TIME OF DELIVERY AND PERINATAL OUTCOMES AT MUHIMBILI NATIONAL HOSPITAL DAR ES SALAAM 2011.

TANZANIA.

By

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A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Medicine (Obstetrics and Gynaecology) of Muhimbili University of Health and Allied Sciences.

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CERTIFICATION

The undersigned certify that he has read and hereby recommend for acceptance by the Muhimbili University of Health and Allied Sciences a dissertation entitled: **Time of delivery and perinatal outcomes at Muhimbili National Hospital Dar es Salaam,** in partial fulfillment of the requirements for the degree of Master of medicine in Obstetrics and Gynaecology of the Muhimbili University of Health and Allied Sciences.

---------- Date----------

Dr. H.L. KIDANTO

(SUPERVISOR)

DECLARATION AND COPYRIGHT

I, **Hinju Januarius**, declare that this **dissertation** is my own original work and that it has not been presented and will not be presented to any other University for a similar or any other degree award.

Signature…… Date……

ACKNOWLEDGEMENTS

I would like to thank God for His help, protection and mercy which enabled me to accomplish this study. I would like to thank all the individuals who were so instrumental in helping me to complete this study. My sincere gratitude and special thanks to Dr. Kidanto, my supervisor; for his dedicated supervision, constructive criticism, instructions and his patience. Even though he had a lot of other important things to do, he always found time to read my work and helped me in reasoning. I wish to thank all the specialists and consultants in the MUHAS and MNH Obstetrics and Gynaecology department, for their valuable inputs during the proposal development, analysis of results, and helping me get something useful from this study. I am very grateful to my research assistants, medical students Mkayamba E and Linda H for her invaluable effort without which data collection would be difficult. Finally to my beloved girlfriend Eva Lugomo for her patience, support and encouragement through the entire process, thank you very much.

DEDICATION

This dissertation is dedicated to my beloved parents late Joseph Hinju, late Veronica Mapunda and to my beloved wife Eva Lugomo.

ABSTRACT

Background:

Adverse perinatal outcomes in terms of 5thminutes Agar score < 7, and perinatal death (still birth and early neonatal death) are not only related to maternal health but also are best indicators of the quality of health care services. Perinatal death is much higher in developing countries; it is 10 times higher than in developed countries**.** According to Millennium Development Goals progress report, December 2010, Infant mortality rate in Tanzania was estimated to be 51 per 1000 live births. In a study done in 2006 at Muhimbili National Hospital PMR was found to be 65/1000 singleton deliveries and 116/1000 multiple deliveries**.** Preterm birth, infection and birth asphyxia are thought to be the main causes of death in newborn babies worldwide[5]. Staffing also has been implicated on causes of adverse outcomes. Understanding the factors contributing to the increased perinatal mortality and morbidity is the key for reduction of adverse perinatal outcomes. At MNH there are three working shifts for nurses; the morning shift has eight hours, the evening shift has 6 hours and the night shift has 12hours. The purpose of this study was to determine the association between time of delivery (shifts) and perinatal outcomes in singleton deliveries at MNH.

Methodology: This was a cross sectional study. All singletoned deliveries of gestation age > 28 weeks between 1st July 2011 to 31st October 2011, who met inclusion criteria and consented, were enrolled in the study.

Results: During the study period there were 3193 deliveries. Five hundred and fifty seven (557) were excluded. The remaining 2636 singletoned deliveries were included in the analysis. There were 802(29.3%), 605(22.1%), and 1328 (48.6%) deliveries in the morning, evening and night shift respectively. Majority 2469(91.3%) of the deliveries were of term pregnancies. Sixty percent (59.7%) of the women had primary school education. Sixty three percent (63.4%) of mothers were admitted from home and, 35.2% were referrals. One thousand three hundred and twenty (50.0%) had spontaneous vertex delivery, 1236 (46.9%) had cesarean section, and 48(1.8%) had low cavity vacuum extraction and 32 (1.2%) had assisted breech delivery. Night time deliveries had more adverse perinatal outcomes as compared to morning and evening shifts. Ten percent (10.4%) had Apgar score less than 7 at 5minutes, 8.2% fresh stillbirth, 5.3% early neonatal death which was statistically significant difference (P-value=0.018, 0.001, and 0.026 respectively).Baseline characteristics of women, in terms of maternal education, referrals, prematurity and mode of delivery were equally distributed in all shifts.

Conclusion: The night shift had significant adverse perinatal outcomes in terms of low Apgar score neonates, early neonatal death and fresh stillbirth as compared to morning and evening shifts.

Recommendations; Staffing at night shift need to be improved since it is longer than other shifts and therefore it has more patients than morning and evening shifts. Shifting residents in 12hours shift instead of 24 hours shifts so as to reduce staff fatigue may improve perinatal

outcomes. Early referrals might improve night shift outcomes. Further in-depth study is needed to be done in this aspect

TABLE OF CONTENTS

LIST OF ABBREVIATIONS:

ANC----------Antenatal clinic

AS----------Apgar score

ENND----------Early Neonatal Death

FSB----------Fresh Stillbirth

GA----------Gestation Age

ICU ----------Intensive Care Unit

IPPM----------Intramural Private Practice Muhimbili

MNH----------Muhimbili National Hospital

MUHAS----------Muhimbili University of Health and Allied Sciences.

OBGY----------Obstetric and Gynaecology

PMR----------Perinatal Mortality Rate.

