

The copyright of this thesis vests in the author. No quotation from it or information derived from it is to be published without full acknowledgement of the source. The thesis is to be used for private study or non-commercial research purposes only.

Published by the University of Cape Town (UCT) in terms of the non-exclusive license granted to UCT by the author.

**THE PREVALENCE AND EFFECTS OF HIV INFECTION  
AMONG A POPULATION OF PREGNANT WOMEN  
NEEDING OBSTETRIC INTENSIVE CARE IN CAPE TOWN**

**GARISH MASUNGI MOHLABA MBChB FCOG (SA)**

Fellow in Maternal and Fetal Medicine

Groote Schuur Hospital & University of Cape Town

A dissertation submitted to the University of Cape Town in  
fulfillment of the requirements for the degree of Master of Medicine  
(Obstetrics & Gynaecology) Part III

Department of Obstetrics and Gynaecology

University of Cape Town

## DECLARATION

I, ....., hereby declare that the work on which this dissertation is based is my original work (except where acknowledgement indicate otherwise).

Signature: .....

Date: .....

University of Cape Town

## **ACKNOWLEDGEMENTS**

I thank my wife Dolly for the support throughout so many years together. I love you dear. My wonderful children Nonhlanhla, Mjekejwa and Nkateko, you always cheer me up and motivate me.

Dr Matjila and Dr Azreena Khan (UK) thanks a lot for your help. I thank also Mr Rauf Sayed for the help with statistics.

Thanks to Professor J. Anthony from the Department of Obstetrics and Gynaecology for acting as my supervisor and all the advice and help in writing up this dissertation, this would not have been possible without your help, thank you very much.

I sincerely thank Eugenia Francis and Charmaine Oliver for searching and retrieving the patient's folders from the Obstetrics records.

Last but not least thanks to GOD ALMIGHTY for giving me strength each and every day.

# TABLE OF CONTENTS

		Page No.
CHAPTER 1	INTRODUCTION	1
CHAPTER 2	MATERIALS AND METHODS	6
CHAPTER 3	RESULTS	10
CHAPTER 4	DISCUSSION	23
CHAPTER 5	CONCLUSION	32
	APPENDIX 1	34
	APPENDIX 2	35
	REFERENCES	36 & 37

## LIST OF TABLES

	<b>Page No.</b>
TABLE 1	11
TABLE 2	13
TABLE 3	15
TABLE 5	17
TABLE 6	19
TABLE 7	20
TABLE 8	22
TABLE 9	24

University of Cape Town

# CHAPTER 1

## Introduction

Care of the critically ill pregnant woman poses exceptional challenges in the intensive care unit and requires the skills of health care providers who have knowledge of the physiological changes of pregnancy as well as specific pregnancy-related disorders in order to achieve optimal management.

The recommendation by Moodley et al (1997) is that all large obstetric units in developing countries should establish their own intensive care units in order that patient care, health personnel training and education may be improved. <sup>1</sup> Sadly there are few obstetric care units in the Sub Saharan region. A study done by B.B Osinaike et al (2006) in Ibadan Nigeria at the University College Hospital documented an increasing intensive care unit utilization for obstetric conditions. <sup>2</sup>

Intensive care unit admissions may be required for the management of massive obstetric haemorrhage, underlying

medical disorders, obstetric sepsis and hypertensive diseases.

Specific reasons for admission include preeclampsia, HELLP syndrome, pulmonary embolic disease, amniotic fluid embolism, status asthmaticus, respiratory infection, adult respiratory distress syndrome, pulmonary oedema as well as sepsis that could either be pregnancy related or non-pregnancy related sepsis.

The premise upon which intensive care is based includes intensive nursing and monitoring leading to rational management. This may include support in therapy, adequate nutritional support, treatment of infection and correction of anaemia. Care is directed at reducing maternal morbidity and mortality as well as striving to achieve good fetal outcome.

According to the Third Report on Confidential Enquiries into Maternal Deaths in South Africa (2002-2004), 37.8% of the deaths due to indirect causes had non-pregnancy related infections. A significant number of these patients had AIDS as well as chest infections that included pneumonia and

tuberculosis.<sup>3</sup> Such patients are likely to require respiratory support and they should have been managed in high care units.

