

UNIVERSITY OF ZAMBIA  
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**ADVERSE OBSTETRIC OUTCOMES IN ADOLESCENT PREGNANCY  
IN RURAL ZAMBIA-THE CASE OF KAWAMBWA AND MANSA  
DISTRICTS OF LUAPULA PROVINCE.**

BY

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## DEDICATION

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I dedicate this study to all the girls whose childhood was cut short; the girls who became mothers when they themselves were still children; the girls that lost their lives while giving life.

## ACKNOWLEDGEMENTS

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To my husband Jude, for pushing me even when I had lost the zeal to push on, thank you honey!

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- To everyone who contributed to this success, friends and family too many to mention, I say THANK YOU!

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## **DECLARATION**

Student's Declaration: "I hereby declare that this dissertation is my original work. It has been completed in accordance with the guidelines for the MPH in Population Studies for the University of Zambia and has not been presented for a degree in any other university and that all sources that I have quoted have been acknowledged by means of complete references."

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Signature.....Date.....

## **CERTIFICATE OF COMPLETION**

I, **Albertina N'gomah Moraes**, do hereby certify that this dissertation is the product of my own work and I am submitting it for my Masters in Public Health in Population Studies Programme. I further attest that it has not been submitted to another university in part or whole for the award of any programme.

Signature.....Date.....

I, **Dr. Rosemary N. Likwa**, having supervised and read this dissertation, am satisfied that this is the original work of the author under whose name it is being presented. I confirm that the work has been completed satisfactorily and is ready for presentation to the examiners.

Signature.....Date.....

Head of Department Declaration:

Name.....Prof. Charles Michelo.....

Signature.....Date.....

**CERTIFICATE OF APPROVAL**

The University of Zambia approves the dissertation of **Albertina Ngomah Moraes** in partial fulfilment of the requirements for the award of a Master of Public Health in Population Studies.

Examiner’s Signature

Date

Examiner 1: ..... Date.....

Examiner 2: ..... Date.....

Examiner 3: ..... Date.....

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## **ABSTRACT**

**Objectives:** Adolescent pregnancy is a major public health problem throughout the world. It has been associated with adverse obstetric outcomes. In Zambia, Luapula province has the highest rate of adolescent pregnancy. The aim of this study was to investigate the maternal and perinatal outcomes among adolescents aged between 10 and 19 years compared to older mothers aged between 20-24 years delivering at selected health facilities in Kawambwa and Mansa.

**Methods:** A retrospective cross-sectional analysis was carried out of all deliveries to mothers aged between 10 and 24 years for the period January 2012 to January 2013. A total of 2,797 ANC and delivery records were reviewed; 1,291 adolescents aged between 10-19 years and 1,504 older mothers aged 20-24 years. Among the outcomes evaluated were eclampsia, anaemia, haemorrhage, fistulae, CPD, low birth weight, asphyxia and pre-term delivery. The crude and adjusted odds ratios for the association between maternal age and adverse obstetric outcomes were obtained through logistic regression models

**Results:** The mean age of the adolescent mothers was 17.5 years. Compared to those aged 20 to 24 years, mothers younger than 16 years were found to face a higher risk factor for eclampsia (OR 40.56, 95% CI 13.09-125.65), haemorrhage (OR 3.59, 95% CI 1.01-12.74), CPD (OR 5.40, 95% CI 2.46-11.85), prolonged labour (OR 1.49, 95% CI 0.43-5.13) and caesarean section (OR 3.33, 95% CI 1.93-5.76) but not for anaemia, sepsis, fistulae, PROM and maternal death. After adjustment for four potential confounders, the association between maternal age and adverse obstetric outcome diminished; young maternal age remained a risk factor only for eclampsia. Children born to mothers younger than 16 were also at significant risk for LBW (OR 1.65, 95% CI 0.87-3.15), PTD (OR 2.26, 95% CI 0.51-10.14), low Apgar score (OR 1.82, 95% CI 0.87-3.83) and neonatal death (OR 1.83, 95% CI 0.63-5.31); the risk for asphyxia, however, tended to increase with age. The maternal death rate among adolescents was found to be 5 deaths per 1,000 live births, whereas the neonatal death rate was 36 deaths per 1,000 live births.

**Conclusion:** The high rates of adolescent pregnancies in Luapula province are likely as a result of the predominantly rural and poor population. The findings of this study demonstrate that young maternal age is a risk factor for adverse obstetric outcomes. Understanding the factors that contribute to the high levels of adolescent pregnancy in the region will be vital in addressing the situation and subsequently reducing the high maternal and perinatal morbidity and mortality rates.

