

**GRANDMULTIPARITY:
PREGNANCY OUTCOME AT MUHIMBILI NATIONAL HOSPITAL
IN DAR-ES-SALAAM, TANZANIA**

By

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**A Dissertation Submitted in Partial Fulfilment of the requirement for the degree of
Masters of Medicine (Obstetrics and Gynaecology) of the Muhimbili University of
Health and Allied Sciences**

Muhimbili University of Health and Allied Sciences

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CERTIFICATION

I have read this dissertation titled “*Grandmultiparity: Pregnancy outcome at Muhimbili National Hospital, Dar-es-salaam, Tanzania*” and confirm it is acceptable for submission in partial fulfilment of the requirement for the degree of Masters of Medicine (Obstetrics and Gynaecology) of the Muhimbili University of Health and Allied Sciences



.....

Prof. Siriel. N. Massawe

Supervisor

.....
1-12-08

Date

DECLARATION

I declare that this dissertation is my own work and it has not been submitted for a similar degree in any other University.

A handwritten signature in blue ink, appearing to read 'Andrew Hans Mgaya', is written over a horizontal dotted line.

Andrew Hans Mgaya

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DEDICATION

To my parents, Prof. Hans and Mrs Mary Mgaya, for their paramount support in my academic achievements.

ABSTRACT

Background: The association of grandmultiparity and poor pregnancy outcome has been controversial for decades. Limited access to medical care, mostly in developing countries, has led to a need of early identification of women whose pregnancies are at increased risk of poor outcome so as to allocate the few resources to the people who greatly need them. Classifying grandmultiparas women as high risk group without a clear evidence of consistent association of grandmultiparity with adverse pregnancy outcomes leads to an unnecessary financial, physical and psychological stress to the mother and the family. Also it unnecessarily increases the cost burden to health system.

Objectives: This study sought to compare the obstetric and perinatal complications among grand multiparas and other multiparous women delivered at MNH.

Material and methods: This was a cross sectional comparative study done at Muhimbili National hospital (MNH) which is the largest tertiary hospital and a University teaching Hospital in Dar es Salaam, the biggest city in Tanzania. Data collection was done in a period of 5 months (August 2007 through to December 2007). Women were identified after delivery from the delivery register, postnatal ward admission book and report books in the general ward. Participants enrolled in the study were assessed and asked questions according to the variables of interest indicated in the standard questionnaire. The level of statistical significant deference was when P value was less than 0.05. Potential confounder such age was controlled in some of the outcome variables and obstetric risk factor by using logistic regression analysis.

Results: There was a significant association of grandmultiparity with a few adverse outcomes compared with the lower parity multiparas women. These adverse effects when the risk was adjusted for age included malpresentation (odds ratio [OR] 2.1, 95% Confidence interval [CI] 1.1-4.9), Placenta previa (OR 2.8; 95% CI 1.1-7.1), meconium stained liquor (OR 2.8, 95% CI 1.3-5.8), low Apgar score (OR 2.9; 95% CI 1.5-5.0),

history of preterm delivery (OR 5.3; 95% CI 3.1 – 8.9) and history of neonatal deaths (OR 3.6; 95% CI 2.1 – 6.2).

Grand multiparity was more associated with relatively higher socio economic status ($P<0.05$), less formal education ($P<0.001$), later booking at antenatal clinic ($P<0.01$) more contraceptive use ($P<0.01$), less planned pregnancies ($P<0.01$) and a tendency of having children with different spouses ($P<0.01$)

Conclusion: This study suggests that grandmultiparity is associated with significant adverse outcomes than lower parity women.

Recommendations:

1. There is a need for a bigger and more comprehensive community based study with sufficient number of cases for comparison of all pregnancy outcome variables of interest in order to be able to search for clear evidence of presence or absence of increased risk of adverse pregnancy outcomes in grandmultiparity compared to the lower parity women.
2. There should be provision of adequate antenatal care and prompt implementation of the elements of the basic and comprehensive obstetric emergency care as designed by WHO in all relevant setting This is to reduce maternal morbidity and mortality across all parities by prompt risk assessment, health promotion, complication preparedness, birth readiness and appropriate care.

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ABBREVIATIONS

APH	Antepartum Hemorrhage
BMI	Body mass Index
BW	Birth weight
CS	Caesarean section
DM	Diabetes Mellitus
GM	Grandmultiparity
HIE	Hypoxic Ischemic Encephalopathy
HTN	Hypertension
ICU	Intensive care unit
IPPM	Intramural Private Partnership at Muhimbili National Hospital
IUFD	Intrauterine fetal death
LBW	Low birth weight
MNH	Muhimbili National Hospital
MUHAS	Muhimbili University of Health and Allied Sciences.
NND	Neonatal death
NPC	New pediatrics complex
PIH	Pregnancy induced Hypertension
PPH	Post partum hemorrhage
SVD	Spontaneous vaginal delivery
TBA	Traditional Birth Attendants
VLBW	Very low birth weight
WHO	World Health Organization

1.0 INTRODUCTION AND LITERATURE REVIEW

1.1 Introduction

The term grand multipara was introduced in 1934 by Solomon, who called the grand multiparas "The dangerous multiparas."¹ The definition of grand multiparity varies from study to study and sometimes is not even defined. The older literature generally defines grand multiparity as parity greater than 7.^{2,3} More recent reports have chosen a definition of grand multiparity to parity of 5 or more, since the threshold of risks of any obstetric complications, neonatal morbidity, and perinatal death has been shown to increase markedly at parity equal to or greater than 5.^{4,5,6}

The relationship between parity and pregnancy complications continues to be of interest to obstetricians, where high parity is thought to be a risk factor of pregnancy related complications.^{4,5,7}

Grand multiparity is rare in high income countries (3–4% of all births). On the other hand, high rates of grandmultiparity are still seen in low income countries (almost 9%). The high rate of grandmultiparity may be due to inaccessibility, unacceptability and social cultural beliefs that influence the decision making and responsibility between men and women on the decision for contraception to attain good reproductive health.^{8,9}

The World Health Organization (WHO) has defined good reproductive health as the state of complete physical and social well being in all matters related to the reproductive system including safe sex, capability for reproduction, safe motherhood and freedom to decide how often, when and with whom an individual should conceive.⁹

Family planning is the most effective way to prevent maternal and infant mortality by helping couples to avoid high risk and unwanted pregnancies, and reduce the risk of fetal and maternal deaths linked to short interval between pregnancies, high birth order and high maternal age.