It is now over two decades since HIV has been identified as a cause of clinical illness. According to the UNAIDS/WHO report in November 2006, 39.5 million people were living with HIV/AIDS globally. Seventeen million women were living with HIV/AIDS with 2.9 million deaths in 2006. These figures included both adults and children. More than 25 million people have died of AIDS since 1981.

Africa has 12 million AIDS orphans. At the end of 2006, women accounted for 48% of all adults living with HIV worldwide and 59% in Sub-Saharan Africa. Young people (under 25 years of age) account for half of all new HIV infections worldwide. Around six hundred thousand people become infected with HIV every day.

In Sub-Saharan Africa, heterosexual transmission is by far the predominant mode of transmission. In South Africa almost one in three pregnant women at antenatal clinics were found to be HIV infected in 2004.

South Africa has one of the fastest growing epidemics in the world and has the highest number of people living with HIV in the Sub-Saharan region.<sup>3,4</sup>

Factors responsible for the epidemic in South Africa are attributable to poverty and social instability that result in family disruption, high levels of sexually transmitted infections, an unacceptably high level of sexual violence and the government's failure to provide antiretroviral therapy. A supply of antiretroviral medication was only achieved after the legal battle instituted by a group of activists against government called the Treatment Action Campaign (TAC).<sup>5</sup>

HIV is not necessarily a fatal condition anymore. More than ninety percent of individuals using antiretroviral medication recover well from their illness and return to lead productive lives. In the antenatal clinics in the PMNS about 90% of pregnant women are tested for HIV following the Voluntary Counseling and Testing initiative.

## **Aims of this study**

To record the prevalence of HIV infection in obstetric intensive care unit population.

To assess the reasons for intensive care unit admission among patients with and without HIV infection.

To compare the interventions and outcomes between women infected with HIV and those with negative screening tests for HIV.

University of Cape Town

## CHAPTER 2

### MATERIALS AND METHODS

A retrospective analysis of folders of all women admitted to the obstetric intensive care unit between February 2004 and January 2006 was conducted.

The intensive care unit is situated in the Maternity Block of Groote Schuur Hospital on the same floor as the labor ward. It is a three- bed establishment that has been in operation for more than one decade. Fulltime obstetric consultants as well as the senior obstetric registrars manage it.

Groote Schuur hospital is a tertiary level teaching institution situated in Cape Town. It renders health care services in The Cape Peninsula situated in the Western Cape Province of South Africa. The maternity section is a referral center from the establishment referred to as the Peninsula Maternal and Neonatal Service (PMNS) that comprises of two secondary level hospitals attached to the institution. The two secondary level hospitals, Mowbray Maternity Hospital (MMH) and New

Somerset Hospital (NSH) also refer patients requiring tertiary level care to Groote Schuur Hospital.

The criterion for admission to the obstetric intensive care unit include the following conditions: severe preeclampsia including HELLP syndrome, renal failure, pulmonary oedema, sepsis, thrombo-embolic conditions, abruption, placenta praevia, post partum haemorrhage, cardiac patients, diabetic women as well as other patients deemed to require intensive care management, usually because more intensive monitoring was required or one-on-one nursing care.

Demographic data of all patients admitted to the intensive care unit (ICU) are recorded in the ICU. Information includes date of admission, indication for admission, summary of interventions received in ICU and date discharged from ICU. From this information we were able to retrieve the folders.

A total of five hundred and eleven patients were admitted in ICU between February 2004 and January 2006, which constitutes about 5.5% of the total tertiary deliveries in that two- year period. The total number of deliveries in Groote Schuur Hospital only during that two- year period was nine

thousand two hundred and thirty seven (9237). This is a utilization rate of approximately 0.9% for the whole PMNS service.

Women who had HIV tests done, have their results documented inside the folders. HIV testing is only done after a pre-test counseling has been offered and the patient has given informed consent. An Enzyme Linked Immunosorbent Assay (ELISA) is used to confirm all HIV positive results.

In the antenatal clinics in the PMNS about 90% of pregnant women are tested for HIV following the voluntary counseling and testing initiative.