## Abbreviations

ADFHS	Adolescent Friendly Health Services
AIDS	Acquired Immuno-Deficiency Syndrome
ANC	Antenatal care
CPD	Cephalopelvic disproportion
CSO	Central Statistics Office
DALY	Disability-Adjusted Life-Years
HIV	Human Immuno-deficiency Virus
LBW	Low birth weight
MDGs	Millennium Development Goals
MMR	Maternal mortality ratio
MoH	Ministry of Health
PROM	Premature rapture of membranes
UNDESA	United Nations Department of Economic and Social Affairs
UNFPA	United Nations Population Fund
UNZABREC	University of Zambia Biomedical Research Ethics Committee
WHO	World Health Organisation
YFC	Youth Friendly Corner
ZDHS	Zambia Demographic Health Survey

## Chapter 1: Background

### 1.1 Adolescent maternal health perspective

The World Health Organization defines adolescents as those aged 10 to 19 years (WHO 2008). The term “adolescent” is often used synonymously with the term “teenager” although in a stricter sense teenagers are those aged 13 to 19 years. It is at this stage in life that sexuality and sexual activity begin. Adolescent pregnancy is defined as a pregnancy which ends before the mother reaches the age of 20 years old (Rosen 2010).

Annual global estimates of adolescent pregnancies are placed at around 16 million. This makes up 11% of all births worldwide. It is estimated that 95% of these pregnancies occur in the developing world and 50% in sub-Saharan Africa alone (WHO 2007). Although accounting for only about a tenth of all births in the world, maternal conditions in adolescents produce 15% of the global burden of disability for maternal conditions, 23% of all disability-adjusted life-years (DALYs) from maternal conditions and 13% of all deaths from maternal conditions (Rosen, 2010).

The majority (95%) of all adolescent pregnancies are unplanned and unintended. Not only do they have a negative impact on the emotional, educational and economic conditions of adolescents, but they are also associated with a high risk pregnancy. The role of adolescent and youth reproductive health should not be overlooked in our bid to achieve the Millennium Development Goals (MDGs), in particular Goal 4 (*Reduce by two thirds, between 1990 and 2015, the under-five mortality rate*) and Goal 5 (*Reduce by three quarters, between 1990 and 2015, the maternal mortality ratio*). (UNDESA 2010). Combating problems related to adolescent maternal health will also indirectly impact on goals 1 (*eradicate extreme poverty and hunger*), 2 (*achieve universal primary education*), 3 (*promote gender equality and empower women*) and 6 (*combat HIV/AIDS, malaria and other diseases*). By improving the education, skills and prospects of pregnant adolescents, they are enabled to earn income, prevent further unwanted pregnancies and to provide for their families. Pregnancy often brings a girl’s education to an end, sometimes before she finishes primary school. Many adolescents do not choose to become pregnant, and have little power to influence their own futures, let alone those of their children. Furthermore, adolescent

girls who have sex with older sexually experienced men have a higher risk of contracting HIV (McIntyre, 2006).

The 2002 United Nations General Assembly Special Session on Children specified the need to improve care for pregnant adolescents, and set a goal to ensure that the reduction of maternal and neonatal morbidity and mortality is a health sector priority. They declared that women, particularly adolescent expectant mothers, should have ready and affordable access to essential obstetric care, well equipped and adequately staffed maternal health care services, skilled attendance at delivery, emergency obstetric care, effective referral and transport to higher levels of care when necessary, postpartum care and family planning in order to promote safe motherhood (UNGASS 2002).

## **1.2 Adolescent pregnancy and the associated risk for adverse obstetric outcomes**

Pregnancy takes a tremendous toll on the body, even in adult women. Adolescent pregnancies pose additional health risks to both the mother and the baby. Often, adolescents do not receive timely prenatal care, and they have a higher risk for anaemia, malaria, HIV and other sexually transmitted infections, obstructed and prolonged labour, fistula, postpartum haemorrhage, mental disorders such as depression as well as pregnancy-related high blood pressure and its complications (Treffers 2004). Pregnant adolescents are also more likely to smoke and drink alcohol than are older women, which can cause further problems for the child prenatally and after birth. Due to the high rates of HIV/AIDS among adolescent women, children born to young mothers have an increased risk of being born with the virus (USAID 2009). Studies have shown rates of new born death to average about 50% higher to adolescent mothers when compared to mothers in their 20s (WHO 2008). Furthermore, children whose mothers die are three to 10 times more likely to die (WHO 2005).

Obstructed labour is especially common among young, physically immature women giving birth for the first time. Those who do not die from unrelieved obstructed labour may suffer from fistula, a hole in the birth canal that leaves them incontinent and often social outcasts (UNFPA 2004). Up to 65% of women with obstetric fistula develop this as adolescents (Neelofur-Khan, 2007). The prevalence of this serious morbidity is particularly high in sub-Saharan Africa. High figures have

been reported in Chad, Ethiopia, Nigeria and Sudan. The etiology in almost all cases is neglected obstructed labour (Treffers 2004).