In most low income countries there is limited access to medical care as a consequence, the need to identify women whose pregnancies are at increased risk of complications is an important part of antenatal screening. The purpose of this identification process is to try and allocate the few resources to those people who are in great need. Since the risk prediction approach does not distinguish those who will develop complications during labor or delivery; disease prevention, health promotion, birth preparedness, complication readiness and appropriate care are essential for good pregnancy outcome across all parities.

On average, a Tanzanian woman bears approximately 6 children. This was lower compared to data from the 1960s and 1980s where an average of 7 births per woman prevailed. The total fertility rate (TFR 2005) of 5.7 which is statistically at the same level as rates estimated by the Tanzania Demographic and Health Survey (TDHS) 1996 and 1999 were 5.8 births and 5.6 births respectively ¹⁰.

At Muhimbili National Hospital there are on average 700 deliveries monthly and grandmultiparas (GM) contribute about 7%. The parity of these GM ranges from 5-13. According to the National guideline for antenatal care gravidity equal or more than 5 is an obstetric risk factor (RCH4 - 2006).

Several studies have identified high parity and reduced interpregnancy interval to be a risk factors for poor maternal and perinatal outcome. As a matter of fact, these studies show an increase in rate of obstetric risk factors, such as anemia, diabetes mellitus, hypertension, malpresentation, abrutio placenta, placenta previa, post partum hemorrhage due the uterine atony, and uterine rupture. Poor perinatal outcomes were low birth weight, prematurity and perinatal mortality. ^{4, 7, 12}

Even though, some other studies did not demonstrate negative maternal and neonatal outcome, grand multiparity presents with several prenatal risk factors that require special attention in the antenatal care. These are smoking, alcoholism, obesity, poor socioeconomic status, lack of adherence to prenatal care and history of fetal and perinatal death in the previous pregnancies. ^{13, 14, 15, 16}

1.2 Literature review

The evidence on whether grandmultiparity is a risk factor for negative fetal and maternal outcome is inconsistent. The rate of the negative maternal and fetal outcome is described by some investigators and not by others. The definition of grandmultiparity itself varies from study to study and remains unclear how the differing definitions contribute to the differing observations.¹⁷

Frequent, short spaced deliveries have been associated with a high tendency of postpartum haemorrhage (PPH) which is due to uterine atony. Uterine atony is caused by excessive uterine myometrial involution that subsequently leads to thinning and hypotonicity of the myometrium due to replacement of contractile myometrial muscle cells with the fibro-elastic connective tissue¹⁸.

Mwambingu et al in 1998 did a retrospective analysis of 646 grand multiparous women in Saudi Arabia. The results of his study revealed an increased incidence of Postpartum haemorrhage (PPH) among the grandmultiparas compared to the non grandmultiparas¹⁹.

Similar results were obtained from a later study in Israel, which examined the outcome of delivery of grandmultiparas (N=1700) compared to two control groups of primiparas (N=622) and lower parity multiparas (N=735). PPH was found to be more common in grandmultiparas 82 (4.8%) compared to Primiparas 23(3.7%) and multiparas 17(2.3%) at P-value of 0.004.²⁰ A more recent study done in California compared maternal and neonatal outcome among grandmultiparous woman more than 30 years of age. There was significantly higher risk of PPH in grandmultiparas even after controlling for age¹⁶.

A study done by Roman et al in 2004 compared the incidence of antenatal and Intrapartum and neonatal complications among grandmultiparas with the same age matched lower parity women. This study revealed a lower incidence of uterine atony among grand multiparas women compared to the control group even though uterine atony was responsible for 50% of PPH cases.⁸ These study results agree with those done by Bai et al in 2002, who evaluated the association between parity and pregnancy outcome. In his study there was no statistically significant increased risk of PPH in women with

parity more or equal to 5, when all parity groups were adjusted for age and socio economic status.⁷

Grandmultiparity has been associated with increased risk of uterine rupture. This is thought to occur due to strong coordinated uterine contractions of grandmultiparas that leads to a counter pressure of the fetus to the thin less resilient uterine wall in which strong myometrial tissue has been partially replaced by fibro elastic tissue due to subsequent myometrial involution in high parity¹⁸

In a review of 5785 grandmultiparas by Fuchs in 1985, ruptured uterus was found to increase 20 fold in grandmultiparas. Ruptured uterus has been one of the major causes of maternal deaths.² In a more recent study on an analysis of ruptured uterus in Nepal by Chuni in 2006, among 101 cases that had ruptured unscarred uterus 55.6% were grandmultiparas.²¹ Other studies found no difference in occurrence of uterine rupture in grandmultiparas compared with the lower parity group.⁴

Fetal malpresentation and unstable lie has been associated with grandmultiparity because of the tendency of grandmultiparas to maintain a higher station for a longer time before delivery, although rapid transition to delivery occurs once full dilatation is reached. This also increases the risk of cord prolapse in premature rupture of membrane¹⁸.

In the study done by Fuchs in 1985 the rate of malpresentation was found to be 3 fold higher in grand multiparas than the control group.² High malpresentation rates have also been demonstrated in Lebanon where there was a 2 fold increase in grandmultiparous women, but the difference was not statistically significant.¹³ Similar results were found in USA.³ More over, in Reunion Islands of Madagascar and Mauritius the rate of breech deliveries was lower in grandmultiparas compared to the low parity women but there was no statistical significant difference.⁸

Occurrence of cord prolapse seems to associate with fetal malpresentation. When the effect of Intrapartum and newborn complication in young women, was studied by Ellis in 2005, the difference in occurrence in malpresentation was detected among young grand

multiparas compared to the young primiparas. The rate of cord prolapse was also found to be increased in young grand multiparas compared to young primiparas.⁵

Goldman in 1994 studied the outcome of delivery of grandmultiparas and found that the percentage of cord prolapse among grandmultiparas, lower parity multiparas and primiparas was 2.2%, 2.0% and 1.0% respectively. However, the observed difference in the rate of cord prolapse was not statistically significant.²⁰

Several studies have demonstrated an increase in the rate of ante partum haemorrhage (APH) with an increase in parity. Bai et al 2002 found the highest odds of APH in parity of 4 (1.58) and 5 (1.60)⁷. Yasmeen et al in 2005 compared the risk of abruption placenta between grandmultiparas and lower parity age matched control group and found a higher risk of abruption placenta in grandmultiparas.¹⁶ Similar results were found in New York, with a significant higher proportion of placenta previa among grand multiparous women compared to lower parity women⁴