Four hundred and fourteen folders were available for analysis. Ninety-seven folders were missing. A data collection sheet (Appendix1) was used for data collection. A body mass index (BMI) above 25 was considered to be obese. This is in accordance to NHANES II (National Health And Nutritional Evaluation Survey II) <sup>6</sup>

The Research Ethics Committee of The University of Cape Town formally approved the study.

A data collection sheet (appendix 1) was designed to collect data. One individual collected all the data. A p value of  $p < 0.05$  was chosen to be statistically significant. The Pearson Chi-square test (1) as well as the Fisher's exact test was used to calculate the p values, when appropriate.

## CHAPTER 3

### RESULTS

#### Study population

The study population consisted of 414 patients admitted to the intensive care unit. Three hundred and thirty one women (80% of the study group) had been screened for HIV. Of the 331 women, 81 (24.47%) were HIV positive, that is one in four was HIV positive. Thirty-five women out of the HIV positive group had CD<sub>4</sub> count which was less than 200 cells/ $\mu$ l. The remaining 250 were HIV negative, these details are shown in Table 1 below:

Table 1. Study population

	n
Total ICU admissions reviewed	414
ICU Population screened for HIV	331
HIV Positive Screens	81
HIV Negative	250
HIV Positive with CD <sub>4</sub> Less than 200 cells/ $\mu$ l	35

## Demographic features

Table 2 shows demographics of patients in relation to their HIV status and those who had CD<sub>4</sub> counts of less than 200 cells/ $\mu$ l.

All women had similar median gravidity and parity. Twenty five percent of the HIV negative were obese compared to 6% of the HIV positive patients.

Table 2. Demographic features

	Total HIV Negative	Total HIV Positive	CD <sub>4</sub> <200 cells/ $\mu$ l	Odds Ratio	95% CONFIDENCE INTERVAL
N	250	81	35		
Age years (SD)	27.18(6.76)	27.1(4.82)	26.68(4.15)		
Gravidity (median)	2	2	2		
Parity, median	1	1	1		
BMI >25	62 (25%)	6 (7%)*	2 (6%)**	0.3* 0.18**	0.13-0.66* 0.03-0.82**
Booked	225 (90%)	65 (80%)*	28 (80%)	0.45*	0.22-0.95*

BMI = Body Mass Index

\* = statistically significant

\*\* = statistically significant

## **Previous Medical history and Co-morbidities**

Table 3 shows co-morbid conditions and previous illnesses that were seen in the study population. Respiratory illness was the predominant condition amongst the HIV positive group. Those who had CD<sub>4</sub> count of less than 200 cells/ $\mu$ l were seven times more likely to have respiratory problem.

There was no difference among the study population concerning the following conditions: pre-eclampsia, essential hypertension, diabetes mellitus and renal disease.

A total number of 56 women had other medical conditions. Half were HIV negative and the other half HIV positive. Eight women had a CD<sub>4</sub> count of less than 200 cells/ $\mu$ l. These medical conditions are listed in appendix 2

Table 3. Previous medical history and co-morbidity

Condition	HIV Negative	Total HIV Positive	CD <sub>4</sub> <200 cells/ $\mu$ l	Odds Ratio	95% CI
Preeclampsia (n)	20	2	0		
Ess.Hypertension (n)	34	5	1		
Diabetes Mellitus (n)	29	4	3		
Renal Disease (n)	4	3	2		
Respiratory Illness	15(6%)	17(21%)*	11(31%)**	4.16* 7.18**	1.86-6.68* 2.72-18.96**
Other Co-morbidity	28(11%)	20(25%)*	8(23%)**	2.35* 2.6**	0.88-6.09* 1.31-5.16**

Ess.Hypertension = Essential Hypertension

\* = Statistically significant

\*\* = Statistically significant

## Reason for admission to ICU

Table 5 highlights reasons for the women admitted in ICU. Preeclampsia was the commonest condition in the HIV negative women admitted to ICU (64%). Amongst the HIV positive group, 43% had preeclampsia, Odds Ratio 0.42; 95% CI, 0.24-0.72.

Sepsis was the most frequent reason for admission to ICU amongst HIV positive women with CD<sub>4</sub> count of less than 200 cells/ $\mu$ l.

There was no difference between the HIV positive and HIV negative patients admitted to ICU due to the following conditions: HELLP syndrome, eclampsia, pulmonary oedema, renal failure, thrombo-embolic conditions, abruption, placenta praevia and post partum haemorrhage.

