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**OFF-HOUR / ON-HOUR DELIVERY OUTCOMES IN LAUTECH TEACHING HOSPITAL OSOGBO,  
A THREE YEAR RETROSPECTIVE CASE REVIEW**

**<sup>1</sup>RA AKINDELE, <sup>1</sup>SO OMOPAIOOLA, <sup>2</sup>NO BELLO, <sup>\*3</sup>WO ADEBIMPE, <sup>1</sup>OOA ALA**

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*Running Title: Off and on hour delivery outcomes*

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**ABSTRACT**

At the time of delivery, care is focused on risk surveillance and intervention if indicated; ready availability of experienced professionals and supportive facilities cannot be over emphasized and cannot be represented at hospitals on a 24-hour / 7-day basis. This study aim to determine the relationship between off-hours delivery and pregnancy outcome compared with on-hour delivery and pregnancy outcome for subgroups of hospital birth in Lautech Teaching Hospital in Osogbo in Southwestern Nigeria. This retrospective study audited medical records of 310 patients who delivered during this period from 28 weeks and above, between the periods of January 1, 2008 to December 31, 2010. Data was analyzed using the SPSS software version 23.0. Results shows that 69.0% were booked, a diagnosis of normal labour was made in 213 (68.7%) of patient while 133 (42.9%) of patient had emergency caesarean section while 65% delivered during the off-hour period. The deliveries were attended by different cadre of health workers. Among the 202 babies delivered during the off-hour, 155 (63.8%) had Apgar score of 7 and above at 1 minute of life as compare to 88 (30.5%) seen among the 108 on-hour deliveries. There was significant statistical relationship between time of delivery, and perinatal morbidity and mortality ( $p = 0.043$ ) while there was no significant statistical relationship between time of delivery and maternal outcome ( $p = 0.552$ ). We concluded that more deliveries occur during off-hours and were associated with an increased risk of perinatal morbidity and / or mortality, suggesting a need to reappraise our practice, and the facilities being deployed into use most especially during off-hour periods

**Keywords:** Time of delivery; off hours/on-hour periods; delivery outcomes; Nigeria

## INTRODUCTION

Socially the most desirable pregnancy outcome to the general population is a live baby and mother pair, radiating joy and smiles to all. Pregnancy risk factors are all the aspects that endanger the life of the mother and the baby [1]. The major negative pregnancy outcomes include neonatal mortality, low birth weight, still births and even the death of the mother due to difficulties during deliveries [1,2]. At present a considerable amount of literature has been published about the relationship between hospital admissions that occur in the evening, at night or during weekend (off-hour) and morbidity and mortality [3]. In obstetrics and neonatal care, studies have focused on the time of birth or admission to a neonatal intensive care unit (NICU) [4,5]. These studies have demonstrated a higher risk of adverse outcomes among infants born or admitted during off-hours as compared to office-hours leading to questions about the quality of care provided during off- hours [3-6].

At the time of delivery, care is focused on risk surveillance and intervention if indicated, including assisted delivery and neonatal intensive care, this requires the ready availability of experienced professionals and supportive facilities [6]. However high-care facilities and multiple expert competence cannot be represented at hospitals on a 24-hour / 7-day basis, while the majority of the non- scheduled deliveries occur around the clock, with a biphasic pattern including a peak

occurring under natural conditions in early morning [6,7] (off-hour). Heterogeneity with respect to personnel coverage around the clock is the rule rather than exception for most clinical care [6].

Studies have shown moderate to strong associations between patient outcomes and organizational features, both with regard to volume of care and care that is day time dependent, such as physician staffing and the immediate availability of anesthetic services [8-12]. In maternal and perinatal care, this evidence is not unequivocal as different studies have demonstrated that high risk fetus have better outcomes in high volume hospitals [13] whereas controversy exist in the case of low and moderate risk fetus[14-16].

Little is known about the interaction between fixed and time dependent organizational characteristics [6]. The time of delivery may be regarded as an indirect expression of organizational vulnerability, as condition may be more suboptimal during the evening and night (off-hour)[6]. Indeed studies have suggested that perinatal outcomes are compromised during the weekend and at night [17-20].

The scope of this study expanded from delivery related perinatal mortality (0.97% total; 66.7% off-hour ) to delivery related perinatal outcome including low Apgar score at 1 and 5 minutes after birth, admission into special care baby unit (SCBU) (8.3% total; 88.5% off-hour) and maternal morbidity to enhance the sensitivity of

the analysis. The expression of the risk as a number rather than odd ratio may give a better indication of the impact of the off-hour effect on the health care and the potential gains of possible improvement in obstetrics and perinatal care in hospital settings. Thus this study aim to determine the relationship between off-hours delivery and pregnancy outcome compared with on-hour delivery and pregnancy outcome for subgroups of hospital birth in Lautech Teaching Hospital in Osogbo in Southwestern Nigeria.