For both physiological and social reasons, mothers aged 15 to 19 are twice as likely to die in childbirth as those in their 20s, and girls under age 15 are five times as likely to die as women in their 20s (UNFPA 2009). Complications of childbirth and unsafe abortions are major factors leading to death in adolescents. Women aged 15-19 account for at least one fourth of the estimated 20 million unsafe abortions and nearly 70,000 abortion-related deaths each year (Graczyk 2007). Lema and others in their study on maternal mortality at The Queen Elizabeth Central Teaching Hospital in Malawi found that the majority of maternal deaths were among those aged 15 - 24 years (Lema et al 2005). A study in Mozambique (Granja et al, 2001) showed similarly worrying findings. The most prevalent causes of death in adolescents were malaria and pregnancy-induced hypertension/eclampsia.

Immediate risks for the babies of adolescent mothers include asphyxia, low birth weight and premature birth thus facing an increased risk of new born health problems. Babies of adolescent mothers also face long-term disabilities and even death. In the first week of life, it has been observed that stillbirths and deaths are 50% higher among babies born to mothers younger than 20 years than among babies born to mothers 20–29 years old. Deaths during the first month of life are 50–100% more frequent if the mother is an adolescent, and the younger the mother, the greater the risk (WHO 2007). Several studies (Conde-Agudelo et al., 2005; Granja et al., 2001; Liran et al., 2012) have concluded that teenage pregnancy is a risk factor for Low Birth Weight (LBW) (<2500 grams), Pre-term Delivery (PTD) (<37 weeks gestation), Eclampsia, foetal death, anaemia, congenital deformities, small for gestational age (SGA) infants and early neonatal death mainly associated to problems of preterm delivery and LBW.

### **1.3 The maternal age versus confounding argument for adverse outcomes**

The role of maternal age and its effect on adverse obstetric outcomes has been the subject of ongoing controversy with some studies showing that the associations of adverse perinatal outcomes in adolescents had been confounded mainly by lack of or inadequate prenatal care and other socio-cultural characteristics. For instance, Tsikouras and others in their study on pregnancy outcome in adolescents found that in most of the cases, deliveries were not complicated. They concluded that teenage pregnancy generally should not be considered as a high risk situation, as long as it is planned and followed with the normal routines of prenatal care. (Tsikouras et al, 2012). A nested case-control study from Bangladesh by Ronsmans and others evaluated risk factors for maternal deaths and found that, compared with women aged 20 to 29 years, mothers aged 15 to 19 years had a 65% increased risk of death after adjustment for inter-pregnancy interval, area of residence, maternal education, religion, and year of birth (Ronsmans et al, 1999).

In contrast, a study from Ethiopia by Kwast and Liff that controlled for the effect of antenatal care, income, occupation, marital status, and parity did not find statistically significant increase in the risk of maternal death among young adolescents compared with mothers aged 25 to 29 years (Kwast and Liff, 1988). In Israel, Liran et al. (2012), conducted a study to investigate teenage pregnancy outcomes while controlling for lack of prenatal care (LOPC) and the socio-cultural context of teenage pregnancy. They found that young maternal age, adjusted for prenatal care and ethnicity, was a significant risk factor for both pre-term delivery (PTD) and low birth weight (LBW), but not for perinatal mortality.

Therefore, it is not clear whether adverse pregnancy outcomes are related to maternal age or to other factors such as lack of prenatal care, education level, poverty, smoking/alcohol use, as well as single parenting (Liran et al, 2012).

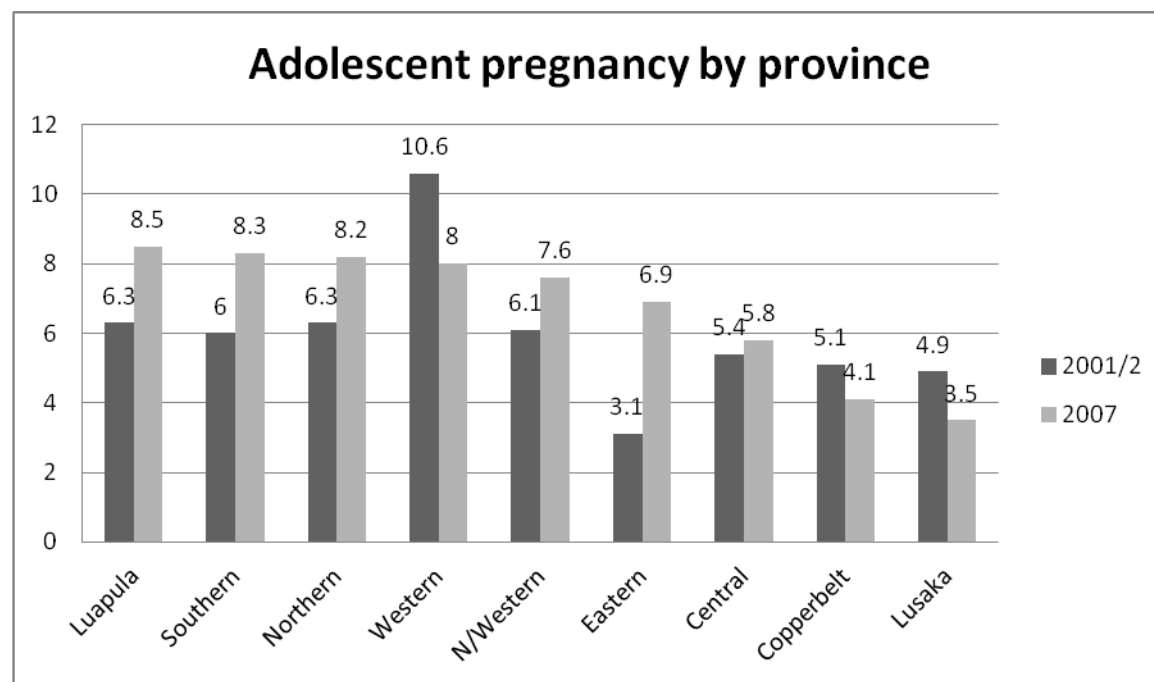
## Chapter 2: Adolescent pregnancy in Zambia

