

WEEKEND EFFECT IN OBSTETRICS: A STUDY OF REFERRAL PATTERNS

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ABSTRACT

Background: Researchers have reported poorer outcomes for patients admitted or treated at the weekends across a variety of medical settings, diagnoses, procedures and countries. Several explanations have been put forward for the weekend effect. Obstetric patients are a vulnerable group who benefit from timely admission to a maternity health facility, thus it deemed important to study the weekend effect of this group. Objectives: To ascertain if differential referral patterns exist and analysis of maternal and perinatal outcomes.

Methods: A Proforma was designed and data was collected. The arrival time was recorded in the hospital receiving room. The duration of stay at referring health institution was estimated by the patient in few and by their relatives in most cases.

Results: There was also a statistically significant difference between reasons for referral on weekends versus weekdays, with a referral for non-medical reasons predominating on weekends (non-availability of doctors, non-availability of NICU and lack of infrastructure), Rates of most perinatal complications were higher on weekend days as compared with weekdays, Odds of obstetric infection were two-fold more on weekends than on weekdays (adjusted OR (aOR), 2.32; 95% CI 1.78 to 3.17), as were odds of composite maternal complication (aOR, 1.83; 95% CI 1.34 to 1.294) and For neonatal outcomes, only depressed Apgar score (aOR, 2.19; 95% CI 1.62 to 2.52) and composite infant outcome (1.93; 1.27 to 3.54) were more frequent on weekend days, compared with weekdays.

Conclusions: This study concludes that early identification, initiation of early treatment and timely referrals are the crucial components for the success of any maternal health intervention.

Key words: Weekend Effect, Maternal Referral, Obstetric Complications

INTRODUCTION

The majority of maternal deaths can be prevented by the presence of a skilled birth attendant who delivers high-quality care and can access an appropriate maternal referral system when needed¹. Hallmarks of a quality referral system include accurate screening, identification of women at risk, timely referral and transportation to a facility that can provide needed

interventions and care, along with experienced and trained medical staff 2. Such a referral system is so important that it has been called the keystone of safe motherhood 3,4 .In India, the state government-funded obstetric health system offers three levels of care in rural communities; primary, secondary, and tertiary. The tertiary level facilities provide specialized obstetric care along with allied medical specialty care. Secondary care is provided by district hospitals that have obstetric specialists available for caesarean sections. The primary health centres (PHC), situated in larger geographical rural settings, provides 24-h day basic obstetric care including birthing facilities for vaginal deliveries and allied basic medical services. Sub centres (SC) are birthing facilities with trained birth attendants in the villages equipped only for vaginal deliveries. High-risk pregnancies and those with intra partum complications are eligible for a referral from SCs, PHCs and secondary care to a suitable higher level of care. High-quality care would ensure accurate and timely identification of at risk pregnancies and births and prompt referral of the woman and her baby to a higher level of care when at-risk pregnancy or birth is detected.

The concept of a “weekend effect” is not new. From as early as the 1970s, researchers have reported poorer outcomes for patients admitted or treated at the weekends across a variety of medical settings, diagnoses, procedures and countries 5-8 . Several explanations have been put forward for the weekend effect. The first is that patients admitted at the weekend are ‘sicker’ and outcomes can therefore be expected to be worse, second is that staffing levels are lower at weekends and this causes delays in diagnostics and procedures and the third explanation is that there is no weekend effect, and that outcomes for patients admitted at weekends are not worse and that studies who report this are seeing a statistical artefact.

Obstetric patients are a vulnerable group who benefit from timely admission to a maternity health facility. Such patients may present at any time of the day, thus staffing levels and resources should be adequate throughout 24 hours, weekends, and holidays. The number of doctors present in a health facility, availability of accredited intense visits, and accessibility of diagnostic and surgical services varies from one level of health facility to another. Thus, patients from primary and secondary level facilities are referred to a tertiary level centre. The study will aim at exploring the difference in referrals between weekends and weekdays and will try to analyze the difference between patterns of subsequent maternal and perinatal mortality in Kashmir if there is any.

MATERIAL AND METHODS

Study Design

This study is a comparative observational study. This comparative study was carried over a period of 18 months from 2020 to 2021. The study explored the role of delivery centres referral system in addressing delays in receiving emergency obstetric care and weekend effect. The study employed a quantitative research technique focusing on the socio-demographic status of respondents, reproductive and birth history, obstetric complications, the delays in the referral system and factors associated with these delays and outcomes of delays. Since it is a review of records, no informed consent needs to be obtained from any patient for being included in the study.

