
Planned/Provided								
None	192	34.7	1830	41.1	470	43.2	17	43.6
IUD	173	31.3	935	21.0	80	7.3	3	7.7
Orals/injectables	25	4.5	312	7.0	57	5.2	2	5.1
Female sterilisation	35	6.3	658	14.8	367	33.7	13	33.3
Male sterilisation	1	0.2	12	0.3	6	0.5	0	0.0
Condóm	3	0.5	99	2.2	20	1.8	0	0.0
Withdrawal/rhythm	0	0.0	47	1.0	13	1.2	0	0.0
Foam/diaphragm/jelly	0	0.0	8	0.2	2	0.2	0	0.0
Other	124	22.4	554	12.4	74	6.8	4	10.3

than for women whose infants were discharged alive (6.5). The mean education was similar for women who had fetal/neonatal loss during the antenatal, intranatal and postnatal periods (Table VII & Fig. 3).

While less than one fourth (21.8%) of the women whose infants were discharged alive did not receive antenatal care, over half (56.5%) of the women with fetal/neonatal loss did not receive antenatal care. The mean number of antenatal visits was three times higher for women with infants discharged alive than for those with fetal/neonatal loss (Table VII & Fig. 3).

The incidence of fetal/neonatal compli-

cations was six times higher for infants who died (35.8%) than those who were discharged alive (5.5%). The incidence of fetal/neonatal complications was higher for infants who died during the postnatal period (52.5%) than for those who died during the antenatal (21.9%) and intranatal (31.5%) period (Table VII & Fig. 3). These differences were statistically significant.

Mortality

The perinatal mortality rate for this series was 64.8 per 1000 deliveries. While the death rate was 11.8 during the intranatal period, it was 27.2 during the antenatal period and 25.8 during the postnatal period (Table VIII).

TABLE VII
Correlates of Pregnancy Outcome

Correlate	Pregnancy Outcome							
	Discharged Alive N=5743		Antenatal Death N=169		Outcome Intranatal Death N=73		Postnatal Death N=160	
	No.	%	No.	%	No.	%	No.	%
Parity								
0	2256	39.3	76	45.0	34	46.6	87	54.4
1-4	3264	56.9	83	49.1	30	41.1	64	40.0
5+	214	3.7	10	5.9	9	12.3	9	5.6
Mean	1.6		1.5		1.6		1.3	
Education								
0	1303	22.7	83	49.1	35	47.9	62	38.7
1-6	1133	19.8	60	53.5	30	41.1	77	48.1
7-10	2174	37.9	22	13.0	4	5.5	19	11.9
11-12	586	10.2	2	1.2	1	1.4	1	0.6
13-14	222	3.9	2	1.2	1	1.4	1	0.6
15+	316	5.5	0	0.0	2	2.7	0	0.0
Mean	6.5		2.6		1.9		2.8	
Number of Antenatal Visits								
0	1251	21.8	103	60.9	44	60.3	80	50.0
1-3	1321	23.0	33	19.5	10	13.7	43	26.9
4-7	1868	32.6	19	11.2	14	19.2	24	15.0
8+	1294	22.6	14	8.3	5	6.8	13	8.1
Mean	4.1		1.7		1.9		2.0	
Fetal Neonatal Complications								
Total	317	5.5	37	21.9	23	31.5	84	52.5

TABLE VIII
Perinatal and Maternal Mortality Rates

Mortality	Number	Rate 1000 Deliveries
Perinatal Mortality	402	64.8
Antenatal death	169	27.2
Intranatal death	73	11.8
Postnatal death	160	25.8
Maternal Mortality	13	2.1

There were thirteen (2.1|1000 deliveries) maternal deaths in this series (Table VIII).

Complications

The incidence of primary puerperal complications was 4.6 percent. Fever

requiring treatment (2.7%) was the most commonly reported complication (Table IX).

TABLE IX
Primary Puerperal Complications

Complication	Number	Per cent
Fever requiring treatment	168	2.7
Bleeding requiring treatment	76	1.2
Other	39	0.6
Total	283	4.6

The incidence of fetal|neonatal complications was 7.5 percent. Fetal distress during labour (4.6%) was by far the most

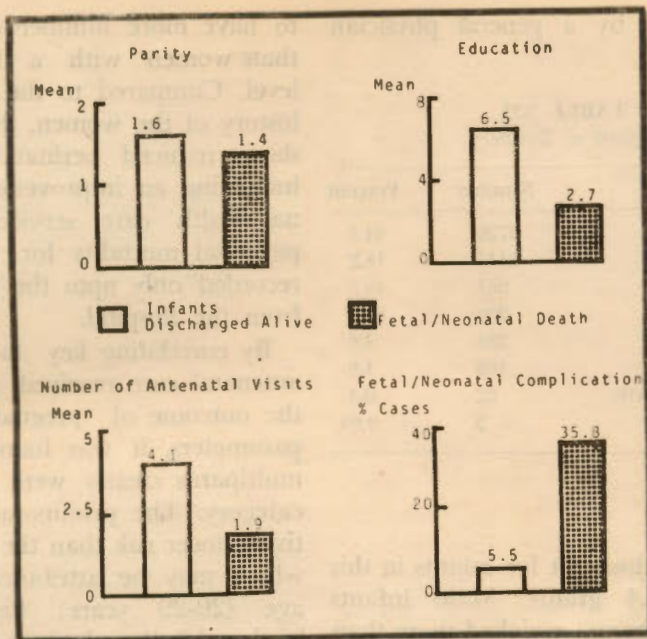


Figure 3
CORRELATES OF PREGNANCY OUTCOME

frequently reported complication. Malformations, major and minor, were reported for 1.2 percent of the infants. Other reported complications were respiratory distress syndrome (0.5%) and trauma (0.05%) (Table X).