### 2.1 Statement of the Problem

Among the Zambian population age 25-49, the average age at first sexual intercourse is 17.9 years for men and 17.2 years for women. About three in ten young women aged 15-19 have begun childbearing, that is, they have given birth already or are currently pregnant with their first child. (CSO 2009). Adolescent pregnancy continues to be a public health problem in Zambia with levels of adolescent pregnancies being as high as 35% in rural areas compared with 20% in urban areas; Luapula in particular had 32.1% adolescent pregnancies (CSO 2009).

Zambia's Adolescent birth rate (ABR) is 141.2 (CSO 2014) which is extremely high compared to the global average of 53 per 1000 (World Bank 2012). According to the 2007 DHS survey (CSO, 2009), at sub-regional level, Luapula province reported the highest rate of first time adolescent pregnancy (8.5%) while Lusaka had the lowest at 3.5%.

Figure 1: Adolescent pregnancy by province



There is a strong correlation between the maternal mortality ratio and adolescent fertility rate; it has been shown that countries with high maternal mortality ratios are generally those countries with high adolescent fertility rates (Rosen, 2010). In developed countries, the maternal mortality rates are so low that age-specific rates are not easily available. On the other hand, developing countries have a much higher maternal mortality. Zambia's maternal mortality ratio, for instance, currently stands at 398 deaths per 100,000 live births (Central Statistical Office, 2014). The proportion of adolescent deaths contributing to this figure, however, has not been specifically documented. This is because in developing countries it is difficult to attain reliable age-specific data in a well-defined population as most data are hospital-based, and the population from which they are derived remains unknown (Treffers, 2004).

According to the Ministry of Health (MoH), unsafe abortions are one of the top five causes of maternal mortality in Zambia. Approximately 30% of maternal deaths are due to unsafe abortions. Induced abortions in girls younger than 18 years account for 25% of maternal deaths (ZDHS 2007). In a 1998 country profile by the Central Statistics Office (CSO), it was shown that in Zambia around 80% of women admitted to health care facilities with complications from induced abortions were younger than 19. Many abortion-related deaths occur outside of these health institutions and usually go unreported. Ironically, Zambia has one of the most liberal abortion laws in southern Africa, but most women and health care providers are unaware of the legality and availability of abortion services. The 1972 Termination of Pregnancy Act allows access to safe abortion on medical or social grounds. Three physicians should approve the procedure, which must be performed at a clinic or hospital. In rural areas, each clinic has one health practitioner who uses his or her discretion to perform abortions. The client takes a chance because, should complications arise, the clinic may be unable to respond adequately (Geloo, 2003).

It has been established that maternal age is a key determinant of child survival. According to available data, the lower the mother's age, the higher the likelihood that her child will die before age five. For instance, the infant mortality rate for children born to mothers who were less than 20 years old at the time of the survey is 100 per 1,000 live births, compared with 78 per 1,000 live births for children whose mothers were 20-29 years old (ZDHS 2007).



The perinatal mortality rate for Zambia as a whole is 38 deaths per 1,000 pregnancies. Perinatal mortality is higher among children of mothers younger than 20 years but tends to decrease with increasing length of birth intervals. Mothers with a secondary education are the least likely to experience a perinatal death (24 deaths per 1,000 pregnancies); however, mothers with more than secondary education are the most likely to experience a perinatal death (67 deaths per 1,000 pregnancies) (ZDHS, 2007).