PND----------Prenatal Death

WHO----------World Health Organization

CHAPTER ONE

INTRODUCTION:

Adverse perinatal outcomes in terms of 5thminutes Agar score < 7, and perinatal death (still birth and early neonatal death) are not only related to maternal health but also it is the best indicator of the quality of health care services. Perinatal death is much higher in developing countries and is 10 times higher than developed countries**.** A study done by WHO in six developing countries found that the perinatal death rate was 12.5 per 1000 births and early neonatal mortality rate was 9.0 per 1000 live births. Spontaneous preterm delivery and hypertensive disorders were the most common obstetric events leading to perinatal deaths (28.7% and 23.6%, respectively). Prematurity was the main cause of early neonatal deaths (62%) [1.] According to Millennium Development Goals, progress report, December 2010, Infant mortality rate in Tanzania was estimated to be 51 per 1000 live births [2]. In a study done at Muhimbili National Hospital PMR was found to be 65/1000 singleton deliveries and 116/1000 for multiple deliveries. [3.]

In many hospitals there are working shifts for midwives and they do differ from one hospital to another. There is no universal agreement on how many working shifts or in what interval of hours; however design of the shifts has been shown to have an impact on perinatal outcomes[4]. Most of the nursing studies rely heavily on the general scientific literature in the field of shift work and sleep disorders. Assuming that shift work is associated with sleep disorders, the focus of the nursing literature has been on improving the design of the shift system and on offering strategies for coping with rotating shift work.

Various recommendations have been made in regard to the design of the shift work system, such as length of shift (8-12 hours); principles of rotation (day, night, evening); scheduling (clockwise, number of shifts); and adjustment to individual needs ("morning people" vs. "night people"). Recommendations for dealing with shift work include taking a nap prior to the shift; shift breaks; bright lighting; healthy snack food; and avoiding coffee, alcohol and smoking before daytime sleep. It has been shown that working for more than 24hours is associated with decreased performance.[4]

Several factors affect the perinatal outcomes, including preterm birth, infection and birth asphyxia. These are thought to be the main causes of death in newborn babies worldwide. However, the importance of causes of death may vary according to whether the birth setting was a hospital, or in the community. In hospital-based surveys, women who are at high risk of adverse outcomes (e.g. referred cases) might be over-represented, while community based studies may be less reliable with respect to accurate diagnosis of the causes of deaths. Additionally, surveys in both hospital and community based studies may not provide information on pregnancy complications or events prior to delivery that may have influenced the risk of death for the fetus or the newborn child. From an obstetric and neonatal care perspective, such information is crucial if the primary events that started the pathological process leading to the death of the fetus or the newborn are to be understood[5].

Antepartum hemorrhage (abruption placenta and placenta previa) has an impact on fetal outcomes. The maternal consequences are secondary to the extent of placental separation. The fetal effects are also determined by the extent of placental separation, gestational age and underlying risk factors like intra-uterine growth restriction.

In the developed world, the frequency of abruption placenta has been reported from 0.43% to 1.8% with perinatal mortality ranging from 4.4 to 67.3%.2. Placenta previa is an obstetric complication that occurs in the second and third trimesters of pregnancy. It may cause serious morbidity and mortality to both the fetus and the mother. It is one of the leading causes of vaginal bleeding in the second and third trimesters. Vaginal bleeding is apt to occur suddenly during the third trimester. If the fetus is preterm and immediate delivery is unnecessary (e.g., fetus < 37 weeks' gestation and hemorrhage not present), the patient may be treated expectantly on an outpatient basis. If the fetus is reasonably mature (i.e.>37 weeks' gestation) and the patient is in labor or if severe hemorrhage is present, therapy is directed at the delivery of the fetus. Placenta previa has a risk of perinatal loss due to increased risk of preterm deliveries [6].

Hypertensive disorders in pregnancy, like eclampsia also contributes to perinatal mortality. It is known to contribute significantly to maternal and perinatal mortality in developing countries. Risk factors to the fetus and eventual perinatal death are intrauterine growth restrictions, low birth weight and prematurity as result of placental insufficiency and chronic hypoxia (due to the underlying pre-eclampsia rather than the eclampsia itself). Other risk factors are sepsis, birth asphyxia and its sequelae, and abruption placenta. [7]

Post term pregnancy that is a pregnancy continuing beyond two weeks of expected date of delivery has shown to have increased risk of perinatal mortality, this is due to diminished placental function, oligohydromios, meconium stained liquor and also it is associated with difficult labour. Recent studies have shown that the risks to the fetus and to the mother of continuing the pregnancy beyond the estimated date of delivery are greater

than originally appreciated. Risks have traditionally been underestimated for two reasons. First, earlier studies were published before the routine use of obstetric ultrasonography and, as a result, likely included many pregnancies that were not truly post term. As noted above, such a misclassification bias would artificially lower the complication rates of pregnancies designated post term and increase the complication rates in those designated term, resulting in a diminution in the difference between term and post term pregnancies. [8]

LITERATURE REVIEW:

Several studies have been done trying to describe adverse perinatal outcome with time of delivery. Perinatal death in particular, intrapartum stillbirth and early neonatal death has been associated with time of the day that the birth has occurred[9]. Generally the rates of perinatal death are reportedly higher in the middle of the night although some studies have demonstrated an increase in the evening hours as well. To date, a considerable number of publications have indicated an increased perinatal and neonatal mortality risk for infants delivered at night[10]. Hospital deliveries at night are associated with increased perinatal mortality and adverse perinatal outcome[11-13].

The time of delivery and other organizational features representing experience (seniority and number of staffs) explain hospital-to-hospital variation. An early study on this topic suggested that it was the relationship between mothers circadian rhythm and infant birth outcomes, it has been demonstrated that oxytocin levels are higher at night.[14] In recent years, when a majority of women are being augmented with oxytocin, the increase in maternal oxytocin secretion may cause uterine hyper stimulation leading to the risk of fetal asphyxia.