On the contrary, Nassar et al in 2006 in Lebanon, found both rates of abruption placenta and placenta previa had no statistical difference in occurrence among the grandmultiparous and the lower parity women.¹³

Hypertensive disorders in pregnancy are found to have a high prevalence in grand multiparas. Both chronic hypertension and pre eclampsia have been shown to have increased with increase in parity. Roman et al in 2004 noted an increased proportion of hypertension in pregnancy in grand multiparas but there was no significant difference in the risk of Pregnancy induced hypertension (PIH), chronic hypertension and Pre eclampsia in grandmultiparas to the lower parity women.⁸

Toohy et al in 1995 also, found no significance difference in chronic hypertension and Pre eclampsia among the grandmultiparas and the same age lower parity women.³

A study done in Zimbabwe, on the relation of parity and pregnancy outcome showed that hypertensive disorders in pregnancy were higher in parity more than 5. However, with stratification of the age confounder, high parity had no significant maternal and fetal

adverse effect. High parity had fewer labour and delivery complications. The associated outcome of medical illnesses was related to age and home birth²²

High parity has also been associated with poor health and nutrition mostly anaemia in pregnancy. The nutritional depletion commonly encountered is iron, folic acid and calcium deficiency. The reduced inter-pregnancy interval, and high parity leads to inadequate replenishment of the used up body nutrient stores. Moreover, women with high number of children suffer self neglect since they are usually overworked and more prone to miss antenatal care visits or seek medical care when they fall sick^{14,18}

Several studies have shown contradicting evidence on the association of anaemia to high parity. In the study done in New York looking at the perinatal outcome in grand and great grand multiparas, maternal anaemia was shown to increase with increase in parity.⁴ Other studies have produced contradicting evidence where in the Lebanon maternal anaemia has been shown to decrease with parity.¹³

Literature contains contradicting data about the influence of maternal parity and age to associate with adverse pregnancy outcome. Even though there is a study which showed, no category of age or parity is associated with maternal poor outcome of pregnancy.²³ Several authors have shown maternal age to be an independent risk factor for poor obstetric outcome.^{24, 25, 26} It has even been suggested that grandmultiparity per se is not associated with increased risk of adverse foeto maternal outcome when the maternal age confounder is controlled.¹⁵

Advanced maternal age in pregnancy has been an important confounder associated with increased rate of chronic maternal illness such as obesity, hypertension in pregnancy, heart disease, diabetes mellitus, hypercholesterolemia.^{15, 17, 20} Maternal obesity and advanced age has also been observed to associate with an exaggerated lumbar lordosis, inclination of the pelvis and forward subluxation of the sacro iliac joint leading to reduction of true pelvic obstetric conjugate that leads to CPD¹⁸

The impact of maternal age on pregnancy outcome has been also associated with significant increase in ante-partum haemorrhage, fetal distress, prematurity, low birth weight chromosome congenital abnormalities and perinatal mortality.^{27, 28}

High parity is associated with low socio economic status.^{8, 13.} The low socio economic status, poverty and deprivation, has been thought to be as a result of early marriages and early start to child bearing. The deeper the poverty, the more intense the social pressure to reproduce and to bear male offspring. This is due to the fact that children are regarded as work force and that they are necessary to ensure productivity and older age survival. When all these are combined they lead to increased poverty and deprivation.¹⁴

A Study done by Balarajani & Botting 1989 demonstrated a relationship of parity, maternal age and socio-economic status. In this study, parity less than 4, low socio economic status and maternal age < 20 and > 30 were associated with increased maternal and perinatal adverse outcome.¹⁸

Grandmultiparity has been found to have fewer intrapartum complications compared to lower parity. The mode of delivery of grandmultiparas has been found to have less cesarean section rates and assisted instrumental delivery compared to lower parity women.⁸

The fetal outcomes associated with high parity are inconsistent. Aliyu in 2005 showed high parity to associate with increased LBW, VLBW, pre term delivery and prematurity in a dose effect fashion. In this study, low birth weight was found to increase with parity, and related to length of gestation rather than physical restriction.¹² LBW babies i.e. preterm and small for gestation age (SGA) have also been associated with short and long interpregnancy interval. A study done by Zhu in 1999 showed a short inter-pregnancy interval (< 5 months) and long inter-pregnancy interval (>24 months) to be associated with a risk of prematurity and LBW. The lowest risk of LBW and prematurity was interpregnancy interval from 18 - 24 months.²⁹ However, other studies have found high rates of macrosomia in grand multiparas compare to the low parity women.^{16, 20}

2.0 STATEMENT OF THE PROBLEM

Grandmultiparity has been considered to be a risk factor for poor pregnancy outcome, for many decades. Classifying grandmultiparous women as high risk group without a clear evidence of consistent association of grandmultiparity with adverse pregnancy outcomes leads to an unnecessary financial, physical and psychological stress to the mother and the family. The care of a woman classified to have an obstetric risk factor also increases the cost burden to the health system. Tanzanian national antenatal assessment card (RCH4 2006) documents that grandmultiparity (gravidity more or equal to 5) is a risk factor that requires a pregnant woman to deliver in a hospital. However, from the study done by Mbaruku in 2005 there was low perception of high parity being associated with poor pregnancy outcome in the community, among health staff and TBAs.³⁰ Therefore, it is yet to be established, whether grandmultiparas as defined, by the Tanzania national antenatal guidelines, is an obstetric risk and thus justify selection and referral to a higher level facility.

3.0 RATIONALE OF THE STUDY

To date there is no current published data on Pregnancy outcome of grandmultiparity in Tanzania. This study will provide evidence whether grandmultiparity as defined in the Tanzania national antenatal card guidelines have a higher occurrence of adverse maternal and fetal outcome than the lower parity women delivering at Muhimbili hospital.

Data from this study can be applied to other health facilities in Tanzania and provide a baseline for which health education program, antenatal education, and policy makers can be use to reduce maternal and perinatal risk, and family socio-economic burden of grand multiparity. This education is likely to improve knowledge and attitude towards family planning and contraception use.

4.0 NULL HYPOTHESIS

There is no difference in pregnancy outcome in grandmultiparas (parity ≥ 5) compared to the low parity women. (Parity 2-4)

5.0 RESEARCH OBJECTIVES

5.1 Main Objective.

To compare obstetric and perinatal complications among grand multiparas and other multiparous women delivered at MNH

5.2 Specific objectives

1. To compare the antenatal, intrapartum and early postpartum maternal outcomes among grandmultiparas to other multiparas women delivered at MNH labour ward.
2. To compare the neonatal outcomes associated with grandmultiparity to other multiparas women delivered at MNH labour ward.