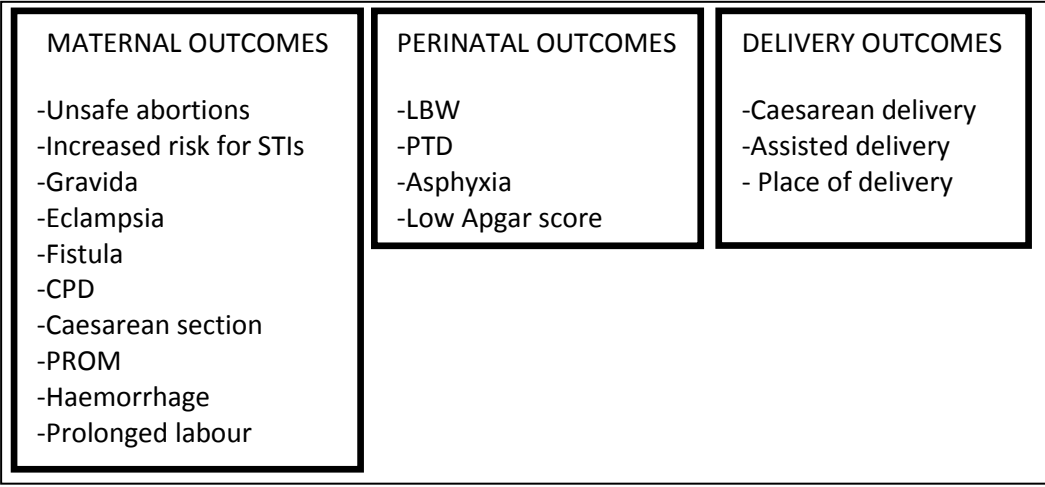
## 2.2 Proximate Determinants Framework

Socio-economic and demographic determinants

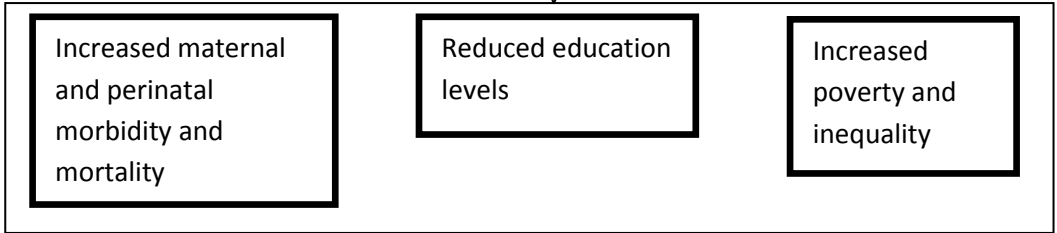
Early sexual debut, early marriages, unintended pregnancies; Poor child spacing, Health seeking behaviour, Education, Poverty, Access to health facilities and contraception.



Proximate determinants



Outcomes



## **2.3 Government policy interventions to address adolescent reproductive health**

More than one-third of women in Zambia have given birth by age 18 and more than half by age 20. Twenty-nine percent of adolescent women aged 15-19 are already mothers or pregnant with their first child (CSO, 2014). The situation is so dire that the Zambian Government has put in place policies that allow adolescents access to a full range of sexual and reproductive health services, including condoms and other means of contraception. One such policy is the National Population Policy. Among its main objectives is the reduction of the high levels of fertility, particularly adolescent fertility (Ministry of Finance and National Planning, 2007). Other policies put in place by the government to ensure the promotion of adolescent health include the National Youth Policy and the National Reproductive Health Policy. The concept of adolescent friendly health services (ADFHS) introduced by WHO to define appropriate and convenient health services for adolescents has not been fully implemented in Zambia. Some facilities have youth friendly corners established which serve as entry points of access to care. Although these offer similar services to ADFHS, they target youths as a whole, which comprise different age groups with different health needs and as such adolescents' needs are not specifically targeted. (Ministry of Health, 2011)

## **2.4 Significance of the study**

Adolescent pregnancy plays a crucial role in maternal and perinatal health; improvements in reproductive health cannot be complete without improvements in adolescent health. According to current statistics, Zambia's maternal and perinatal mortality rates are amongst the highest in the region. It is hoped that the findings of this study will highlight the high levels of adolescent maternal and perinatal mortality and morbidity in Luapula province and assist in the promotion of programs and policies advocating for the improvement of adolescent maternal-perinatal health as well as to build on the currently available literature.

## **2.5 Research aim:**

The aim of this study is to evaluate the obstetric outcomes of adolescent pregnancies in Kawambwa and Mansa districts of Luapula Province, Zambia.

## **2.6 Research objectives**

1. To determine the association between adolescent pregnancy and adverse obstetric outcomes.
2. To investigate the maternal-perinatal morbidity and mortality rate associated with adolescent pregnancy in Mansa and Kawambwa districts of Luapula province, Zambia.

## **Chapter 3: Methodology**

### **3.1 Study Setting**

Luapula province is located in the northern part of Zambia. It has 7 districts; the study was restricted to 2 districts- Mansa and Kawambwa. The research was based on secondary data collected from the 6 randomly selected health facilities - Mansa General Hospital, Senama Clinic, Buntungwa Clinic, Kawambwa Central Clinic, Mbereshi Mission Hospital and Kawambwa district hospital.

### **3.2 Population and sampling**

Luapula province has a population of 979,663 of which 457,653 are female and 455,576 are male. The target population was mothers aged between 10 and 24 years. The study population was mothers aged between 10 and 24 living in Mansa and Kawambwa districts of Luapula province, Zambia.