Additionally it has been shown that spontaneous labour is more likely to start at night with multiparous women more likely to deliver in the late morning and nulliparous women in the early afternoon[15]. Thus those women in labour extending into the night may represent a higher-risk group. A reason for this could possibly be related to maternal fatigue[16]. Heterogeneity with respect to facility and personnel coverage around the clock is the rule rather than the exception for most clinical care, even in surgery and intensive care.

Studies have shown moderate to strong associations between patient outcomes and organizational features, both with regard to the volume of care and care that is daytime dependent, such as physician staffing and the immediate availability of anaesthesiological services.[17] In maternal and perinatal care, this evidence is not the same. Different studies have demonstrated that high-risk newborns have better outcomes in high-volume hospitals, whereas controversy exists in the case of low- and moderate-risk newborns.[18,19,20]

Little is known about the interaction between fixed and time-dependent organizational characteristics. The time of delivery may be taken as an indirect expression of organizational vulnerability, as conditions may be more suboptimal during the evening and night. Indeed, recent studies have suggested that perinatal outcomes are compromised during the weekend and at night [21-23], and a recent analysis in the Netherlands – without elaborating on the specific organizational features – has suggested a similar relation for off-hour deliveries with regard to intrapartum and neonatal mortality[24-27]

Studies done on nursing and physician fatigue indicated higher rates of adverse and near miss events [28,29]. A recent study found that physician fatigue and working at 24hr shifts (extended shifts) was associated with higher rate of motor vehicle accidents [30]. This means staff fatigue also contributes to higher perinatal mortality at night in labour and delivery settings.

Another factor is extent of supervision of residents which is often inadequate at night than the day time. One study on adverse events and their causes, among residents have identified decreased supervision as a contributing factor[31]. Therefore extent of supervision to

residents during night hours is minimal and may contribute to adverse perinatal outcomes during night hours.

Some studies have shown that night time deliveries are associated with high rate of cesarean section which may result into adverse perinatal outcomes. At MNH, experience shows delays in referrals from the municipal hospitals and after reaching MNH and a decision to deliver by CS is made, there are very long intervals between decision and actual procedure of C/S. Some patients deliver vaginally while waiting for CS, resulting into adverse perinatal outcomes[32]. Study done in Japanese Red Cross Katsushika Maternity Hospital Tokyo found the increased adverse perinatal outcomes for cesarean section done over night time in which there was an increased rate of low umbilical artery pH in patients with emergency cesarean delivery [33]

Some studies have shown no difference in perinatal outcome in relation to the time of delivery of the day. A study done at Moffit-Long Hospital associated with the University of California San Francisco, did not demonstrate any significant differences in neonatal morbidity or mortality by time of day among neonates delivered at term in their hospital [34].

The aim of this study is to further explore this issue by examining the adverse perinatal outcomes in different shifts at a teaching hospital in Dar es Salaam Tanzania.

PROBLEM STATEMENT:

Perinatal morbidity and mortality are of public importance since; they have an impact to the family and nation as well. Developing countries' including Tanzania perinatal morbidity and mortality is 10 times higher compared to developed countries. Adverse perinatal outcomes may end up into handicapped people who may not stand on their own. Muhimbili National Hospital has PMR of 65/1000 for singleton deliveries and 116/1000 for multiple deliveries [2].

At Muhimbili National Hospital night shift has many hours and more deliveries and it has fewer midwives as compared to morning shift. In my observation, night shift has more adverse perinatal outcomes as compared to other two shifts. There is a need to study this observation if there is any statistically significant difference.

RATIONALE OF THE STUDY:

The Millennium Development Goal number 4 aims at reduction of under-five mortality rate by two-third by the year 2015. Perinatal mortality is part of infant mortality which contributes to the under-five mortality rate.

Reduction of perinatal adverse outcomes will only be possible if the causative factors are known including events during delivery. Previous studies in several countries have shown an association of time of birth and adverse perinatal outcomes. [9,10,11,12]

Currently no data on association of time of delivery and perinatal outcomes at Muhimbili National Hospital inspite of having high perinatal rate.

All studies reviewed except a study done at Moffit-Long Hospital associated with University of California San Francisco have shown association of time of delivery and adverse perinatal outcomes. The reviewed studies were done in developed countries none was from developing countries. This called for a study to document the presence or absence of relationship between time of delivery and adverse perinatal outcomes at this hospital. This study also serves as the baseline for more in depth studies on the topic.

Research question:

Is there any association between adverse perinatal outcomes and shift of the day a birth has occurred at Muhimbili National Hospital?

OBJECTVES OF THE STUDY;

Broad Objective.

To determine the association between time of delivery and perinatal outcomes in singletone deliveries at Muhimbili National Hospital.

Specific objectives.

1. To determine the proportion of newborns who had adverse perinatal outcomes in different shifts.

2. To compare adverse perinatal outcomes in the morning, evening and night shifts.

3. To determine modes of delivery and perinatal outcomes for singleton deliveries.

OPERATIONAL DEFINITIONS:

In this study, *adverse perinatal outcomes* defined as; Apgar score<7 at 5minutes, fresh stillbirth, early neonatal death and physical birth trauma (including skull fracture,clavicle fracture, facial nerve palsy and brachial plexus injuries).

The *perinatal period* commences as 28 completed weeks of gestation if weight is not known, and if the weight is known is above 500g, and it ends with the early neonatal period (i.e. first 7 postnatal days).

Early neonatal death is a death of a live born baby within 7days post delivery.

A *stillbirth* is the birth after fetal death in the perinatal period and *fresh stillbirth* is intrapartum (fetal death during labour) based on physical appearance of skin which is unpeeled skin

A *perinatal death* is death during the perinatal period, and includes stillbirths and early neonatal deaths.