Table 5. Reasons for admission to ICU

Diagnosis	HIV Negative n=250	HIV positive n=81	CD <sub>4</sub> < 200 n=35	Odds Ratio	95% Confidence Interval
Preeclampsia	161(64%)	35(43%)*	9(26%)**	0.42* 0.40**	0.24-0.72* 0.23-0.71**
Sepsis	23(9%)	31(38%)*	16(46%)**	6.12* 8.13**	3.15-11.93* 3.51-19.77**
HELLP	60(24%)	21(38%)	5(14%)		
Eclampsia	54(22%)	12(25%)	2(14%)		
Pulm.oedema	71(28%)	20(25%)	8(23%)		
Renal Failure	55(22%)	19(23%)	4(11%)		
TED	13	6	1		
Abruption	32	5	3		
Plac.Praevia	7	1	0		
PPH	43	12	5		

HELLP = Haemolysis Elevated Liver Enzymes Low Platelets syndrome, Pulm. oedema = Pulmonary oedema, TED = Thromboembolic disease, Plac.Praevia = Placenta Praevia, PPH = Post Partum Haemorrhage

\* = Statistically significant

\*\* = Statistically significant

## Interventions

Major and minor interventions conducted in ICU are tabulated in Table 6.

There was no difference in use of blood and blood products amongst all women admitted to the ICU. Usage of anticoagulants was the same amongst all women managed in ICU. Operative procedures were similar amongst the study population.

HIV positive women especially those with CD<sub>4</sub> count of less than 200 cells/ $\mu$ l were more likely to be ventilated, 43% compared to 32% out of the HIV negative group.

The mean number of days spent in ICU amongst the HIV positive was 2.42 compared to the HIV negative group spent 1.8 days in ICU.

Table 6. Interventions

	HIV Neg n=250	HIV pos n=81	CD <sub>4</sub> < 200 n=35	RR	95% Confidence interval
Dynamap	235(94%)	79(97%)	33(94%)	ns	ns
CVP	91(36%)	34(42%)	12(34%)	ns	ns
Blood TF	91(36%)	38(47%)	17(48%)	ns	ns
IPPV	80(32%)	37(46%)*	15(43%)**	1.4* ns*	1.06-1.92* ns**
CPAP	20(8%)	13(16%)*	8(23%)**	2.01* 2.86**	1.05-3.85* 1.36-5.99**
Inotropes	9(4%)	10(12%)*	3(9%)**	3.43* ns**	1.44-8.14* ns**
Antibiotics	211(84%)	78(96%)*	35(100)**	3.43* ns**	1.44-8.14* ns**
Dialysis	4(2%)	3(4%)	1(3%)	ns	ns
ICU Days	1.8±1.29	2.42±1.79*	2.17±1.26	P<0.001*	ns**
Surgical Proc	80(32%)	23(28%)	10(28%)	ns	ns

CVP = Central Venous Pressure, Blood TF = Blood Transfusion, IPPV = Intermittent Positive Pressure Ventilation, CPAP = Continuous Positive Airway Pressure, Surgical Proc = Surgical Procedure.

\* = Statistically significant

\*\* = Statistically significant

## Outcome

Eleven women (13%) out of the HIV positive group died. In the immunocompromised group of women six (17%) died from respiratory conditions.

There was no significant difference between 5 minute APGAR scores and birth weights of neonates from both groups. The number of stillbirths and neonatal deaths from both groups was not significantly different.

Table 7: Outcome

	HIV negative	HIV positive	CD4 <200	RR	95% Confidence Interval
Maternal Mortality	1(0.4%)	11(13%)*	6(17%)**	33.95* 42.86**	4.45-258* 5.32-346**
SB / NND	55(25%)	21(31%)	7(24%)	ns	ns
Birth Weight	2103(924)	1941(910)	1898(832)	ns	ns
APGAR	8	7	7	ns	ns

SB =Still Birth, NND = Neonatal Death, Birth weight measured in grams.

\* = Statistically significant

\*\* = Statistically significant

### **Analysis of outcome of the pre-eclampsia subgroup**

Pre-eclampsia was the most common condition requiring intensive care. This group constituted 64% of the total admissions. Table 8 illustrates the outcome in this group.