Study Setting

The sample included all referred obstetric complicated cases from the different delivery centres to “Postgraduate Department of Obstetrics and Gynecology”, Govt. Lalla Ded Hospital, an associated hospital of Government Medical College Srinagar.

Sample Size

All the obstetric referrals from primary and secondary health facilities to Lalla Ded Hospital were included in the study after fulfilling inclusion and exclusion criteria.

Selection of Sample

All obstetric referrals were identified and their records were checked. Among these females, those who fulfilled the inclusion and exclusion criteria were taken into study.

Inclusion Criteria

All obstetric referrals from primary and secondary level health facilities.

Exclusion Criteria

- All non-obstetric referrals.
- Women whose records had incomplete data that did not allow ascertainment of the primary exposures and outcome (e.g., gestational age at delivery, IOL, and day of the week of delivery) were omitted from the analysis

Methodology

The overall proposed methodology is represented in a flow chart in Figure below.

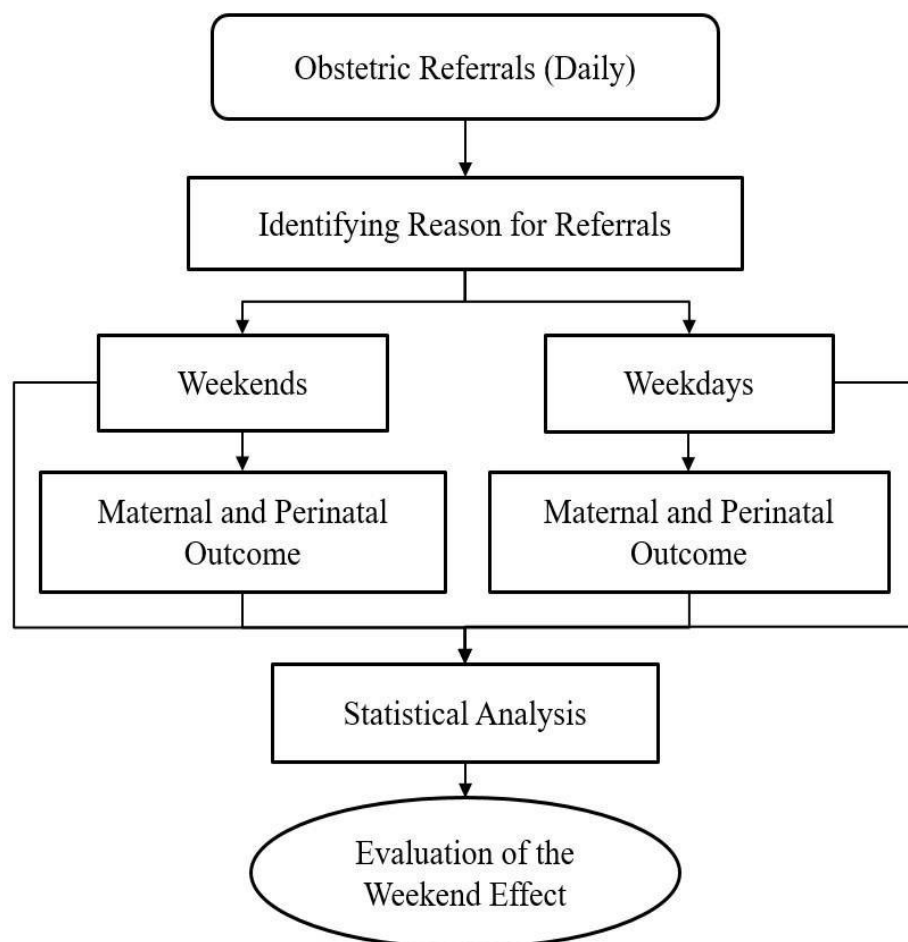


Figure 1. Flow chart of methodology

A proforma was designed and data was collected. The arrival time was recorded in the hospital receiving room. The duration of stay at referring health institution was estimated by the patient in few and by their relatives in most cases.

All the obstetric referrals from primary and secondary health facilities to Lalla Ded Hospital were considered for the study. A detailed history was taken from patients or attendants regarding the age, Obstetric history, place of referral, duration of stay at a referral centre, Management done at a referral centre, Time and date of referral, Mode of conveyance and time taken Information given on referral letter. Detailed clinical examination of the patient and findings noted in proforma.