#### **3.2.1 Inclusion/Eligibility Criteria**

Inclusion in the study group was restricted to women aged between 10 and 24 years who gave birth between January 2012 and January 2013. Adolescent mothers were categorized into 3 groups: 10-15 years, 16-17 years, and 18-19 years. A comparison group of 20-24 year old mothers served as the reference group for use in all comparisons in order to assess the association between maternal age and adverse maternal and perinatal outcomes. This age group was considered because it is generally regarded as safe for childbirth and is the peak child bearing age group.

#### **3.2.2 Exclusion Criteria**

Twin pregnancies were excluded from the study; only singleton deliveries were considered in order to eliminate any confounding caused by twin pregnancy.

### 3.2.3 Sample Size

The sample size was calculated using the following prevalence formula

$$N = \frac{Z^2 \times P(1 - P)}{(d)^2}$$

Where

N = sample required

Z =Z statistic =1.96 (95% C I)

P= expected prevalence 0.321 (assuming 32.1% of births were to adolescent mothers)

d= Acceptable accuracy range (precision) 0.05

Therefore  $N > \frac{(1.96)^2 \times 0.321(1-0.321)}{(0.05)^2}$

> **335cases**

## 3.3 Study Design

### 3.3.1 Data Extraction

This was a 12 month cross sectional study of all deliveries that took place between January 2012 and January 2013. Data was extracted from the ANC and delivery registers at selected health facilities across the two districts included in the study. Only complete records were considered. Of the 2795 complete records reviewed, 1291 were adolescent mothers.

The variables analysed were maternal age and adverse obstetric outcomes. Maternal age was defined as the age of the mother in completed years at the time of delivery. The maternal outcomes evaluated were eclampsia, fistulae, premature rupture of membranes (PROM), cephalopelvic disproportion (CPD), Caesarean section, anaemia, haemorrhage, sepsis, prolonged labour and maternal death. The perinatal outcomes evaluated were LBW (live infant weighing <2500g at birth), preterm delivery (live infant delivered at <37 weeks' gestation),

neonatal death (still birth or death occurring during the first 7 days of life), asphyxia and low Apgar scores (<7) at 5 minutes.

The potential confounding factors considered in the logistic regression analysis were gravida, marital status, number of antenatal visits and place of delivery. Gravida was taken to be the number of pregnancies, including current pregnancy, regardless of whether the pregnancies were carried to term. Marital status was dichotomized between those who had a partner and those who did not have a partner. Antenatal visits were categorised as either poor (no visits), fair (1-2 visits) or good (3-4 visits). The place of delivery was categorised as either having delivered at a health facility or away from the facility.

### **3.3.2 Data analysis**

The analysis was carried out using Stata version 11.0. The rates of adverse obstetric outcomes were calculated for each maternal age group. Estimates of the odds ratio (OR) with 95% CI were computed as measures of association between each maternal age group and adverse pregnancy outcomes under consideration. Logistic regression models were used to control for potential confounding and to derive the adjusted ORs (aORs). Both unadjusted and adjusted odds ratios were reported.

### **3.5 Ethical Consideration**

Clearance was sought from the University of Zambia Biomedical Research Ethics Committee (UNZABREC). Permission was also obtained from the Ministry of Health (MoH) office of the Provincial Medical Officer, Luapula Province to carry out the study at the named sites.

The study used secondary data and no contact was made with the participants. Anonymity and confidentiality was maintained by ensuring that no patient names appeared in the research findings; the information collected from the patient records was recorded anonymously and used purely for academic purposes. Only the researcher had access to the patient records and no records were removed from the health centres.

## Chapter 4: Results

In total, 2,795 delivery records were reviewed, of which 3% (n=81) were 10-15 year olds, 14% (n=396) were 16-17 year olds, 29% (n=814) were 18-19 year olds and 54% (n=1,504) were 20-24 year olds (reference group). Mbereshi Mission Hospital had the highest proportion of adolescent pregnancies at 50.7%. The mean age of the adolescent mothers was 17.5years. Table 1 below shows the distribution of adolescent births by facility.

**Table 1: Distribution of births to adolescent mothers by facility**

	<b>FACILITY</b>	<b>TOTAL NO. OF RECORDS REVIEWED</b>	<b>NO. OF BIRTHS TO ADOLESCENT MOTHERS</b>	<b>% OF ADOLESCENT MOTHERS</b>	<b>MEAN AGE OF ADOLESCENT MOTHERS</b>	<b>SD</b>
1	Buntungwa Clinic	507	234	46.2%	17.6	1.53
2	Kawambwa Central Clinic	429	183	42.7%	17.4	1.02
3	Kawambwa District Hospital	501	247	49.3%	17.3	1.20
4	Mansa General Hospital	744	344	46.2%	17.5	1.08
5	Mbereshi Mission Hospital <sup>1</sup>	142	72	50.7%	17.4	1.30
6	Senama Clinic	472	211	44.7%	17.8	0.91
	<b>TOTAL</b>	<b>2795</b>	<b>1291</b>	<b>46.2%</b>	<b>17.5</b>	<b>1.58</b>

<sup>1</sup> Mbereshi Mission Hospital was under Kawambwa District until 2014 when it was reassigned to Nchelenge District.