There was a significant difference in the number of days spent in ICU between the HIV negative and HIV positive admitted with pre-eclampsia.

Table 8. Preeclampsia and HIV positive women

	Pre-eclampsia	PET and RVD	Significance
n	161	35	
Maternal mortality	1	3	RR 13.8(1.48-129)
Stillbirths and NND's	48	12	ns
ICU Days	1.93(1.42)	2.64(2.09)	p<0.05

RVD = Retroviral disease, PET = Pre-eclampsia, NND's = Neonatal deaths, ns = not statistically significant

### **Sepsis and HIV**

Maternal mortality was more common amongst the HIV positive women. There was no statistically significant difference in the perinatal outcome.

Table 9. Sepsis and HIV

	HIV negative	HIV positive	p Value
n	23	31	
Maternal mortality	0	8	p<0.05
Perinatal mortality	6	4	ns
ICU days	2.13± 1.39	2.83± 2	ns

## CHAPTER 4

### Discussion

The Obstetric ICU at Groote Schuur Hospital has been in operation for more than a decade now. When looking at the number of ICU admissions from ten years ago compared to present situation, it is almost the same, but the total number of deliveries in the PMNS have risen by almost 18% from 27007 (in 1997) to 33104 deliveries by the end of 2006.

This could be related to a number of factors that include women coming from other provinces seeking better health care in the Western Cape.

An audit into the causes for maternal mortality in the PMNS showed that in 1997 there were four maternal deaths from pregnancy related sepsis and no one died due to non-pregnancy related sepsis. During 2006, according to the same report, a total number of nine patients died from non-pregnancy related sepsis and the maternal mortality rate rose from 55/100 000 to 57/100 000. HIV / AIDS was the leading cause of death from the non- pregnancy related sepsis.

These overall trends are also reflected in the ICU deaths presented in this study. Other changes in the ICU population mirror changes that have taken place over the last decade. Most notable of these has been the increasing prevalence of HIV infection.

The study has shown that one out of every four women admitted in the ICU was HIV positive and 50% of the women were immunodeficient. This agrees with the prevalence of HIV amongst pregnant women nationally in South Africa, which is presently at around 28%.<sup>5</sup>

According to the Saving Mothers Third Report on Confidential Enquiries into Maternal Deaths in South Africa 2002-2004, 32.9% of deaths were due to non-pregnancy related sepsis from chest infections especially pneumonia, AIDS and TB and this study is consistent with this report. Women who had a positive screen test for HIV were four times more likely to have respiratory illness when compared to the HIV negative group. Those who were immunodeficient were even higher with a seven- fold increased risk. However caution should be exercised when interpreting this data because of small sample.

This study differs by far from the causes of maternal mortality in developed countries like England where suicide and thromboembolic diseases are the leading causes of maternal deaths (CEMACH 2005).<sup>8</sup>

Antenatal care usage in the HIV negative group was 90% (225 out of 250), which is good because it allows early detection of underlying disease.

Nevertheless, large numbers of HIV positive women were booked and it is interesting that despite high rates of access to good quality care, the need for critical care persists along with the risk of morbidity and mortality.

There was slightly less use of antenatal services from the HIV positive group. The reasons for this are not apparent but may reflect people coming from outside the system. The triennium 2002-2004 report on confidential enquiries into maternal deaths in South Africa showed that non-attendance for antenatal care carried an approximately four times increased risk of maternal death compared with the general population. This study confirms this observation.

Age and parity did not show any significant statistical difference between the HIV positive group and the HIV negative group, however the HIV positive group were less likely to be obese.

Reviewing the literature pertaining to obstetric intensive care, there are few publications. This is an unusual service with probably only two if not one Obstetric ICU in the whole Sub Saharan region.

Moodley et al 1997 reviewed all patients who were admitted to the surgical Intensive care unit at King Edward V111 hospital in Durban, South Africa and made recommendations regarding management of such patients. They found that eclampsia was the most common diagnosis accounting to 64% of all obstetrics admissions. 24% out of these admissions required special care and were admitted to the surgical ICU. The overall mortality amongst all patients male and female in the general ICU was 21%, but obstetrics and gynaecology patients formed a major workload to the surgical ICU and the majority of these patients were women with eclampsia. <sup>1</sup> Again this study is not comparable to that

one because of different study population, but the interesting part is that Obstetric patients formed the biggest work load.