The comparison was made between the referrals from weekdays and weekends for 18months. The weekend was defined as “Saturday through Sunday,” while the weekday was defined as “Monday through Friday.” The data regarding referrals was analysed to conclude whether the weekend effect exists or not. It included the analysis of reasons for referrals both medical reasons like multiple pregnancy, ectopic pregnancy, Intra Uterine Fetal Demise (IUFD), abruption, etc. and non-medical reasons like no availability of NICU, non-availability of doctors, lack of infrastructure, no availability of blood bank facility etc. Consistency between the indication for referral and actual diagnosis after admission was also analysed.

Any maternal morbidity or catastrophe was noted. Factors contributing to delay in coming to the hospital were also noted. The fetal outcome was noted regarding gestational age, live or stillbirth, birth weight, Apgar score at 1 and 5 min, Nursery admissions and reasons for nursery admission, duration of stay in the nursery, the clinical course of the baby before the discharge of mother and if any complications occurred. Further, the data of maternal and perinatal outcomes was analysed and compared between weekday and weekend referrals.

Patients were admitted to ICU and were treated by a multidisciplinary team consisting of Anaesthesiologist and Critical Care experts, Neurologists, Cardiologists, Nephrologists along obstetricians providing a daily consultation. The condition of the mother and neonate both were noted before discharge.

Statistical Analysis

All the collected data were recorded in Microsoft Excel and analyzed using SPSS v23. Categorical variables were described as frequencies and percentages. Discrete variables were described in terms of median and inter quartile range. Continuous variables were summarized as mean and standard deviation and finally, the appropriate statistical tests were applied for data analysis. Data included frequencies and proportions of referral causes, day and time of referral, as well as maternal and neonatal outcomes.

Further analysis was carried out using the Chi-Square test and t-test respectively, wherever applicable. Statistical significance was set at $P < 0.05$.

RESULTS AND OBSERVATIONS**Table I. Demographic profile and general characteristics.**

Parameters
Age
<20
20-25
26-30
>30
Parity
Primigravida
Multigravida
Residence
Rural
Urban
Prior antenatal check-up
Yes
No
Type of referring hospital
District hospital
Sub-district hospital
Community health centre(CHC)
Primary health centre
Subcentre
Private hospitals

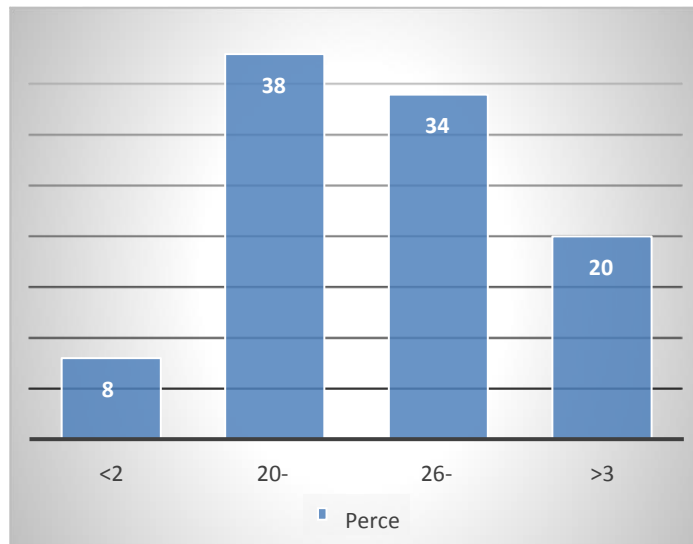


Figure1. Age distribution

The demographic profile and general characteristics are depicted in Table I. The majority of patients (57%, n=4560) were primigravida and came from rural areas (77%, n=6160).70% (n=5600) of the study population did not have any prior antenatal checkup and visited the referral centre for the first time. In our study, 42% (n=3360) of total referrals were from the district hospitals followed by 27% (n=2160) from community health centre (Table I and Figure 1).

Table II. Time of referral.