6.0 STUDY METHODOLOGY

6.1 Study design:

This was a cross sectional comparative study

6.2 Study area:

This study was done at Muhimbili national hospital. MNH is a largest tertiary hospital and a University teaching Hospital in Dar es Salaam, the biggest city in Tanzania. The city has a population of 3 million people (Tanzania census 2002). MNH serves as a national referral center for all Dar es Salaam municipal hospitals (Mwananyamala, Temeke, and Amana Hospitals), private hospitals, health centre and from health care facilities outside Dar es Salaam for specialized care. Some patients come from home, especially those who were attending MNH Antenatal clinic and those who had previously delivered at MNH regardless of status of the current pregnancy. Thus nearly 60% of women delivering at MNH have no identifiable risk factor.

The MNH Obstetric and Gynaecology wards are currently housed in the KIBASILA block. There are eight wards, in which four, are general Obstetrics and gynaecology wards each having a capacity of 30 beds. There is one labour ward (LW) which has a bed capacity of 25 beds. The Obstetric Intensive care unit and section for post delivery observation of women after uncomplicated deliveries are combined in another ward. The ICU has bed capacity of 11 beds while the post delivery section has about 15 beds. The remaining two wards are neonatal unit and a ward for nursing mothers who their babies are in neonatal unit.

The LW and obstetric ICU are managed by the team of doctors on call and the nursing staff allocated in these respective areas. The admitting firm conducts a major ward round (MWR) in the LW and ICU everyday in the morning. The rest of the day's activities are managed by the consultant, specialist and resident /registrar on call, teaming up with the nursing and associated staff on a particular shift in the LW and Obstetric ICU.

According to the MNH obstetric data base, in the year 2006 there were about 9,000 deliveries. The majority of deliveries were of primigravids (45%) while grandmultiparas constituted about 7% of all deliveries at MNH. On admission in the labour ward, all women are seen by the nurse midwife who screens them before entering the labour ward. A brief history is taken, including personal particulars, next of kin, antenatal history and past obstetrics history. The partogram is filled and initial obstetric examination is done except pelvic assessment which is done by the doctor on call. The routine monitoring of labour is done according to the partogram. Labour progress is observed and the necessary interventions are done depending on the trend of labour. Women, who deliver spontaneously vaginally or by breech without complications, are transferred to the postnatal ward and observed for at least 6 hrs before being discharged home. Those who had complicated deliveries or were delivered by caesarean section are transferred to the general ward for further management or postoperative recovery respectively.

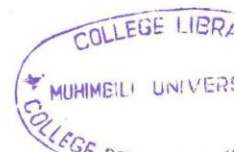
The Neonatal ward has an essential role in obstetrics as it cares for sick and premature neonates. The neonatal ward also cares for babies delivered by caesarean section whose mothers are on post operative recovery.

6.3 Study population:

All multiparas women who delivered at MNH labour ward at a gestation age equal to or more than 28 weeks from August 2007 to December 2007, were assessed for eligibility for inclusion in the study. Multiparas who delivered twins and those who were seriously ill to the extent of being unable to communicate the information required for the study were excluded. Women who did not consent to join the study were also excluded.

6.5 Study duration

Data collection was done from 1st August 2007 through to 31st December 2007.



6.4 Study sample size:

The sample size was computed from EPI info 6 program. This was based on the study being a cross sectional design using the following parameters of interest:

Number of women expected to deliver in 6 months	5,000
Power of the study (1-B)	80%
Confidence interval:	95%
Estimated ratio of unexposed to exposed group	3
Expected least frequency of disease in unexposed group	2.0%
Risk Ratio	3.0
Odd ratio	3.13

The minimum required sample size is: 1025 (GM 265, Lower parity 760)

6.6 Sampling procedure

Women were identified after delivery from the delivery register, postnatal ward admission books and report books in the general ward. The list of all women who delivered in a particular day was assessed for eligibility. Parturients who met the inclusion criteria were given a consent form to read and sign, if they accepted to join the study.

6.7 Data collection

Data collection was done in a period of 5 months. The principal researcher and the research assistants collected data thrice daily after the women had delivered but before they were discharged. Data collection was done in the postnatal observation ward in the morning before 9 am, in the afternoon before 1 pm and in the evening before 6 pm.

For those mothers who had operative or complicated deliveries, data collection was done in their respective wards when they were stable and able to communicate well.

Participants who were enrolled in the study were assessed and asked questions according to the variables of interest laid down by the standard questionnaire (Appendix 1). The variables of interest were obtained from the participants themselves, labour ward registry, antenatal card, partogram and participants' clinical notes.

A standard questionnaire was designed to contain four sections. The first part inquired about the participants socio-economic and demographic characteristics such as maternal age, parity, level of formal education, marital status, socio economic status, alcohol consumption and cigarette smoking. The second part inquired about obstetric risk factors including hypertension and diabetes in the current pregnancy, previous preterm delivery, previous instrumental delivery or caesarean section, and history of perinatal death.

The third part recorded pregnancy outcome variables which comprised of maternal, fetal and neonatal outcomes. The maternal outcomes included, operative delivery: elective cesarean delivery or emergency cesarean delivery; placenta previa, abruptio placenta, malpresentation, umbilical cord prolapse, uterine atony and uterine rupture. The neonatal outcomes of interest were birth weight (g), prematurity (GA < 37weeks), neonatal malformations, Apgar score and perinatal deaths. The last part focused on the perception of grandmultiparity and; knowledge and practice of family planning among women under study.

6.8 Definition of variables

Socio economic status was assessed by using the wealth index as it has been used in the TDHS (2004/5).¹⁰ In this study, the wealth index was constructed using household asset from data collected in the questionnaire that covered information on household ownership of consumer items such as a radio, television, car, and the house itself as well as dwelling characteristics such as source of drinking water, type of sanitation facilities, and type of materials used in the house construction. Each asset was assigned a weight (factor score) which was converted to a standardized score by factor reduction using

computer programming (Appendix 4 in table I). The scores of each assert were summed up for each participant's household. The range of the score in the sample was divided into thirds. The participant's socio economic status was ranked according to the total score of their household. The group in the lowest range of the scores was assigned low socioeconomic status, those in the middle range were assigned medium socioeconomic status and those of highest range were assigned high socio economic status as shown in Appendix 4 in table II which also tabulates the assigned weight scores of the household asserts and shows the standardized factor score generated by principal component analysis procedure

Operational definitions for other study variables such perinatal death , intrauterine fetal death , low apgar score, low birth weight, very low birth weight and macrosomia were as defined in Appendix 3.