## **SUBJECTS AND METHODS**

The study area was Ladoke Akintola University of Technology Teaching Hospital Osogbo commenced operation in 2000. It is a 300 bedded tertiary hospital located in the semi-urban state capital of Osun State, Southwestern Nigeria. The maternity unit of the hospital is well equipped, and managed by experienced appropriate health care workers. This was a retrospective study that audited medical records of women with deliveries.

The study population was selected from medical records of all patients who delivered during this period from 28 weeks and above, between the periods of January 1, 2008 to December 31, 2010 were reviewed. This excludes schedule deliveries, intrauterine fetal death, births before arrival and fetus with congenital defects that are not compatible with life. All the cases of deliveries within the stated

period that met the selection criteria were reviewed.

A validated checklist constructed after a review of patients case-notes and review of relevant literatures was prepared. On-hour was regarded as official working hours; 8am to 4pm on Mondays to Fridays. Off-hour refers to official call duty hour; 4pm to 8am on Mondays to Fridays and weekends. Maternal socio-demographic factors, pregnancy and labour characteristics, maternal and perinatal outcome were obtained. Trained resident doctors were employed in data synthesis from case-notes. The data obtained were fed into SPSS software version 23.0. Categorical variables were summarized using number and percentages and multivariate analysis was done, a level of significance put at less than 5%.

## **RESULTS**

There were 1399 deliveries during the period of evaluation, 502 (35.9%) met the inclusion criteria and 310 (22.2%) were analyzable. Majority (87.4%; 271/310) of the pregnant women falls between the age of 25 – 34 year, 99% (307/310) of them were married while 24.2% (75/310) were unemployed. A total of 96.1% (298/310) of these patients have at least secondary education and the study population was predominantly of Yoruba ethnicity- as shown in Table 1.

Table 2 shows that majority of these patients (69%) were booked, 28% were un-booked while 3.0% were registered. Majority of the

patient 174 (56.1%) were multiparous, 71(78.9%) out of the 90 un-booked patient were referred from secondary health care facilities and 279 (90.0%) of the patient delivered at term. Diagnosis of normal labour was made in 213 (68.7%) of patient, 240 (77.4%) of the newborn had birth weight between 2.5kg – 3.4kg, 133 (42.9%) patient had emergency caesarean section. In addition, 65% delivered during the off-hour while 35% delivered during the on-hour period. The deliveries were attended by different cadre of health workers as shown in Figure 1.

Table 3 shows that majority of the newborn 243 (78.4%) had Apgar score of 7 and above at one minute of life, with resuscitation this increased to 299 (96.5%) newborn at 5 minute. Three newborns out of the eleven that had Apgar score of less than 7 at 5 minute had perinatal death. Seventeen patients (5.5%) had postpartum hemorrhage, 9 (2.9%) of which had blood transfusion while majority of the patient 245 (79%) had packed cell volume of 30% and above. More babies delivered during the off-hour 155 (63.8%) had Apgar score of 7 and above at 1 minute of life as compare to 88 (30.5%) seen during On-hour, similar trend was observed in babies with low Apgar score at 1

minute of life. Off-hour deliveries account for 2 (66.7%) of perinatal mortality and 23 (88.5%) of SCBU admission observed in the study; there was significant statistical relationship between time of delivery, perinatal morbidity and mortality ( $p < 0.05$ ). Ten (58.8%) of the 17 patients that had postpartum haemorrhage delivered during off-hour period while 4 (44.4%) of the 9 patients that had transfusion delivered during off-hour, there was no significant statistical relationship between time of delivery and maternal outcome ( $p > 0.05$ ) according to Table 4

Twenty eight (71.8%) of babies with low Apgar score at 1 minute that were delivered by booked mothers were nursed by their mother side, there was significant statistical relationship between booking status and low Apgar score at 1 minute ( $p < 0.05$ ). Fourteen (70%) of the babies whom mothers were referred from secondary health facility and had low Apgar score at 1 minute were admitted into SCBU, there was significant statistical relationship between referral status and low Apgar score at 1 minute ( $p < 0.05$ ). Thirteen (65%) babies delivered by senior registrar who had low Apgar score at 1 minute were nursed by mother side according to Table 5.