Time of referral	Antepartum(%)				Intrapartum(%)			
	Week days	Week end	Total	p-value	Week days	Week end	Total	p-value
With complications	292	108	400 (38.5)	0.007*	1960	840	2800 (40.2)	<0.001*
Without complications	416	224	640 (61.5)		2621	1539	4160 (59.8)	
Total (8000)	708	332	1040 (13)		4581	2379	6960 (87)	

Without Complications With Complications

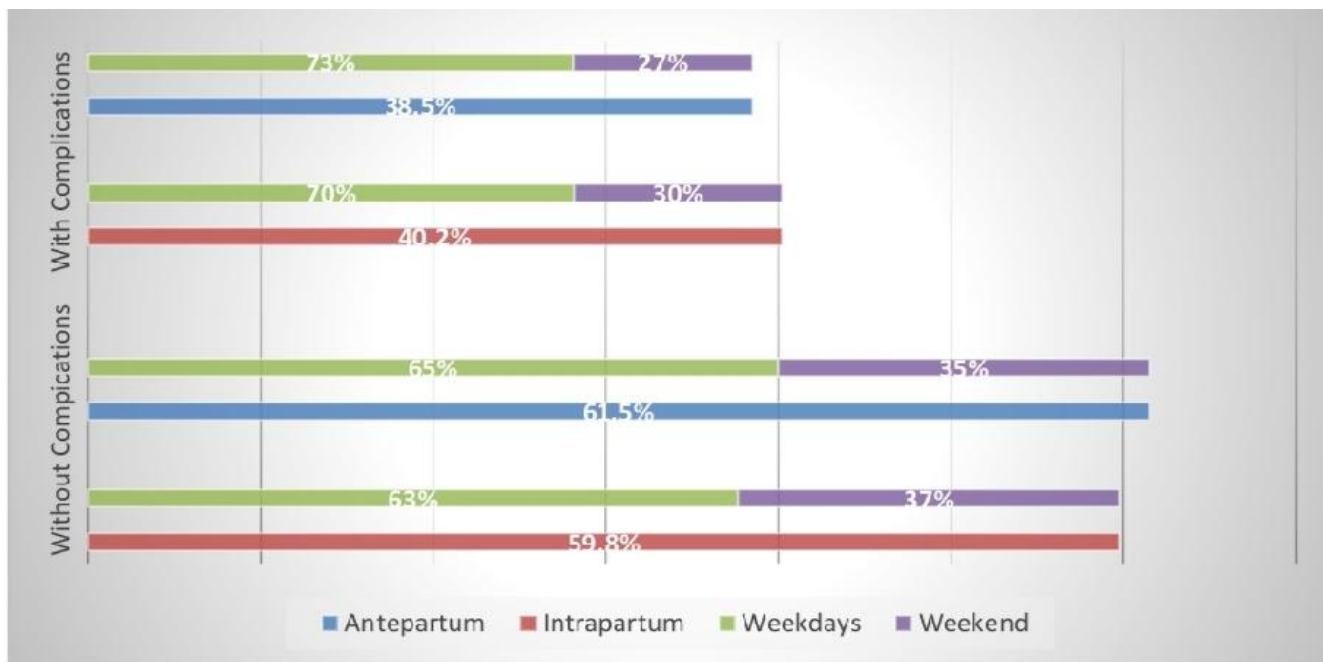


Figure 2. Time of referral.

Most of the referred patients were in labour at the time of referral (87%, n=6960) whereas only 13 % (n=1040) of referred patients were antepartum. 2800 out of 6960 intrapartum referrals (40.2%) presented with medical/obstetric complications (Table II and Figure 2).

Table III. Mode of delivery.

Mode of delivery	Number of patients			Percentage (%)	p-value
	Weekdays	Weekend	Total (8000)		
Vaginal					0.123
Spontaneous	1840	640	2480	31	
Ventouse	500	140	640	8	
LSCS	3660	1220	4880	61	

P-value by Chi-square test

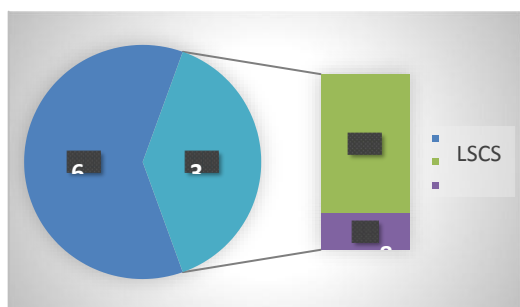


Figure 3. Mode of delivery.

61% of referred patients required surgical management in the form of LSCS (61%, n=4880) and instrumental deliveries (8%, n=640). 31% (n=2480) of total patients had spontaneous delivery (Table III and Figure 3).

Table IV. Fetal Outcome.