A study from Ibadan Nigeria examined retrospectively obstetric patients admitted to the ICU of the University College Hospital. Seventy obstetric patients (representing 1.4% of all deliveries) were admitted to the ICU during a five-year period 1998 to 2002. Sixty percent of the patients had pregnancy-induced hypertension as primary diagnosis and 31% had respiratory insufficiency. A significant number of women needed ventilation. The need for ventilation or inotropic support predicted poor outcome. Overall mortality was 52%.

Our study showed poor outcome once patient was intubated and HIV positive as well. Pity we do not know the HIV status of these women in their study.

Many studies have been done to examine the outcome of obstetric patients admitted to a general ICU, but not many are done in a purely obstetrics-only ICU.

Literature review has been extremely difficult because there are no studies done to examine the outcome of HIV positive women who were admitted in a purely Obstetrics ICU.

In the developed world, a lot of studies pertaining to the outcome of Obstetrics patients admitted to the ICU with different conditions has been done, but these studies are irrelevant to mention because their patient profile differs with that of South Africa due to the high prevalence of HIV, hence we have very little referencing.

However one study done in an obstetrics-only ICU by Le Roux et al (2002) from Groote Schuur hospital looked retrospectively to all women who were admitted to ICU from 1995 till 1998 to determine risk factors and outcome on women admitted with severe preeclampsia and renal failure, and they found that major obstetric complications were common and perinatal outcome was poor, however the need for dialysis was infrequent with only 10% of women requiring transient dialysis and there were no cases of chronic renal failure that required dialysis or kidney transplant.<sup>7</sup>

Muckart et al (1997) looked at patients both male and female admitted to the surgical ICU in King Edward V111 hospital. A prospective double blind study was conducted to determine if HIV status influenced outcome for the period September 1993 till February 1994. Four hundred and two were the total number of patients admitted to the surgical ICU. 267 were males and 135 women. 52 (12.9%) were HIV positive and 350 (87.1%) were HIV negative. These groups were similar in sex distribution but differed significantly in age.<sup>9</sup>

The results shown no difference in mortality but morbidity were higher in the HIV positive group. They then concluded that in that patient population, a positive HIV test result should not be a criterion for excluding patients from intensive care. They further concluded that HIV positive patients admitted to ICU for diseases unrelated to their HIV status have a similar mortality and duration of stay in ICU when compared to their HIV negative counterparts.

The later concurs with obstetric patients that are admitted with conditions like preeclampsia that has been shown to be the most prevalent condition in most obstetric units in South Africa (Moodley et al)

There is an increased need for obstetrics-only ICU in the Sub Saharan region because conditions that require intensive care monitoring are on the increase.

The battle to curb the HIV pandemic is far from over and the need for skilled health care providers who understand changes that occur during pregnancy cannot be over emphasized.

This study has demonstrated that more than 4.5% of Obstetric admissions are more likely to be admitted in an ICU. Therefore there is an immense need to get more intensive care units in the developing countries and a dire need for information concerning the women population admitted in such units.

Severe maternal morbidity is easy to underestimate because pregnant women are usually healthy and recover quickly, and are discharged with relatively little follow-up. Information concerning obstetric patients is of vital importance. The South African situation with the highest number of people having HIV need more studies to be done on this disease profile.

A review by Bewley & Creighton identified a small but very sick group of pregnant women with high rates of medical intervention, many of whom did not go home with live babies or with their fertility intact. They required a disproportionate amount of resources and skill and are women for whom medical facilities may have been life saving, this is particularly needed in the Sub Saharan region, however the stumbling block will be cost.<sup>10</sup>

## CHAPTER 5

### CONCLUSION

The pattern of women admitted in ICU is changing. When we look at the previous audit carried out in the same ICU between 1995 – 1998, out of 588 patients, four women were HIV positive, one died due to AIDS. 60% of women admitted had preeclampsia, 30% suffered from medical disorders and 10% had haemorrhage.

This study showed that almost 64% of admissions had preeclampsia and almost 17% were admitted for sepsis. More deaths occurred during this period compared to the previous three-year audit.