## 4.1 Maternal characteristics by age group

According to the ANC registers, the ratio of girls with a partner to those without a partner increased with age; 46.9% of those aged 10-15 reported having a partner compared to 71.8% of 15-16 year olds, 84.2% of 18-19 year olds and 94.2% of 20-24 year olds. The majority (97.1%) of adolescents aged 10-15 were gravida 1. Among those aged 16-17 years, 92.2% were gravida 1 with only 0.9% recorded as gravida 3. Similarly, among adolescents aged 18-19 years, the majority (77.8%) were gravida 1 while only 0.2% were gravida 5. Those in the reference group ranged from 32.5% in gravida 1 to 0.15 in gravida 8, with the highest proportion (45.6%) being gravida 2. On average, most pregnant adolescents attend at least 1 to 2 antenatal visits during their pregnancy. Less than 5% of all age groups, both adolescent and adult, under consideration failed to attend at least 1 antenatal visit. Most adolescent mothers opt to deliver from a health facility- 100% of those aged between 10 and 17, and up to 97.3% of 18-19 year olds.

**Table 2: Maternal characteristics by age group**

	<b>Maternal age group</b>				
	10-15	16-17	18-19	All Adolescents	20-24
<b>Marital Status (N=1390)</b>					
Partner	15(46.9%)	130(71.8%)	336(84.2%)	481(78.6%)	733(94.2%)
No Partner	17(53.1%)	51(28.2%)	63(15.8%)	131(21.4%)	45(5.8%)
<b>Gravida (N=2244)</b>					
1	68(97.1%)	306(92.2%)	519(77.8%)	893(83.5%)	382(32.5%)
2	2(2.9%)	23(6.9%)	124(18.6%)	149(13.9%)	536(45.6%)
3	0(0.0%)	3(0.9%)	20(3.0%)	23(2.2%)	168(14.3%)
4	0(0.0%)	0(0.0%)	3(0.4%)	3(0.3%)	60(5.1%)
5	0(0.0%)	0(0.0%)	1(0.2%)	1(0.1%)	18(1.5%)
6	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	9(0.8%)
7	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	1(0.1%)
8	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	1(0.1%)
<b>Antenatal care (N=1403)</b>					
Poor	0(0.0%)	6(3.2%)	10(2.5%)	16(2.6%)	9(1.2%)
Fair	20(62.5%)	123(65.8%)	262(64.2%)	405(64.6%)	524(67.5%)
Good	12(37.5%)	58(31.0%)	136(33.3%)	206(32.8%)	243(31.3%)
<b>Place of Delivery</b>					
Out of Hospital	0(0.0%)	0(0.0%)	6(2.7%)	6(1.7%)	3(0.8%)
Hospital	22(100%)	102(100%)	214(97.3%)	338(98.3%)	397(99.2%)



## 4.2 The association between maternal age and adverse obstetric outcomes

Mothers under the age of 16 years were found to have the highest rates of eclampsia, haemorrhage, CPD, prolonged labour and caesarean section compared to their older counterparts. With regards perinatal outcomes, rates of LBW, pre-term delivery and low Apgar score were highest among mothers aged 10-15 years. Significant association was found between maternal age and eclampsia, fistulae, Cephalopelvic disproportion (CPD), Caesarean section, low birth weight (LBW) and perinatal mortality. However, there was no association between maternal age and prolonged labour, anaemia, haemorrhage, sepsis, PROM, maternal death, preterm delivery, asphyxia and low Apgar scores. The maternal and perinatal outcomes with corresponding p values are listed in Table 3 below.

**Table 3: Rates of adverse obstetric outcome by maternal age group.**

	Maternal age group				p value
	10-15	16-17	18-19	20-24	
<b>Maternal Outcomes</b>					
Eclampsia	10(23.8%)	1(0.5%)	4(1.1%)	5(0.8%)	<0.001
Anaemia	0(0.0%)	2(1.0%)	3(0.8%)	2(0.3%)	0.513
Haemorrhage	3(6.0%)	2(0.8%)	9(1.8%)	16(1.8%)	0.089
Sepsis	0(0.0%)	2(1.0%)	4(1.0%)	4(0.6%)	0.751
Fistulae	0(0.0%)	0(0.0%)	4(1.8%)	19(4.8%)	0.032
PROM <sup>2</sup>	0(0.0%)	1(1.0%)	4(1.8%)	4(1.0%)	0.767
CPD <sup>3</sup>	11(36.7%)	29(18.6%)	39(10.6%)	64(9.7%)	<0.001
Prolonged labour	3(7.1%)	8(4.2%)	19(5.3%)	25(3.8%)	0.576
Caesarean section	25(43.9%)	70(26.6%)	125(22.6%)	187(19.0%)	<0.001
Maternal death	0(0.0%)	2(2.0%)	2(0.9%)	8(2.0%)	0.682
<b>Perinatal outcomes</b>					
Low birth weight	12(17.1%)	52(15.7%)	103(14.6%)	140(11.1%)	0.035
Pre-term delivery	2(5.4%)	9(5.2%)	15(3.6%)	18(2.5%)	0.239
Asphyxia	0(0.0%)	2(1.3%)	7(1.9%)	4(0.6%)	0.248
Low Apgar score	9(15.8%)	38(14.4%)	61(11.0%)	92(9.3%)	0.062
Neonatal death	4(7.0%)	7(2.7%)	38(6.9%)	39(4.0%)	0.018