Fetal outcome	Number of babies(n)			Percentage (%)	p-value
	Weekdays	Weekend	Total (8090)		
Live births	5875	1948	7823	96.69	<0.001*
Still births	185	82	267	3.31	
NICU admissions	685	305	990	12.23	<0.001*
Neonatal mortality With NICU care	263	104	367	4.53	<0.001*

Of a total of 8090 births, there were 267 stillbirths (3.31%). Among 7823 (96.69%) livebirths, 7456 survived which is 92.16% of total births (Table IV).

Table V. Distribution of referred cases and indications for referrals.

Indications for Referral	Weekdays n=6000(%)	Weekend n=2000(%)	p-value
Non-Medical reasons	3867(64.4)	1360(68.0)	0.004*
Non-availability of NICU	1798	523	0.009*
Non-availability of doctors	749	437	<0.001*
Lack of infrastructure (water, construction, USG, NST)	641	119	<0.001*
Non-availability of blood bank facility	276	121	0.018*
No reason specified	403	160	0.085
Medical reasons	2133(35.6)	640(32.0)	0.004*
Ectopic pregnancy	603	168	0.031*
Eclampsia/PIH	592	163	0.023*
Postdatism	297	121	0.043*
IUFD/abruption	259	94	0.469
Multiple pregnancy	124	52	0.159
Malformations	258	42	<0.001*
Total	6000(100)	2000(100)	

*Statistically Significant Difference (P-value<0.05); P-value by Chi-square test

In this country, most doctors in the government sector work on Saturdays, at least in the morning. To look for differences in referrals based on time of day, the 24-h period from 7am was divided into 3-h intervals and the time of arrival of referred cases was noted. The majority of patients were referred between 4 pm on Saturdays and 1 am on Sundays, as compared to a more uniform distribution among all periods on other days. (Table V).

DISCUSSION

We present data about referral patterns and compare the delivery outcomes of weekends vs weekdays at the largest tertiary care maternity hospital in Kashmir. 8000 Obstetric referrals from primary and secondary health facilities to Lalla Ded Hospital were included in the study. Out of these 8000 subjects, 6000 subjects (75%) were referred on the weekdays and 2000 subjects (25%) on the weekend days. The definition of weekend use represents 28% of the time and 25% of deliveries occurred in this period.

In our study, the mean maternal age at presentation was 27 years with the range from 16 to 37 years (Table I and Figure 1). Similarly, 21-24 years was the most frequent age group preferred at Fatima Memorial Hospital, Lahore (Ambreen et al.)⁹

In our study, the majority of referred cases (57%) were nulliparous and 43 % were multiparous (Table I). In a similar cross-sectional study conducted by Kaye et al. 10 in Uganda, the majority of referred cases were primigravidas, with little or no formal education. 77% of the study population lived in rural areas and only 23% lived in urban areas (Table I) which are similar to the study by Wahane et al. 11 where 95.65% of women came from rural areas & only 4.34% came from urban areas. This higher incidence of rural patients may be due to delay in seeking care owing to ignoring warning signs due to lack of awareness compounded by poor transport facilities. 70% (n=5600) of the study population did not have any prior antenatal checkups and visited the referral centre for the first time (Table I). Only 30% of patients were booked cases which is comparable with another local study in Lahore where 90% of patients never had any antenatal check-up⁹. Most of the patients were referred from district hospitals (42%) and CHC (27%) of various neighbouring districts indicating that the major burden of referrals is from rural India (Table I).

Most of the referred patients were in labour at the time of referral (87%, n=6960) where as only 13 % (n=1040) of referred patients were ante partum. 2800 out of 6960 intrapartum referrals (40.2%) presented with medical/obstetric complications (Table II and Figure 2). Patients with obstetric complications were seen to be significantly higher on weekends as compared to weekdays. In a similar observational study conducted in Gujarat by Patel et al. ¹², out of the 155 referrals, the most common referral was during the intrapartum period similar to our study.

61% of the referred patients underwent emergency LSCS whereas 39% had vaginal delivery (Table III and Figure 3) which is similar to a study conducted by Ambreen et al. ⁹ where 62% of referred cases underwent caesarean section. Similar results were seen in a study by Narsaria et al. ¹³ and Clark et al. ¹⁴ showed a higher occurrence of LSCS during weekdays than on weekends.