TABLE X
Primary Fetal/Neonatal Complications

Complication	Number	Per cent
Fetal distress during labour	282	4.6
Malformations	76	1.2
Respiratory distress syndrome	33	0.05
Trauma	3	0.05
Other	67	1.1
Total	461	7.5

Type of Delivery

Delivery was spontaneous for the majority (73.8%) of the women. Caesarean

section was performed for 13.4 percent and forceps were used for 4.9 percent cases. Breech deliveries accounted for only 1.8 percent of the cases (Table XI).

TABLE XI
Type of Delivery

Type of Delivery	Number	Per cent
Spontaneous	4529	73.8
Caesarean section	822	13.4
Outlet forceps	303	4.9
Vacuum extractor	216	3.5
Breech	108	1.8
Destructive procedure	14	0.2
Other	144	2.3

Attendant at Labour/Delivery

Delivery was conducted for 44.5 percent of the cases by an obstetrician/gynecologist, followed by 18.2 percent cases by nurses, 15.5 percent by qualified midwives

and 15.2 percent by a general physician (Table XII).

TABLE XII
Attendant at Delivery

Attendant	Number	Percent
OB GYN physician	2729	44.5
Nurse	1117	18.2
Qualified midwife	951	15.5
General physician	930	15.2
Auxiliary TBA	284	4.6
Medical student	100	1.6
Student nurse midwife	22	0.4
None	3	0.05

Birthweight

The mean birthweight for infants in this series was 2845.4 grams. Male infants (mean=2965.6 grams) weighed more than female infants (mean=2866.5 grams) (Table XIII). However, this difference was not statistically significant.

TABLE XIII
Birthweight and Sex of Infant

Birthweight (Grms)	Male N=3216		Female N=2914	
	No.	%	No.	%
1999	174	5.4	216	7.4
2000-2499	484	15.0	514	17.6
2500-2999	1360	42.3	1262	43.3
3000+	1198	37.2	922	31.6
Mean	2965.6		2866.5	

Conclusion

This extensive analysis depicts the wealth of information that can be obtained from simple data recording systems.

From the analysis it can be seen that nearly 10 percent of the pregnancies were among teenagers. This small but significant number still persists despite government's efforts to increase the age at marriage. Higher educated women were more likely

to have more number of antenatal visits than women with a lower educational level. Compared to the previous obstetric history of the women, the present analysis shows reduced perinatal mortality rates, indicating an improvement in the maternal health care services. However, the perinatal mortality for this series was recorded only upto the time of discharge from the hospital.

By correlating key factors like parity, antenatal care received, maternal age and the outcome of pregnancy with other parameters, it was found that the grand multiparas clearly were in the high risk category. The primiparas were at a relatively lower risk than the grand multiparas which may be attributed to their young age (20-29 years) higher educational level and better physique. However, the incidence of fetal|neonatal complications was higher among the primiparas than the grand multiparas.

It can be safely deduced from this analysis that a minimum of primary school education is required for greater awareness for the need for antenatal care. Women with fetal|neonatal loss had a lower educational level and received inadequate antenatal care compared to women with infants discharged alive. Older women had a higher incidence of puerperal complications than their younger counterparts, thus, being categorised as high-risk. Younger women accepted contraceptive methods more easily than the older women. The incidence of fetal|neonatal complications was higher for fetus|neonates who died before discharge from hospital than for those infants who were discharged alive.

In conclusion, it can be seen that the 801 form is one model application of a new information technology to one of the most serious problems in developing

countries. Standardized system of data collection, analysis and regular feedback in a meaningful and cost-effective manner facilitates the improvement in maternity care.

Acknowledgement

The authors gratefully acknowledge the cooperation of the fourteen Contributors listed in Table I without their contribution this paper would not have been possible.

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might have saved the patient an attempt is made in this study to point out the advantages of early laparotomy in grade III ectopic abortion.

Material and Method

The study comprised of 43 cases of III ectopic abortion. A retrospective study of previous cases after review of general practice (Ganeshji and Basu, 1973). These cases were admitted to the General Hospital since January 1982 to January 1983. It does not vary with respect to the management of ectopic abortion.

Program on Ectopic Abortion

Account of history was taken with reference to clinical investigation, time of

abortion.

Management of a ectopic abortion is a long standing dilemma. The decision of laparotomy will remain a crucial point around which the management revolves. The controversies on the part are many and the time of laparotomy is still under the light of intense debate. Generally, it is felt that ectopic abortion remains probably the leading cause of maternal mortality.

General Case 1982

In some instances, cases are kept under observation for a month laparotomy is performed if there is no improvement.

The decision of operation and operation was decided by the Medical Officer in charge of the hospital. The decision was based on the clinical investigation, time of