These deaths occurred more amongst women who had non-pregnancy related sepsis and this is consistent with the National data for confidential enquiries into maternal deaths, which demonstrated that non-pregnancy related sepsis is the biggest single cause for maternal mortality.

Women who had low CD4 counts had an increased incidence of morbidity and mortality and they were more likely to develop sepsis than the HIV negative women.

Therefore HIV infected women disproportionately represented in ICU population are sicker, more likely to die and require more intervention.

It must be emphasized that this is a retrospective study which is subject to bias because there was no blinding, records usually go missing and most are hand written and very difficult to interpret.

The topic on its own is of utmost importance but there is very little data published.

More research needs to be done and is of vital importance in this area.

## Appendix 1

	Parameters	YES	NO
1	Age		
2	Parity		
3	Gravidity		
4	Booked		
5	BMI		
6	Medical History		
	PET		
	Ess.Hypertension		
	Diabetes		
	Renal Disease		
	Immune Disorder		
	Resp.Disease		
	Other		
7	Surgical intervention		
8	Indications for admission to ICU		
	PET		
	Renal failure		
	HELLP		
	Pulmonary Oedema		
	Sepsis		
	Thrombo-embolism		
9	Obstetric haemorrhage		
	Abruption		
	Placenta praevia		
	PPH		
	Other		
10	Management		
	Dynamap		
	CVP		
	IPPV		
	CPAP		
	Dialysis		
11	Drugs		
	Fluids		
	Antibiotics		
	Diuretics		
	Inotropics		
	Anticoagulants		
	Blood & Blood products		
	Other		
12	RVD		
13	CD4 Less than 200		
14	Declined		
15	Days in ICU		
16	Outcome		
	Pregnancy		
	Delivered		
	Birth Weight		
0	Apgar score		
	SB/NND		
	Maternal		
	Alive		
	Discharged to Ward		
	Another ICU		

Appendix 2. **List of conditions mentioned as other co-morbidities.**

Diagnosis	No. Of Patients
• Cardiac conditions	18
• Epilepsy	6
• Extra uterine pregnancy	5
• Anaemia	4
• Ruptured uterus	3
• Breast cancer	2
• Kyphoscoliosis	2
• Bladder injury	2
• Bronchospasm	2
• Cardiac arrest	2
• Vaginal laceration	1
• Persistent tachycardia	1
• Carcinoma of cervix Stage 1 <sub>b</sub>	1
• Hypoglycaemia	1
• Takayasu arteritis	1
• Scoline apnea	1
• Toxic epidermolysis	1
• Inverted uterus	1
• Theophyline overdose	1
• Shortness of breath (No proper diagnosis)	1

## References

1. Moodley J, Platteau P, Engellhardt T, Mucckart DJJ, (1997) Obstetrics and Gynaecological patients in an intensive care unit: a 1 year review (Trop Doct 27:202-206).
2. B.B.Osinaike, S.D, Amanor-Boadu, A.A, Samsi: Obstetric intensive care: A Developing country experience. The internet journal of Anesthesiology: 2006 Volume 10 No.2
3. Saving Mothers. Third Report on Confidential Enquiries into Maternal Deaths in South Africa 2002 – 2004. Executive Summary
4. UNAIDS/WHO 2006 Report on the global AIDS epidemic.
5. Minister of Health vs. Treatment Action Campaign (TAC)(2002)5 SA 7219(CC)
6. National Health and Nutrition Examination Survey II (NHANES)
7. Andrew J. Drakeley, Paul A Le Roux, John Anthony, James Penny (AMJ Obs Gynecol 2002; 186:253-6. Acute renal failure complicating severe preeclampsia requiring admission to an obstetric intensive care unit

8. Confidential Enquiry into Maternal and Child Health (CEMACH) (2005)
9. Muckart J J David, Bhagwanjee Satish, Prakash M Jeene, Prushini Moodley. BMJ vol. 314 (1997) 1857 – 1996. Does HIV status influence the outcome of patients admitted to a surgical intensive care unit? A prospective double blind study.
10. Bewley, S. & Creighton, S. "Near-miss" obstetric enquiry. JOG 1997; 17: 26 – 29