Primipara in this study meant a woman in her first pregnancy and first delivery.

Multipara is a woman who had more than one pregnancy and delivery.

Shift in this study meant organization of working hours for 24hours.

Morning shift is a working duration from 7am to 2pm.(8hours)

Evening shift is a working duration from 2pm to 7pm.(6hours)

Night shift is a working duration from 7pm to 7am.(12hours)

CHAPTER TWO

METHODOLOGY;

Study design.

Descriptive Crossectional study.

Study Settings.

Muhimbili National Hospital which is a tertiary as well as a teaching hospital is located in Dar es Salaam Tanzania. It has a maternity block in which all obstetric cases are being attended. The maternity block has three labour wards namely, ward 34, Intramural Private Practice (IPPM) Annex and ward 35 which is special for eclamptic patients and it acts as a semi Intensive Care Unit (ICU) for obstetric cases. The labour ward receives admissions from home (some of these women are attending antenatal clinic at Muhimbili National Hospital (MNH) and others are from other antenatal clinic so they are self referred), also receives referrals from municipal hospitals and nearby district hospitals like Mkuranga and Kisarawe. The hospital has all levels of health personnel from consultants to medical students.

Usually there are 2 residents, an intern doctor and specialist on call working in labour ward, obstetric theatre and admitting ward for 24hrs.

Midwives work in shifts, there are three shifts per 24hours, first shift called morning shift (8hours) from 7am to 2pm which has a maximum of 8midwives shift.

Although in this shift there are more nurses only 5 nurses are directly involved in the care of patients, the rest are administrators. The evening shift is from 2pm to 7pm. It has 6 working hours with 4 midwives and the third is (night shift) from 7pm to 7am with maximum of 5midwives.And this has 12 working hours. On average there are about 20-30 deliveries in 24hrs.

Almost every morning the major ward rounds are conducted in the labour ward except for Wednesdays, weekends and public holidays. The major ward rounds involve consultants, specialist, residents, interns, midwives and medical students and they are usually teaching ward rounds.

There are two residents on call who divide themselves after the major ward round, one staying in the obstetric theatre and the other one staying in the labour ward together with an intern doctor; they are responsible also to see patients in the admitting ward. All admissions in the admitting ward are done by an intern doctor and reviewed by a resident in case of difficulties a specialist on call is consulted. All admissions in the labour ward are being admitted by a nurse midwife and assessed by resident doctor and decisions are made by the resident and in case of difficulties a specialist on call is consulted.

The specialist on call during working hours is readily available. During the night time sometimes there are delays on getting specialist review since most of them reside far from the hospital. However phone consultations are regular.

Study duration:

4 months (120days). Data was collected from 1stJuly 2011 to 31st October 2011.

Study Population:

All Pregnant women delivered at Muhimbili National Hospital.

Exclusion criteria:

1. Pregnancies with abruption placenta

2. Deliveries resulted into neonates with physical lethal congenital anomalies.

3. Confirmed IUFD by ultrasound.

4. All cesarean birth performed as elective cases.

5. Gestation age < 28 weeks.

6. Multiple pregnancies.

SAMPLE SIZE:

Convenient sampling, was done all deliveries were enrolled except those who were in the exclusion criteria. During the study period there were 3193 total deliveries, 2636 deliveries were enrolled in the study which is 83% of the total deliveries. 557 were excluded per exclusion criteria.

Data collection:

Data was collected from labour wards (ward 34, ward 35 which is special for eclamptic patients and IPPM Annex) by use of checklist and questionnaire on the following variables, social demographic characteristics of the mothers (age, marital status, level of education). Obstetric characteristics (parity, gestation age, source of admission, number of gestations, nature of labour and mode of delivery) and perinatal outcomes in terms of 5minutes Apgar scores, birth trauma, intrapartum stillbirth and early neonatal death, were picked. The number of midwives at that particular shift a delivery has occurred was recorded too. Two research assistants were employed; one was collecting data in ward 34 and the other one in ward 35 and IPPM Annex.

Data on perinatal outcomes of interest were collected from the partograms and case notes. This was supplemented by interviewing women to obtain social demographic data which were missing in the case notes. Information was collected immediately after delivery.

Neonates with Apgar score less than seven as scored by midwives were admitted in neonatal unit (ward 36) and were followed up for seven days to document the early neonatal

outcome. For those neonates who were not admitted that is those discharged after delivery were not followed due to poor postnatal care, therefore it was not possible to follow up and they were taken as neonates with good outcomes. The principal investigator crosschecked the checklist and questionnaire after every shift, in case of omissions and completion was done. And midwifery registry book was used to confirm the number of deliveries and in case of missing deliveries were taken.

Data Analysis:

Data was coded and entered into computer using EPI-info version 6. Cleaned data were analyzed using the SPSS version 16. Comparisons of proportions were done by use of Odds Ratio (OR) and values within 95% confidence interval and a p-values<0.05were taken as statistically significant. Bivariate analysis (logistic regression) was done to compare the adverse neonatal outcomes in between shift were done while taking morning shift as a reference shift.

Ethical Issues:

The aim of the study was explained to the participants before enrollment. A written informed consent was given to the participants. For those mothers who lost their babies, counseling was done to cope with the situation, hospital trained counselors were involved, wherever necessary.

Ethical Consideration and Ethical clearance:

Ethical clearance was obtained from MUHAS Research Ethical Committee. Permission to conduct the study at Muhimbili National Hospital was granted by MNH management.

All women included in the study, were asked to be enrolled in the study and voluntarily consented to participate. Confidentiality was guaranteed, names were not filled in the questionnaire instead Hospital registration numbers were used for retrieval purposes only.