6.9 Training of Research assistants.

Two medical students and six nurse midwives were trained as research assistants. Among the nurse midwives two (2) were from the post natal ward and four (4) from the general Obstetrics and Gynaecological wards. The midwives from the general ward, teamed up with the medical students. The research assistants were recruited and trained for one day on the protocol and conduct of the study. The task of the research assistants was to assist the principal investigator in the study. Their responsibility was to recruit participants, and administer consent forms (Appendix 5 or 6), and questionnaires.

The training of research assistants consisted of the ethical issues concerning the study on the correct conduct of human subjects in research. The training also included the study procedures namely identification of the study participant, application of the inclusion and exclusion criteria, administration of the consent form and questionnaire and extraction of variable of interest from the ward register, participant's file and the participant herself. The research assistants were arranged in a way that there was someone responsible to collect data during the day and night.

6.10 Pilot study

A two weeks Pilot study was done to test the questionnaire and assess the flow of variables, the ease to obtain the relevant information and make necessary modifications of the questionnaires wherever necessary.

6.11 Data Analysis

Each questionnaire was assigned with an identification number. Data entry and cleaning was done by Epi info 6 and then transferred to SPSS 13.0 for statistical analysis. Cross tabulation and comparison of variables of interest was done. Chi square test and student's t test were used to assess the difference between the groups, for categorical variable and continuous variables respectively. The level of statistical significance was taken as P value < 0.05. Some of the outcome variables and obstetric risk factor were controlled for age. Predictors for adverse outcome in relation to GM were assessed using logistic regression analysis.

6.12 Ethical considerations

Important aspects that were covered on the ethical consideration were: Assurance to the participants that their decision to join the study is completely voluntary and whether or not they decide to participate, medical care will not be affected and no risks are associated with this study.

Thorough explanation concerning the conduct of the study, in terms of all aspects covered in the research, and proper administration and signing of the informed consent by the study participants before their enrolment, was observed. The study participants were treated with utmost respect and their personal information was kept confidential. The participants answered questions to the best of their knowledge and care was taken to avoid a feeling of embarrassment when they were unable to answer some of the questions. The participant did not incur any cost from participating in this study. Those who had any condition that needed intervention received prompt management or directed

toward the required intervention and family planning counselling was done to those who required.

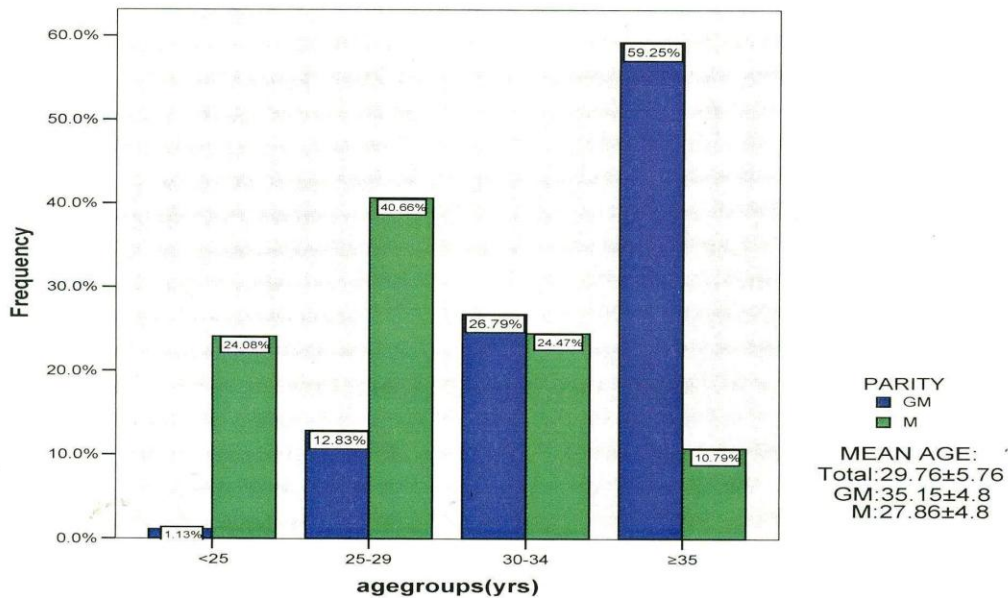
Ethical clearance was granted by the Muhimbili University of Health and Allied Sciences research and Publications Committee. The study began when the permission was obtained from the relevant authorities and the Executive Director - MNH.

7.0 RESULTS

There were 3494 deliveries from 1st August to 31st December 2007. Among these, 1685 were primiparas and 128 were twin deliveries therefore not illegible for the study. Analysis was done to 1025 multiparas women who were recruited in the study. The remaining number of women were excluded from analysis due to incompleteness of the data, either because they were too sick to provide information or because of missing important information in the questionnaire. The sample was broken down by parity where, 265 women were grand multiparas (parity ≥ 5) and 760 were lower parity women (parity 2-4). The mean parity for the grandmultiparas was 5.08 ± 1.64 and that of the lower parity multiparas was 1.99 ± 1.2 . (O.R 3.1; 95% CI 2.9-3.2)

Figure 1 shows maternal age between the two parity groups. The mean maternal age of the grandmultiparas (GM) was 35.15 ± 4.8 while for other multiparas (M) was 27.86 ± 4.8 (O.R 7.2; 95% C.I 6.6-7.9) i.e. grandmultiparas were more than 8 years older than the lower parity group.

Figure1. Percentage age distribution of the study population



Grand multipara women were significantly of more advanced age compared to the lower parity women of which 59.3% of grandmultiparas had age above 35 years compared to 10.8% of lower parity women ($p=0.001$). The age group that was comparable between GM and lower parity women was of 30-34 years of age, which constituted 25% of the study sample.

The socio-economic and demographic characteristics are presented in table 1. The lower parity women who were not married (7.4%) were twice as many as their grandmultiparas counterparts (3.0%) although the difference was not statistically significant. Other categories of the marital status were comparable between the two groups with the majority of women in the study being married.