In this study, 3.31% (n=185) of all births was a stillbirth and 96.69% (n=7823) were live births (Table IV). Amongst the births seen on weekdays, 685 underwent NICU admission of which 263 expired. On weekends 305 NICU admissions were reported of which 104 expired

despite of the NICU care. The difference between the NICU admissions and neonatal mortality despite of NICU care on weekdays and weekends was found to be statistically significant. A study by Pasupathy et al.¹⁵ in Scotland found an adjusted odds ratio for weekend neonatal death of 1.3 (1.0 to 1.6), compared with weekday in-hours, which was similar for all out of hours deliveries 1.3 (1.1 to 1.6). Given the differences in structures, resourcing, and management of health services internationally, this mixed picture is expected. A recent study in the UK by Palmer et al.¹⁶ found that there was an increase in perinatal mortality and maternal infection on weekend days. The traditional birth attendants in India (Dais) are untrained and sometimes unaware of the problems encountered during pregnancy and labour. So, they bring the patient to the hospital very late and usually in serious condition.

In our study, major inconsistencies were observed between reason for referral and actual diagnosis (Table V). Non-medical reasons such as non-availability of NICU, non-availability of doctors and lack of infrastructure showed predominance on weekends with statistical significance as compared to weekdays. Similar effect was seen by Chauhan et al.¹⁷, where they observed a temporal inconsistency in pattern of inter institutional referrals with variation attributable to non-patient factors thereby establishing Saturday effect. Furthermore, referrals for medical reasons such as ectopic pregnancy, eclampsia / PIH, postdatism and congenital malformations also showed an increased-on weekends (Table V). This was also found to be statistically significant.

Maternal adverse outcomes including obstetric infection, obstetric haemorrhage, severe perineal lacerations, prolonged LOS and overall composite maternal were observed to be significantly higher in weekend deliveries as compared to the weekdays. Similar effects were reported by Palmer et al.¹⁶ and Gould et al.¹⁸

In this study, we also examined whether maternal and perinatal complications of childbirth varied by daily obstetric volume and timing of delivery (weekend vs weekday) among the Kashmiri population in our hospital. In our study, unadjusted rates of most perinatal complications were higher on weekend days as compared with weekdays. There was a consistent 'weekend effect' for maternal complications, with increased odds among weekend births. Odds of obstetric infection were two-fold more on weekends than on weekdays (adjusted OR (aOR), 2.32; 95% CI 1.78 to 3.17), as were odds of composite maternal complication (aOR, 1.83; 95% CI 1.34 to 2.52). For neonatal outcomes, only depressed Apgar score (aOR, 2.19; 95% CI 1.62 to 2.92) and composite infant outcome (1.93; 1.27 to 3.54) were more frequent on weekend days, compared with weekdays.

This analysis adds to the growing literature on the capacity strain and perinatal complications of childbirth. These findings provide further evidence that weekend births have higher rates of complications, and delivering a baby on a busy weekend day may further increase the risk of perinatal complications.

Although recent studies of hospital-level factors have found null associations between some hospital-level factors (e.g., the obstetric hospitalist staffing model¹⁹ and condition-specific obstetric protocols²⁰ and perinatal outcomes, the search for meaningful hospital-level factors should continue.

Research on hospital-level factors in obstetric care (e.g., staffing models and use of protocols) has grown in recent years. More research on these topics is needed, and future research

should also examine the role that hospital administration and management can play in obstetric care quality; such factors have been demonstrated to affect patient outcomes in other areas of inpatient medicine^{21,22}. Such information would fill evidence gaps, helping identify hospital level and policy levers to improve maternal outcomes of childbirth.

CONCLUSION

This study concludes that early identification, initiation of early treatment and timely referrals are the crucial components for the success of any maternal health intervention. Minimizing the causes of delay to emergency obstetric care significantly decrease maternal and neonatal morbidity and mortality.

There is a continuous rise in referral rates in tertiary care centres. Lack of education, lack of awareness of hazards of delay in seeking help, poor peripheral health care system, lack of health care facilities at basic health units, absence of adequately trained medical and paramedical personal and lack of transport facility are the factors responsible for delay in referral. There is a need to mobilize and motivate the government to formulate robust peripheral health system right from sub centre to district level, to hold census and tracking of pregnant and postnatal mothers, and meticulous and prompt delivery of health facilities to all of them.

Limitations

1. These data are observational, and causality is difficult to establish, although randomization is not practical in this context. Linked vital statistics data and patient discharge data are more reliable and accurate than either data source on its own, yet such administrative data have known limitations concerning data quality.
2. Some neonatal outcomes, such as neonatal death and neonatal seizures, are rare, which may have limited our statistical power to detect differences for these outcomes.

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