CHAPTER THREE

RESULTS:

During the study period there were 3193 deliveries. Five hundred and fifty seven (557) were excluded in the study out of which 327 had elective cesarean section. Forty nine (49) had abruption placenta, 51 were macerated neonates, 99 were multiple deliveries in which 96 were twins and 1 was triplet delivery. Twenty one (21) had IUFD confirmed by ultrasound before delivery, 9 were delivered before 28weeks of gestations and one was anencephalic delivery. Therefore 2636 singletoned newborns remained for analysis.

The distribution of deliveries were 802(29.3%), 605(22.1%), and 1328 (48.6%) for morning, evening and night shift respectively. Majority (79.6%) mothers comprised of age group of 20-30years and contributed to 79.1% of all night shift deliveries. Majority 2469(91.3%) of the deliveries were term deliveries. Sixty percent (59.7%) of the women had primary school education. Sixty four percent (64%) of mothers were admitted from home and 34.7% were referrals, sixty percent (60.8%) of night deliveries were admitted from home and, 38.2% were referrals. One thousand three hundred and twenty (50.0%) were delivered by spontaneous vertex delivery, 1236(46.9%) were delivered by cesarean section, 48(1.8%) were by low cavity vacuum extraction and 32 (1.2%) were by assisted breech delivery. Night time deliveries had more adverse perinatal outcomes as compared to morning and evening that included: Ten percent (10.4%) Apgar score less than 7 at 5minutes, 8.2% fresh stillbirth, 5.3% early neonatal death. And this was statistically significant difference. No newborn during the study period sustained physical birth trauma.

FLOW CHART OF WOMEN DELIVERED AT MNH DURING STUDY PERIOD:

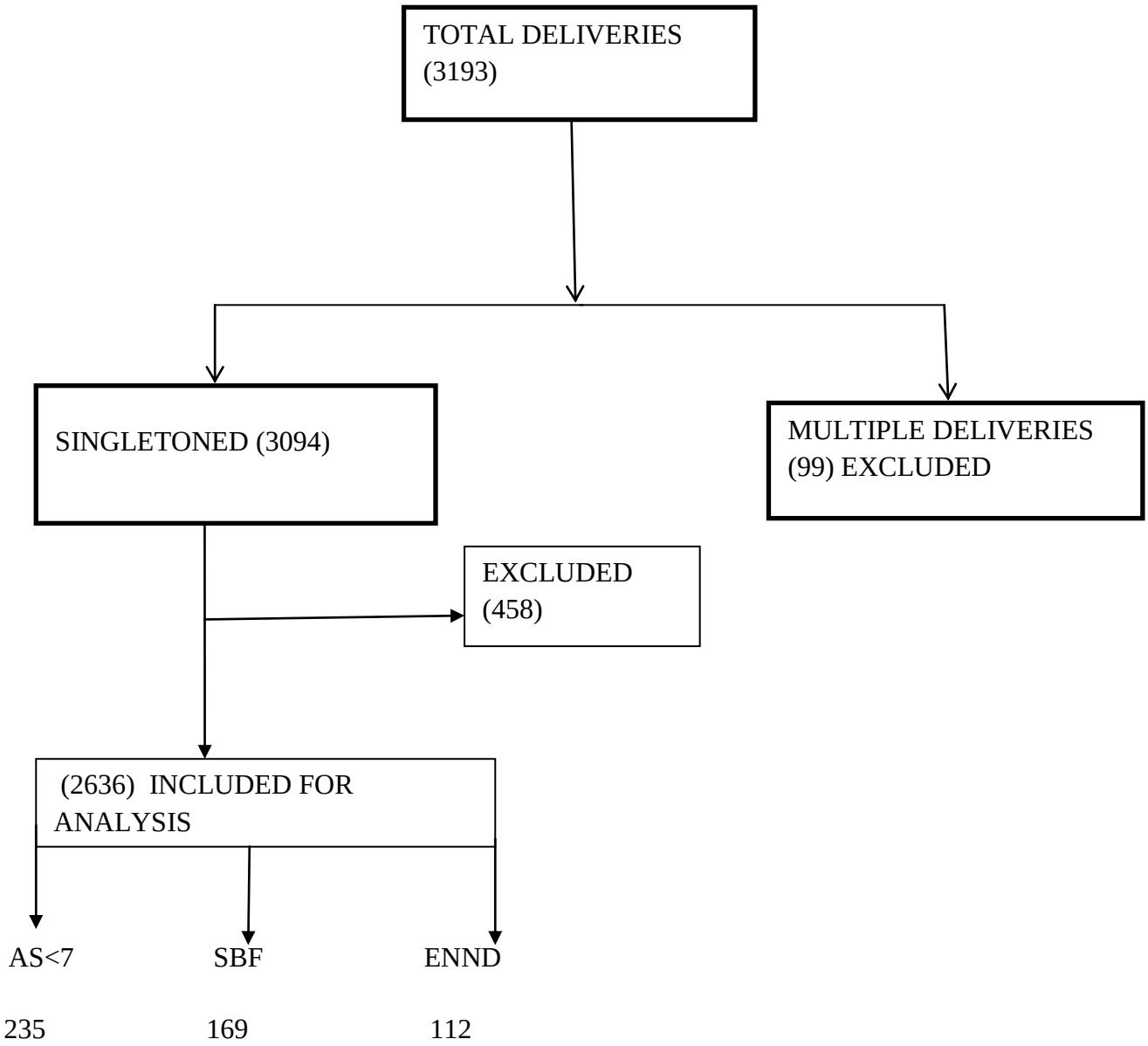

Table 1: Demographic and obstetric characteristics of women delivered at MNH.