Table1. Socioeconomic and demographic characteristics of the study groups

Variable	Grandmultiparas n = 265(%)	Multiparas n = 760(%)	P-value
Marital status			
Not married	3.0	7.4	0.06
Married	80.8	75.9	
Divorced	1.9	1.3	
Cohabiting	14.3	15.4	
Level of education			
No formal	17.7	9.3	<0.001
Primary school	71.0	72.2	
Secondary school and above	11.2	18.5	
Socioeconomic status			
Low	28.6	35.3	0.04
Medium	30.6	32.1	
High	40.8	32.6	
Regular income	61.5	54.3	0.04
Mean income	89,132±116,206	87,436±128,574	0.85
Cigarette smoking	3.8	1.7	0.05
Alcohol consumption	4.2	3.0	0.42

The grandmultiparous women were noted to be significantly less educated with 17.7% with no formal education, compared to 9.3% of the lower parity group ($p < 0.001$). Majority of women in the study ($>70\%$) were of low education. A bigger proportion of lower parity women (18.5%) had secondary school and above compared to the grandmultiparas counterparts (11.2%).

There were more grandmultiparas in the high socio-economic category compared to the lower parity women (40.8% vs. 32.6%), and 61.5% had regular family income compared to 54.3% lower parity women. But their income (Grandmultiparas 89,132±116,206) was comparable to that of the lower parity women (87,436±128,574)

The rate of cigarette smoking and alcohol intake during pregnancy between the two groups was comparable.

The antenatal profile and obstetric risk factors are presented in Table 2. Grandmultiparas had a later ANC booking (GA-21.45±5.9) compared to the lower parity women (GA-19.49±5.7) with OR 1.9; 95% CI 1.1-2.7. Hypertension and Diabetes mellitus in the current pregnancy was significantly higher in grandmultiparas, but proportions were comparable in the two groups when adjusted for age. In the univariate analysis, history of previous abortion, premature delivery IUD and NND were all significantly higher among grandmultiparas. However; only history of previous pre-term delivery (OR 5.3 95% CI 3.1– 8.9) and previous NND (OR 3.6; 95% CI 2.1 – 6.2) had persistent statistical significant difference in the two group after controlling for age. Mode of deliveries in previous pregnancies showed that lower parity women had higher tendency of CS compared to grandmultiparas (OR 1.1; 95% CI 0.6-1.7), whereas instrumental delivery was more associated with grandmultiparity (OR 4.0; 95% CI 0.5-29.1) although difference was not statistically significant.

Table 2. **Antenatal profile and obstetric risk factors of the study groups**

Variables	Grandmultiparas N = 265(%)	Multiparas N =760(%)	Unadjusted O.R (95%CI)	Age adjusted O.R (95%CI)
GA at booking	21.45±5.9	19.49±5.7	1.9(1.1-2.7)	
HTN - current pregnancy	18.1	9.1	2.3(0.6-8.6)	1.6(0.28-9.8)
DM - current pregnancy	1.5	0.7	2.3(0.5-3.4)	1.4(0.8-2.3)
Previous abortion	26.0	16.2	1.6(1.1-2.5)	1.2(0.5-2.8)
Previous preterm delivery	35.1	5.8	8.8(5.9-13.0)	5.3(3.1-8.9)
Previous IUFD	21.5	7.4	3.4(2.3-13.0)	1.2(0.7-2.1)
Previous NND	27.2	4.9	7.3(4.7-11.2)	3.6(2.1-6.2)
Previous C-Section	16.6	20.5	0.77(0.53-1.11)	1.1(0.6-1.7)
Previous instrumental deliveries	1.5	0.7	2.3(0.6-8.7)	4.0(0.5-29.1)

Maternal pregnancy outcomes are presented in Table 3. Majority of women (62.1%) delivered vaginally, 37.3% had operative delivery (OP) while 0.4% had vacuum extraction. The mode of delivery did not differ significantly according to parity. Among the maternal complications, malpresentation, placenta previa, meconium stained liquor and uterine atony were significantly more associated with grandmultiparity in univariate analysis.

Table 3. **Maternal outcome among the GM and lower parity women.**

Variable	Grandmultiparas n = 265(%)	Multipara n = 760(%)	Unadjusted OR(95%CI)	Age adjusted OR (95% CI)
Mode of delivery				
SVD	64.2	61.2	1.1(0.8-1.5)	1
Operative delivery	34.7	38.7	0.8(0.6-1.1)	0.8(0.6-1.1)
Vacuum extraction	1.1	0.1	8.6(0.9-83.9)	8.2(0.8-79.8)
Maternal complications				
Malpresentation	6.1	2.1	2.1(1.1-4.1)	2.2(1.1-5.0)
Premature Delivery	12.5	10.5	1.1(0.8-1.5)	0.8(0.6-1.2)
Cord prolapse	0.4	0.9	0.4(0.1-3.3)	0.6(0.1-5.3)
Meconium stained liquor	8.3	3.0	2.9(1.6-5.3)	2.8(1.3-5.9)
Abruptio placenta	2.6	1.7	1.5(0.6-3.9)	1.8(0.6-5.1)
Placenta previa	4.2	1.8	2.3(1.0-5.1)	2.8(1.1-7.1)
Uterine atony	4.8	1.4	3.2(1.4-7.1)	2.0(0.7-5.7)
Others	3.0	6.2	0.4(0.2-1.0)	0.6(0.2-1.4)

When adjusted for age in logistic regression analysis, malpresentation, meconium stained liquor and placenta previa were at least two times more likely in the GM than the lower parous women.

Table 4 presents the neonatal outcomes in the current pregnancy in the studied groups. The mean birth weight was 3.00 ± 0.68 kg. The mean BW for grandmultiparas was 3.08 ± 0.70 while mean birth weight for lower parity women was 2.92 ± 0.67 with no statistical significance difference between the two groups when adjusted for age (OR 1.2; 95% CI 0.9 – 1.6).