Table 1: Socio-demographic distribution (No. of patient = 310)

Variable	Frequency (%)
Age in years	
15-24	18(5.8)
25-34	271(87.4)
35-44	21(6.8)
Marital status	
Married	307(99.0)
Single	3(1.0)
Occupation	
Unemployed	75(24.2)
Employed	235(75.8)
Educational Status	
Post-secondary	211(68.0)
Secondary	87(28.1)
Primary	12(3.9)
Tribe	
Yoruba	288(92.9)
Others	22(7.1)
Religion	
Christianity	197(63.5)
Islam	113(36.5)

Table 2: Obstetrics and Labour history (No. of patient = 310)

Variable	Frequency (%)
Booking status	
Booked	214(69.0)
Un-booked	87(28.0)
Registered	9(3.0)
Parity	
Primipara	136(43.9)
Multipara	174(56.1)
Un-booked; referral status	
Secondary Health Care	71(78.9)
Others	19(21.1)
Estimated Gestational Age	
Pre term	24(7.7)
Term	279(90.0)
Post term	7(2.3)
Diagnosis at presentation	
Normal labour/Uncomplicated labour	213(68.7)
Abnormal/complicated labour	75(24.2)
Maternal Co-morbidity	22(7.1)
Birth Weight	
1.5kg-2.4kg	34(11.0)
2.5kg-3.4kg	240(77.4)
3.5kg-4.1kg	33(10.6)
>4.1kg	3(1.0)
Mode of delivery	
Spontaneous Vaginal Delivery	173(55.8)
Instrumental Vaginal Delivery	4(1.3)
Emergency Caesarean Section	133(42.9)
Time of delivery	
Off-hour	202(65.0)
On-hour	108(35.0)

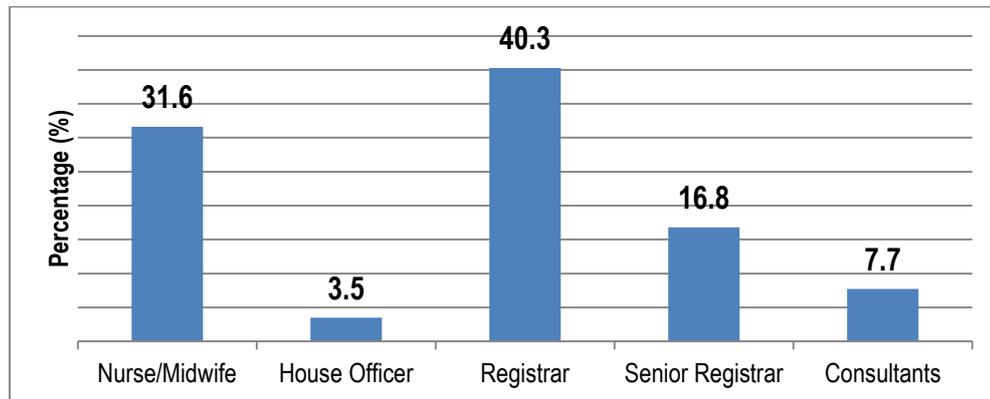


Figure 1: Accoucher

Table 3: Fetal and Maternal outcome (No. of patient =310)

Variable	Frequency (n)
Apgar score at 1minute	
<4	8(2.6)
4-6	59(19.0)
7 and above	243(78.4)
Apgar score at 5minutes	
<4	3(1.0)
4-6	8(2.6)
7 and above	299(96.5)
Outcome of Apgar score of < 7 at 1min	
Perinatal mortality	3(4.5)
SCBU admission	26(39.4)
Nursed by mothers sides	38(56.1)
Post partum hemorrhage	
Yes	17(5.5)
No	293(94.5)
Maternal Packed cell volume	
30 and above	245(79.0)
26-29	50(16.1)
25 and below	15(4.8)
Maternal Blood Transfusion	
Yes	9(2.9)
No	301(97.1)

Note: SCBU mean Special Care Baby Unit.

Table 4: Time of delivery with Fetal and Maternal outcome

VARIABLES	Time of delivery		Chi-square	P-value
	On-hour N (%)	Off-hour N (%)		
APGAR score at 1min				
<4	1(12.5%)	7(87.5%)	2.445	0.295
4-6	18(30.5%)	41(69.5%)		
7 and above	88(36.2%)	155(63.8%)		
APGAR score at 5mins				
<4	1(33.3%)	2(66.7%)	1.765	0.414
4-6	1(12.5%)	7(87.5%)		
7 and above	105(35.1%)	194(64.9%)		
Outcome of APGAR score of < 7 at 1min				
Perinatal mortality	1(33.3%)	2(66.7%)	6.297	0.043*
SCBU admission	3(11.5%)	23(88.5%)		
Nursed by mothers side	15(40.5%)	22(59.5%)		
Post partum hemorrhage				
Yes	7(41.2%)	10(58.8%)	0.353	0.552
No	100(34.1%)	193(65.9%)		
Maternal Packed cell volume				
30 and above	83(33.9%)	162(66.1%)	0.292	0.864
26-29	18(36.0%)	32(64.0%)		
25 and below	6(40.0%)	9(60.0%)		
Maternal Blood Transfusion				
Yes	5(55.6%)	4(44.4%)	1.815	0.178
No	102(33.9%)	199(66.1%)		

Note: SCBU mean Special Care Baby Unit.