Women characteristics		**Time of delivery**		
		Morning(n=780)%	Evening(n=577)%	Night(n=1279)%
Age	**>20yrs**	56(7.1)	23(3.9)	91(7.1)
	20-30yrs	614(78.8)	476(82.5)	1012(79.1)
	35+yrs	110(14.1)	78(13.5)	176(13.8)
Education level.	**Illiterate**	10(1.3)	13(2.2)	19(1.5)
	Primary	443(56.8)	338(58.6)	892(61.2)
	Secondary	216(27.7)	146(25.3)	305(23.8)
	College	111(13.8)	80(13.9)	163(12.7)
Marital status.	**Married**	752(96.4)	544(94.3)	1179(92.2)
	Single	28(3.6)	33(5.7)	100(7.8)
Parity.	**Primipara**	285(36.5)	183(31.7)	458(35.8)
	Multipara	495(63.5)	394(68.3)	821(64.2)
Source of admission.				
	Referral	233(29.9)	192(33.3)	489(38.2)
	From home	536(68.7)	375(65.0)	777(60.8)
	Antenatal clinic	10(1.3)	9(1.5)	6(0.5)
	Antenatal ward	1(0.1)	1(0.2)	7(0.5)
Gestation age.	**28-36weeks**	76(9.7)	48(8.3)	106(8.3)
	37+weeks	704(90.3)	529(91.7)	1173(91.7)
Mode of delivery.	**SVD**	397(51.0)	300(52.0)	623(48.6)
	C/S	361(46.2)	269(46.6)	606(47.5)
	ABD	8(1.0)	3(0.5)	21(1.6)
	LCVE	14(1.8)	5(0.9)	29(2.3)

Key; SVD-Spontaneous vertex delivery, ABD-Assisted breech delivery, C/S-Cesarean section, LCVE-Low cavity vacuum extraction

Baseline characteristics of the women were equally distributed in all shifts

Majority of women were at age group of 20-30years and contributed to 79.1% of night shift deliveries and 60.8% of night shift deliveries were admitted from home and 38.2% were referrals. Majority of deliveries (90%) were term deliveries in which it contributed to 91.7% of night shift deliveries. And the main modes of delivery were SVD and emergency cesarean section in all shifts. However, majority1279 (48.6%) delivered at night and 47.5% of these delivered by cesarean section.

Baseline characteristics of women, in terms of maternal education, referrals, prematurity and mode of delivery were equally distributed in all shifts.

Table 2. Bivariate (logistic regression) of the adverse perinatal outcomes in morning, evening and night shift. Odds ratio (OR) and 95% confidence intervals (CI) using morning shift as a reference group.

Perinatal outcomes	SHIFTS							
	Morning. (N=780) (7am-2pm)		Evening (N=577) (2pm-7pm			Night(N=1279) (7pm-7am)		
	N	OR	N	OR(95%CI)	P-value	N	OR(95%CI	P-value
AS<7 at 5minutes	57	1	44	1.05(0.09-1.58)	0.83	134	1.48(1.07-2.04)	0.018
ENND	25	1	18	0.97(0.53-1.79)	0.93	69	1.70(1.07-2.72)	0.026
FSB	35	1	29	1.16(0.69-1.93)	0.65	105	1.95(1.31-2.90)	0.001

Key; SVD-spontaneous vertex delivery, ENND- Early neonatal death, AS-Apgar score ,OR-odds ratio, CI-confidence interval. N=Number

There were no statistically significant difference in adverse perinatal outcomes in terms of AS<7, FSB and ENND between the morning shift and evening shift. But there were statistically significant difference in terms of FSB between the morning shift and night shift in which the risk of having FSB at night is 2 times higher as compared to morning shift. (0R 1.949,(95%CI)=1.3-2.9, P-value=0.0001)

Note: During the study period, distribution of midwives was as follows.

In the Morning shifts, there were 5 midwives and one nurse attendant, the evening shifts had 4 midwives and one nurse attendant and the night shifts had 5midwives and one nurse attendant

Table 3. Mode of delivery and perinatal outcomes.

Mode of delivery	**Perinatal outcomes**				
	AS≥7 (%)	AS<7(%)	ENND (%)	SBF (%)	TOTAL
SVD	1116(84.7)	77(5.9)	54(4.0)	73(5.4)	1320(100)
C/S	968(78.2)	137(11.1)	52(4.1)	79(6.5)	1236(100)
ABD	11(34.4)	7(21.9)	5(15.6)	9(28.1)	32(100)
LCE	25(56.3)	14(25)	1(2.1)	8(16.7)	48(100)
TOTAL	2120	235	112	169	2636

Key: SVD-Spontaneous vertex delivery, C/S-Cesarean section, ABD-Assisted breech delivery, LCVE-Low cavity vacuum extraction.AS-Apgar score, ENND-Early neonatal death, FSB-Fresh stillbirth.

SVD showed to have less adverse perinatal outcomes as compared to other modes of delivery while ABD and C/S showed to have higher adverse perinatal outcomes

CHAPTER FOUR

DISCUSSION:

This study has shown that adverse perinatal outcomes are more evident at night shifts as compared to morning and evening shifts. Perinatal outcomes were investigated in terms of low Apgar score at 5minutes, early neonatal death and fresh stillbirth. These variables are known indicators for the quality of the obstetric care given in a particular institution. Several studies have shown there is an association between time of delivery and adverse perinatal outcome [8,9,11]. Most of the studies found that night time deliveries are associated with adverse perinatal outcomes, although others like the study done at Moffit-Long Hospital associated with University of California San Francisco have found a comparable neonatal outcome between daytime and nighttime.[34]

This study has shown that night time deliveries were associated with more adverse perinatal outcomes compared to other shifts. Logistic regression analysis has shown a 2 fold risk of having SBF at night shift; however it did not show a significant difference between morning and evening shifts. This finding of increased adverse perinatal outcomes at night is similar to a recent large study done in The Netherlands where they found that hospital deliveries at night were associated with an increased rate of perinatal mortality and adverse perinatal outcomes in singleton deliveries without explaining the structure and institutional characteristics [12].