Table 4. Neonatal outcome in the current pregnancy in the studied groups

Variables	Grandmultiparas N = 265(%)	Multiparas N = 760(%)	Unadjusted OR (95% CI)	Age adjusted OR (95% CI)
Birth weight				
Mean BW (Kg)	3.08±0.70	2.92±0.67	1.2(1.0-1.6)	1.2(1.0-1.6)
VLB	1.9	3.3	0.5(0.2-1.5)	0.8(0.48-1.34)
LBW	14.1	15.7	0.9(0.6-1.3)	1.3(0.8-2.3)
Normal BW	78.0	78.6	0.9(0.6-1.2)	1
Macrosomia	6.0	3.4	1.9(1.0-3.6)	0.8(0.3-1.7)
Still births	6.8	5.5	1.2(0.7-2.2)	1.6(0.8-3.3)
Apgar Score < 7(5th min)	12.1	5.4	2.1(1.3-3.3)	2.9(1.5-5.0)
Congenital anomalies	2.3	1.71	1.3(0.5-3.5)	1.1(0.3-3.6)

In the study, mean birth weight and the rates of VLBW, LBW and macrosomia was when adjusted for age. The rate of low score babies were more in the grandmultiparas group (12.1%) compared to the lower parity women (5.4%) with OR 2.9; 95% CI 1.5-5.0. When several risk factors for low apgar score were assessed by multivariate logistic regression model, GM and low birth weight were independently associated with low apgar score with OR 2.4; 95% CI 1.4-4.2 for GM and OR 4.2; 95% CI 2.3-7.8 for LBW.(Table 5)

Table 5. **Risk factors associated with Low Apgar score.**

Variables	β	P- value	O R (95%CI)
GM	0.88	0.002	2.4(1.4-4.2)
HTN	0.04	0.89	1.0(0.5-1.9)
Maternal age(>35yrs)	-0.41	0.27	0.6(0.3-1.4)
LBW	1.45	<0.001	4.2(2.3-7.8)
Smoking	0.82	0.4	2.2(0.3-17.2)
Alcohol intake	-0.6	0.23	0.5(0.2-1.5)
Referrals	0.1	0.67	1.1(0.6-1.8)

Table 6 presents maternal perception of grandmultiparity, knowledge on contraception and practise of family planning. Less than 30% of all women in the study knew that grandmultiparity is associated with adverse pregnancy outcome although those who understood the definition of grand multiparity were less than 17%. Women who knew at least one contraceptive method were about 96%; however, only 6 % had knowledge of emergency contraception. The percentage difference between grandmultiparas and the lower parity women in terms of perception of grandmultiparity and knowledge on contraception was not statistically significant.

There were more grandmultiparas (69.4%) who had a history of contraception use in their life time compared to the lower parity group (58.7%) with a p-value of 0.002. However, grandmultiparas (32.5%) who planned for the current pregnancy were significantly less than the lower parity counterparts (55.4%) with a p-value of < 0.001.

Table 6. **Perception of GM, knowledge on contraception and family planning practice among the two groups**

Variable	Grandmultiparas n = 265(%)	Multiparas n = 760 (%)	P-value
Perception of:			
Adverse outcome of GM	27.5	29.1	0.63
Definition of GM	15.5	16.8	0.60
Knowledge on:			
Contraception	95.1	97.1	0.12
Emergency contraception	4.9	6.6	0.3
Practise on:			
Contraception use	69.4	58.7	0.002
Planned current Pregnancy	32.5	55.4	<0.001
Children of different spouses	26.0	12.6	<0.001

Between the two groups, grandmultiparas (26%) were significantly more associated with children that have different paternity compared to the lower parity group (12.6%) with a p-value of <0.001.

8.0 DISCUSSION

This study was aimed at looking for evidence whether grandmultiparity is an obstetric risk factor that needs management of delivery in hospital level, health facility in current health care settings. Further more this study compares maternal awareness of grandmultiparity and attitude towards family planning between the grandmultiparas and lower parity women.

8.1 SOCIOECONOMIC AND DERMORAPHIC CHARACTERISTICS

8.1.1 Maternal age, education and marital status

Grandmultiparity has shown to be associated with advanced maternal age which has been observed to have an increased obstetrics risk^{3, 17, 24, 25, 31}. This study; had a racially homogeneous population with a significant difference in maternal age between the grandmultiparas, who were of advanced age compared to the lower parity counterparts. The problem of age disparity between the two groups has been dealt with by comparing the rate of important variables using age adjusted odds ratios. Similar comparable age has been used in some studies while others have done age matching from the time of sampling.^{4, 25, 31} Similar to other studies^{3, 10, 18} this study found, more adverse pregnancy outcome associated with grandmultiparity than the lower parity counterparts, even after controlling for age.

Consistent with another author⁸, Grandmultiparas women were more associated with being married at least once, but were less educated compared to their lower parity counterparts. Generally, more exposure to formal education reflects more perception in health related issues. Conversely, in spite of lower parity women being more educated, the perception of grandmultiparity as an obstetric risk and the knowledge of contraceptive methods were comparable between the two groups.

8.1.2 Socioeconomic status

Grandmultiparas were observed to have a relatively higher socio economic status compared to the lower parity women. Other studies^{3, 7, 8} seem to associate grandmultiparas to low socio economic status. An important finding that could explain the difference is the fact that

in this study, lower parity women were less associated with regular family income and moreover, they also more associated with single parenting compared to the grandmultiparas. Since more than 60% of lower parity women were of a young age (age less than 30 yrs) then it is more likely for them to be in the early stages of their social and financial independence. Hence, majority of lower parity women were less likely to have a stable adequate family income and therefore a relatively lower representation in those with high socio economic status compared to the grandmultiparas women.

8.2 ANTENATAL PROFILE AND OBSTETRIC RISK FACTORS

Our analysis found the incidence of Hypertension and Diabetes in pregnancy to be comparable between the two groups when the confounder of age is controlled. Similarly Bugg and Toohey came to the same conclusion.^{3,6} Unlike our findings, many studies^{7,20,22,32} have found significantly higher incidence of hypertension and diabetes mellitus in grandmultiparas women. Hypertension and Diabetes Mellitus in pregnancy were clearly shown to be twice as much among grandmultiparas than the lower parity counterparts although without significant statistical difference. This could be attributed to a small number of women in the study having hypertension and diabetes mellitus.

As in previous studies^{8,13} our grandmultiparas were observed to have more than 3 times likelihood of a history of neonatal deaths with or without a history of prematurity being a possible cause of early neonatal death. The history of previous IUFD was comparable between the two groups when age was adjusted. This finding suggests a possibility of an alternative explanation other than history of fetal or neonatal loss being a recurrent risk³³. One explanation can be the observed need of mother with previous fetal or neonatal loss to eagerly continue bearing children to compensate for their loss as attempt for successful pregnancy outcome.

8.3 MATERNAL PREGNANCY OUTCOME

Similar to Toohey and Roman,^{3,8} fewer grandmultiparas had history of previous caesarean section although the rate of SVD, operative delivery and vacuum extraction were comparable. In our environment cephalopelvic disproportion is the commonest indication for Caesarean Section(CS); therefore lower parity women delivered by CS from first or

second pregnancy do not reach grandmultiparity as they are usually advised not to conceive after three consecutive operative deliveries. This could partly explain the lower rates of history of CS in GM. Toohey and Roman have even shown reduced rates of operative delivery and instrumental delivery with high spontaneous vaginal delivery among grandmultiparas compared to the lower parity counterpart.^{3,8} The statistical comparability in the rates of vacuum extraction despite vacuum extraction being 10 times in Grandmultiparas than the lower parity multiparas can be explained by low use of vacuum extraction during the time of study due to lack of appropriate vacuum extractor pump at MNH.