Table 5: Fetal outcome with booking status, referral status and accoucher

	Low Apgar score at 1 minute			Chi-square	P-value
	Perinatal mortality (%)	SCBU admission (%)	Nursed by mother-side (%)		
Booking Status					
Booked	2(5.1%)	9(23.1%)	28(71.8%)	12.624	0.013*
Registered	0(0.0%)	0(0.0%)	1(100.0%)		
Un-booked	1(3.8%)	17(65.4%)	8(30.8%)		
Referral status					
Primary Health Care	0(0.0%)	2(50.0%)	2(50.0%)	13.382	0.010*
Secondary Health Care	0(0.0%)	14(70.0%)	6(30.0%)		
Not referred	1(50.0%)	1(50.0%)	0(0.0%)		
Accoucher					
Nurse/Midwife	1(12.5%)	0(0.0%)	7(87.5%)	12.007	0.151
House Officer	0(0.0%)	0(0.0%)	2(100.0%)		
Registrar	2(6.1%)	17(51.5%)	14(42.4%)		
Senior Registrar	0(0.0%)	7(35.0%)	13(65.0%)		
Consultants	0(0.0%)	2(66.7%)	1(33.3%)		

## DISCUSSION

Birth in the hospital during off-hour accounts for about two-thirds of all deliveries in the present study, this was higher than the 50% reported for a similar study; suggesting an increased adverse perinatal outcome of hospital delivery at night [6].

Off-hour delivery was associated with an increased risk of perinatal morbidity and/or mortality as against on-hour delivery; 66.7% vs. 33.3% and 88.5% vs. 11.5% for perinatal mortality and SCBU admissions respectively; this was statistically significant ( $p < 0.05$ ). The findings in this study is similar to, but more pronounced than those of retrospective studies based on data from the Netherlands perinatal registry[3,6], the latter study found 1.7% and 0.19% increase in adverse outcome and perinatal mortality respectively. Among the infants with poor Apgar score at 1 minute in this study, very few suffered perinatal mortality; this is in agreement with 5% reported in effect of hospital delivery during off-hour on perinatal outcome [3], and 5.5% reported in another study from Pakistan [21]. The risk of perinatal morbidity were concentrated in the un-booked subgroup which accounts for about one third of the SCBU admission ( $p < 0.05$ ), a study from south eastern Nigeria [22] had shown increase risk in birth asphyxia in un-booked patient (80%) compared to booked patient (20%). Out of the 17 SCBU admissions in this subgroup, majority were referred from secondary health

facilities amounting to 70% of SCBU admission in the un-booked category, this might probably be due to the extent of intervention before referral. There was significant statistical relationship between perinatal morbidity and referral status ( $p < 0.05$ ). However two thirds of perinatal mortality recorded was seen in booked patient.

Few (5.5%) of the patient in this study had postpartum hemorrhage which is just below the worldwide prevalence rate of 6%[23], half of these patients delivered during the off-hour and about 3% of them had blood transfusion, which is about ten times the overall blood transfusion rate for primary postpartum hemorrhage in another study; a tertiary care hospital review of transfusion for primary post-partum haemorrhage, [24] though the finding in our study was not statistically significant ( $p > 0.05$ ). It was however noted that about half in the on-hour group had blood transfusion due to post-partum hemorrhage as against about two-fifth in the off-hour group.

Sixty seven babies have low Apgar score ( $< 7$ ) at 1 minute accounting for about one fifth of all deliveries; about half of these babies were delivered by registrar; there was no significant statistical relationship between fetal outcome and cadre of accoucher at the delivery. The category of accoucher present at the delivery of these babies with low Apgar score at 1 minute probably reflects the preparedness for possible

poor perinatal outcome in this category of babies.

## CONCLUSION

More deliveries occur during off-hours and were associated with an increased risk of perinatal morbidity and / or mortality. There is need to reappraise our practice, the facilities being deployed into use during off-hour period, and appropriate measures taken to reduce the risk of mortality and morbidity in this group of patients.

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