At Muhimbili National Hospital the significant increase of adverse perinatal outcomes between the time of delivery of the day could be explained by the increased load

over the night shift since the number of deliveries is higher during night time and this higher number of deliveries could be contributed to long duration of night shift (12hours) as compared to other shifts. Furthermore the night shift had more referrals (delayed) as compared to morning and evening shifts. The referrals generally take a long time to reach MNH due to transport problems. In order to save fuel ambulances wait until there are more than two patients, furthermore, in municipal hospitals the same ambulance ferries patients from other wards as well, so there is a tendency of waiting irrespective of the degree of emergency. Some of the cases referred for C/S could have been delivered at the referring hospital, which might have prevented fetal death. This finding is similar to the study done by Kidanto et al 2009 on introduction of a qualitative perinatal audit at Muhimbili national hospital, Dar es Salaam, Tanzania.[32]

In this study morning shift showed to have less adverse outcomes as compared to the other shifts. This might be explained by adequate staffing in morning shift, in terms of nurses and doctors. Moreover, when the number of midwives was compared with perinatal outcomes, still the night shift had more adverse perinatal outcomes though it had one more midwife as compared to evening shift.

The evening shift had less adverse outcomes as compared to night shift though the night shift had one more midwife as compared to evening shift. And therefore the difference of one midwife could not make a difference in terms of perinatal outcomes. And the presence of senior doctors during the morning major ward rounds might contribute to low adverse outcomes since management plan were done during the major ward rounds, resulting into good perinatal outcomes on deliveries at the evening time. The senior doctors

are not readily available during night hours, since most of them stay far from the hospital. Their absence during night time might account for the increased adverse outcomes at night. Increased adverse perinatal outcomes over the night could also be due to increased number of deliveries as well as referrals though majority of nighttime deliveries were admitted from home. Moreover in our institution majority of women especially the primigravidas are being augmented with oxytocin, the increase in maternal oxytocin secretion during the night may cause uterine hyper stimulation to augmented women leading to risk of fetal asphyxia.

In this study majority of mothers delivered over the night shift (48.5%), this is contributed to the length of the shift which is 12 hours. In most of the previous studies have shown to have more deliveries over the night as compared to the day [31, 33]. A study done on 24hours rhythm of oxytocin and beta-endorphin secretion in human pregnancy has demonstrated that oxytocin levels are higher at night that could be a reason of most of the labour starts over the night[13]. This study indicated that 47.5% of the night deliveries were delivered by cesarean section; this might have been due to the fact that most of the referrals from municipal hospitals (38.2% of night time deliveries) were made at night. It was observed that most of these referrals had stayed for long time in labour at referring hospitals and thus had obstructed labour hence delivered by cesarean section. This is proved by Fifty nine percent (58.8%) of neonates with Apgar score less than seven were delivered by cesarean section at the night shifts. Therefore, the rate of adverse perinatal outcomes associated with cesarean deliveries was increased at night time; this is similar to the study done in Japanese Red Cross Katsushika Maternity Hospital Tokyo in which there was an increased rate of low umbilical artery pH in patients with emergency cesarean delivery [33].

Residents usually work for 24hours and hence fatigue could lead to poor decision making and hence lead to increased adverse perinatal outcomes at night, as it was found in one study on Residents report on adverse events and their causes on working for 24hours [31]. And thus it may be that staff fatigue (residents) also contributes to higher adverse perinatal outcomes at night.

Limitation of the study:

A possible limitation of this study could be; overlapping of shift complications. That is a woman may have been diagnosed to have fetal distress at one shift and decided for cesarean section, due to some delays, this woman will deliver at next shift ending into adverse perinatal outcome at that other shift though the problem was detected during evening time. And another limitation is failure of follow up to neonates who had no complications and were discharged within 6-8hours. If these neonates developed complications at home and were not returned to MNH, it was not possible to follow them. We only followed neonates admitted to neonatal unit.

Finally generalizability of our findings to the general population, since this was hospital based study, it is not possible to generalize our findings to other hospitals and community at large; might be comparable to other referral hospitals of this kind in Tanzania.

Conclusion:

The night shift had significant adverse perinatal outcomes in terms of low Apgar score neonates, early neonatal death and fresh stillbirth as compared to morning and evening shift.

Recommendations:

Staffing at night shift need to be improved since it is longer than other shifts and it has more patients than morning and evening shifts. Shifting residents in 12hours shift instead of 24 hours shifts so as to reduce staff fatigue may improve perinatal outcomes.

Early referrals might improve night shift outcomes. Further in-depth study is needed to be done in this aspect.

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CONSENT FORM

Hello, my name is ……, from the Muhimbili University of Health and Allied Sciences carrying out a research on 'Time of Delivery and Perinatal outcomes'

The aim of the study is to assess the effect of time on perinatal outcomes so as we can reduce the adverse outcomes if time has any effect on the outcome.

All the information gathered will be strictly confidential and used for research purposes only. In case of any concerns about the study, feel free to contact Prof Abood, the chairperson of the Research and Publication Committee at Muhimbili University of Health and Allied Sciences (Tel :2150302); P. O. Box 65001, Dar-es-salaam.

I therefore ask for your neonate to participate in this study for its information to be filled in this questionnaire, thanks.

I agree/ don't agree ……. (Name)

…… (Signature)

FOMU YA IDHINI.