The risk of Meconium stained liquor, malpresentation and placenta previa have been demonstrated to be higher in the grandmultiparas compared to the lower parity group in concurrence to other studies^{4, 7, 18} Other maternal complications such as preterm labour, cord prolapse, abruptio placenta and uterine atony were comparable between the two groups. This was found to be similar to other studies.^{3, 6, 22} Probably the practise of Active Management of Third stage of Labour and wide availability of uterotonics can explain the generally low rates of uterine atony to all women delivered at Muhimbili labour ward. Meconium stained liquor has been used as an indicator for fetal distress. It is still a controversial marker for fetal compromise, since passage of meconium can be a physiological response of a mature GIT of the fetus or anal sphincter relaxation in response to fetal hypoxia. Conclusive evidence of fetal distress is more related to characteristics of fetal rate variability. Majority of malpresentation were of breech type. In the absence of other obstetric indication of C-section e.g. CPD, footling, previous scar, cord prolapse or prematurity; grandmultiparas have a better performance in labour than the lower parity women. Therefore a mere breech presentation may not necessary an added obstetric relative risk to the lower parity women.

8.4 NEONATAL PREGNANCY OUTCOME

As in previous studies,⁴ neonates born with low apgar score were shown to be more associated with grandmultiparas. The independent predictors closely correlated to low apgar score were grandmultiparity and low birth weight. Hypertension in pregnancy, smoking, alcohol intake or a mother being a referral case from another hospital did not associate with neonatal low apgar score.

Despite the evidence from the literature³³ showing that a mere history of fetal or neonatal loss is a recurrent risk factor, grandmultiparity had comparable rate of fetal demise and neonatal deaths compared to the lower parity counter parts. Other neonatal outcome such as birth weight, stillbirths and congenital malformations were comparable between the two groups when adjusted for age. This study showed grandmultiparity to have a higher prevalence of history of previous neonatal deaths rather than the fetal or neonatal demise in the current pregnancy. Such a tendency can be associated to the impact of socioeconomic deprivations that is usually associated with grandmultiparity, leading to poor care of the newborn in the early or later neonatal period rather than the actual obstetric performance in the current pregnancy that is more related to the state of the baby at delivery.

8.5 PERCEPTION OF GRANDMULTIPARITY, KNOWLEDGE OF CONTRACEPTION AND FAMILY PLANNING PRACTISE.

Despite more than 80% of women having at least primary education level and above, more than 70% of women in both groups neither considered grandmultiparity to be an obstetric risk factor nor knew the definition of grandmultiparity. This suggests a deficit of reproductive health education in the formal education curriculum. Mbaruku in 2005 who also observed the lack of knowledge of grandmultiparity being an obstetric risk factor in up to 40% of health worker, 10% of TBA and 10% of community members in rural Tanzania.³⁰ Health workers and TBA are part of the community and therefore may share same beliefs as the general population regarding grandmultiparity which in turn contribute to the women not appreciating risk of grandmultiparity. Furthermore, the relative decline of awareness regarding grandmultiparity may be a reflection of the impact of recent evidence that grandmultiparity is not associated with adverse pregnancy outcome.

This study showed grandmultiparity to be more associated with contraception use at least once in life time, unplanned pregnancies and having children with more than one spouse. Unintended pregnancies have been shown to be associated with low contraception use in other studies done in rural Bangladesh and Athens^{34,35}

The higher contraception use revealed in this study reflects only the rate of exposure to contraception rather than adherence to it. More over, majority of lower parity women were those of parity of 2 who are still eager to have children. This study did not focus on eliciting reasons for the close association of grandmultiparity to women who had children by more than one spouse but one of the factors that could explain the findings is that from previous observation ³⁵, the male partners are usually given an upper hand in matter related to contraception. Also during our study, a male dominance in matters related to family planning was observed. Women with history of having more than one spouse tend to be pressurised to fulfil their husbands' wishes of having their own biological children, regardless of the woman's parity at the time of their union. In general terms; lack of women empowerment and access to contraception which have a marked influence on family planning.

9.0 STUDY LIMITATIONS

Some of the shortcomings in this study are lack of an account of other confounders like interpregnancy interval, nutritional status and psychosocial status of women which all affect pregnancy outcome. This study being a cross sectional design failed to make causal inference of some risk factor although it sufficed to show the rate of representation of adverse pregnancy outcome between the grandmultiparas women and the lower party counterparts. It is important to note that due to low prevalence of some variables such as vacuum extraction, DM in pregnancy, cord prolapse and uterine atony, there may be a bias on comparability of the events.

Despite the limitations, this study had adequate sample size that provided acceptable level of precision in the estimates. The study area, MNH is a teaching national referral hospital which has diversity of women coming to deliver from different lower health facilities and practise basic and comprehensive emergence obstetric care with a relatively standard mode of management. This is important in terms of accuracy and applicability of the results.

10.0 CONCLUSION

This age adjusted cross sectional study has shown that grandmultiparity has a relatively higher incidence of some adverse pregnancy outcomes such as low apgar score, meconium stained liquor, malpresentation and Placenta previa, compared to the lower parity women. History of preterm delivery, neonatal deaths, change of spouse, and low contraceptive use are some of the major factors found in high parity.

It is the author's considered opinion that, grandmultiparity per se does not mandate a planned delivery in a hospital if all health facilities have satisfactory health care conditions that are mandatory for good pregnancy outcome i.e. early identification and alleviation of risk factors, skilful management of labour, and good working referral system.

11.0 RECOMMENDATIONS

From findings revealed by this study and supported by other authors, it is recommend that:

1. There is a need for a bigger and more comprehensive community based study with sufficient number of cases for comparison of all pregnancy outcome variables of interest in order to be able to search for clear evidence of presence or absence of increased risk of adverse pregnancy outcomes in grandmultiparity compared to the lower parity women.
2. There should be provision of adequate antenatal care and prompt implementation of the elements of the basic and comprehensive obstetric emergency care as designed by WHO in all relevant setting. This is to reduce maternal morbidity and mortality across all parities by prompt risk assessment, health promotion, complication preparedness, birth readiness and appropriate care.

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