Habari yako mama,mimi naitwa ---------- kutoka chuo kikuu cha tiba na sayansi shirikishi cha Muhimbili,nafanya utafiti wa kuangalia uhusiano wa muda ambao motto amezaliwa na matokeo ya afya ya motto baada ya kuzaliwa.

Lengo la utafiti huu ni kujua matatizo ya afya ya motto baada ya kuzaliwa yanatokea zaidi muda gani ili tuweze kujipanga namna ya kuyapunguza.

Maelezo yote nitakayoyapata toka kwako,itakuwa ni siri na yatatumika kwaajili ya utafiti tu.Na kama unamashaka yoyote kuhusu utafiti huu uwehuru kuwasiliana na Prof. Abood mwenyekiti wa kamati ya utafiti chuo kikuu cha tiba na sayansi shirikishi cha Muhimbili (simu,2150302) S.L.B 65001 DSM.

Naomba uruhusu mwanao ashiriki kwenye utafi tihuu.

Nimekubali/sikotayari kushiriki----------(jina)

----------(sahihi)

QUESTIONNAIRE.

1. Code number. ----------
2. Hospital registration no. -------
3. Ward of delivery
    a) Ippm Annex
    b) Ward 35
    c) Ward 34
4. Age of the mother.----------
5. Parity.----------
6. Number of gestations----------
7. Gestation Age----------
8. Residence.----------
9. Level of Education.
    a) Not gone to formal school.
    b) Primary Education.
    c) Secondary school.
    d) College.
10. Marital status.
    a) single
    b) married
11. Admission status.
    a) From home.

b) Antenatal clinic.

c) Referral

d) Antenatal war.

12. Nature of labour.

a) Spontaneous.

b) Induced.

13. Mode of delivery.*If twins skip

a) Spontaneous vaginal delivery.

b) Operative vaginal delivery.

c) Cesarean section.

d) Assisted breech delivery

14. Mode of delivery for twins.

a) Both spontaneous vaginal delivery

b) First cephalic and second breech

c) Both breech

d) Both cesarean section

e) First cephalic and second cesarean section

13. Time of delivery.

a) Morning shift(7am to 2pm).

b) Evening shift (3pm to 7pm).

c) Night shift (8pm to 6am).

15. Number of midwives per shift.

a) Morning shift (7am to 2pm).

b) Evening shift (3pm to 7pm).

c) Night shift (8pm to 6am).

16. perinatal outcomes.* If twins skip

a) Apgar score > 7 at 5minutes.

b) Apgar score <7 at 5minutes..

c) Still birth fresh.

d) Early neonatal death.

e) Admission to ward 36

17. Perinatal outcomes for twins

a) Both Apgar score more than 7

b) Both Apgar sore less than 7

c) First Apgar score more than 7 and second less than 7

d) First Apgar score less than 7 and second more than 7

c) Both stillbirth fresh

d) First alive second still birth

18. Birth trauma.

Any birth trauma (specify ----------)

DODOSO.

1.Namba ya dodoso ----------

2.Namba ya usajili ya hospitali----------

3.Umri wa mama----------

4.Uzazi wa wangapi ----------

5.Umri wa mimba----------

6. wodi aliyojifungulia.

a) wodi 34.

b) wodi 35.

c) wodi ya IPPM

7.Idadi ya watoto aliyojifungua.

a) mmoja.

b) wawili.

c) watatu

8.Mahalianapoishi.

a) Ilala.

b) Temeke.

c) Kinondoni

9.Kiwango cha elimu.

a) Hajaenda shule.

b) Elimu ya msingi .

c) Elimu ya secondary.

d) chuo

10. Hali ya ndoa.

a) Hajaolewa.

b) Ameolewa

11. Amelazwa akitokea.

a) nyumbani.

c) kliniki ya wajawazito.

d) Rufaa.

e) wodini.

12. Aina ya uchungu.

a) umeanza wenyewe.

b) umeanzishwa.

13. Aina ya uzazi kama ni mmoja(kama zaidi ya mmoja nenda *)

a) kajifungua kwa njia ya kawida katanguliza kichwa

b) kujifungua kawaida kwakuvutwa.

c) kazaa kwa upasuaji.

d) kazaliwa kawaida katanguliza matako

* Aina ya uzazi kama nimapacha (watoto wawili)

a) wote wamezaliwa kawaida kwa kutanguliza vichwa

b) wote wametanguliza matak.

c) wote kwa njia ya upasuaji

d) wa kwanza kazaliwa kawaida wa pili upasuaji

e) wa kwanza katanguliza kichwa wa pili matako.

f) wa kwanza katanguliza matako wa pili kichwa

14. Muda wa kujifungua.

a) Asubuhi(saa 1-saa 8).

b) Jioni (saa9 hadi saa1.

c) usiku (saa 2 hadisaa 12asbh)

15. Idadi ya wakunga katika zamu aliyojifungulia.(--------)

16. Hali ya mtoto baada yakuzaliwa kama ni mmoja (kama wawili nenda *)

a) Alipata ‘APGAR score’ zaidi ya saba

b) Alipata ‘APGAR score’ chini ya saba

c) Alizaliwa mfu (stillbirth fresh).

d) Alikufa ndani ya siku 7 baada ya kuzaliwa.

* Hali ya watoto baada ya kuzaliwa kama ni mapacha

a) wote walipata ‘APGAR Score’ zaidi ya 7

c) wote walipata ‘APGAR score’ chini ya

b) wote wa mezaliwa wafu

d) wa kwanza mfu na wa pili alipata zaidi ya 7

e) wa kwanza alipata zaidi ya 7 na wa pili ni mfu

17. Majeraha aliyopata motto baada ya kuzaliwa.