<sup>2</sup> PROM=Premature Rapture of membranes

<sup>3</sup> CPD=Cephalopelvic disproportion

### **4.3 Logistic Regression models of risk factors for adverse obstetric outcomes in adolescent mothers**

Adolescent mothers were found to face higher odds for eclampsia, anaemia, haemorrhage, sepsis, cephalo-pelvic disproportion, prolonged labour and caesarean section but not for fistulae, PROM and maternal death. The odds of anaemia and sepsis were higher in older adolescents (16-19). Young maternal age was associated with higher odds for low birth weight, asphyxia, pre-term delivery, low Apgar score and neonatal death; the odds for asphyxia, however, tended to increase with maternal age.

Logistic regression models were used to control for the selected confounders and to derive the adjusted ORs (aORs). These are shown in table 3 and 4 below. When adjusted for confounding, the association between maternal age and adverse obstetric outcome diminished. Mothers aged 10-15 had higher odds of eclampsia, CPD, and prolonged labour, whereas those aged 16-19 had higher odds of anaemia, PROM and maternal death. Children born to mothers younger than 18 had higher odds of having LBW.

**Table 4: Logistic regression models of risk factors for adverse maternal outcomes<sup>4</sup>**

Maternal outcomes	Maternal age group	Crude Odds ratio (95% CI)	Adjusted Odds ratio (95% CI)
Eclampsia (N=1245)	10-15	40.563 (13.094-125.651)	30.503 (7.802-119.247)
	16-17	0.683 (0.079-5.883)	0.459 (0.049-4.312)
	18-19	1.467 (0.391-5.497)	0.179 (0.019-1.697)
Anaemia (N=1245)	10-15	0.000 (0)	0.000(0)
	16-17	3.450 (0.483-24.652)	7.645(0.439-133.114)
	18-19	2.755 (0.458-16.563)	1.252 (0.093-16.765)
Haemorrhage (N=1717)	10-15	3.586 (1.010-12.739)	0.071 (0)
	16-17	0.463 (0.106-2.025)	0.000 (0)
	18-19	1.015 (0.446-2.315)	0.022 (0.001-0.437)
Sepsis (N=1387)	10-15	0.000 (0)	0.466 (0)
	16-17	1.739 (0.316-9.561)	0.475(0)
	18-19	1.796 (0.447-7.218)	0.250(0.013-4.729)
Fistulae (N= 744)	10-15	0.000 (0)	<sup>5</sup> 0.000 (0)
	16-17	0.000 (0)	0.000 (0)
	18-19	0.371 (0.125-1.106)	0.000 (0)
PROM (N=744)	10-15	0.000 (0)	0.000(0)
	16-17	0.980 (0.108-8.865)	1.804 (0.175-18.588)
	18-19	1.833 (0.454-7.404)	0.712 (0.108-4.685)
CPD (N=1216)	10-15	5.401 (2.461-11.852)	1.604 (0.721-3.569)
	16-17	2.130 (1.320-3.438)	0.687 (0.416-1.136)
	18-19	1.102 (0.724-1.678)	0.471 (0.301-0.736)
Prolonged labour (N=1245)	10-15	1.488 (0.432-5.126)	2.569 (0.710-9.289)
	16-17	0.345 (0.119-0.995)	0.397 (0.136-1.155)
	18-19	0.862 (0.479-1.552)	0.928 (0.512-1.682)
Caesarean section (N=1859)	10-15	3.334 (1.930-5.760)	0.082 (0.011-0.616)
	16-17	1.548 (1.128-2.124)	0.124 (0.044-0.355)
	18-19	1.243 (0.964-1.605)	0.048 (0.015-0.151)
Maternal death (N= 744)	10-15	0.000 (0)	0.000 (0)
	16-17	0.980 (0.205-4.687)	1.242 (0.251-6.142)
	18-19	0.449 (0.095-2.136)	0.207 (0.031-1.386)

OR=1 exposure does not affect odds of outcome

OR>1 exposure associated with higher odds of outcome

OR<1 exposure associated with lower odds of outcome

<sup>4</sup> The covariates included in the logistic regression model were marital status, gravida, place of delivery and ANC

<sup>5</sup> The potential confounders were not significantly associated ( $p>0.05$ ) with maternal age and fistulae

**Table 5: Logistic regression models of risk factors for perinatal outcomes<sup>6</sup>**

Perinatal outcomes	Maternal age group	Crude Odds ratio (95% CI)	Adjusted Odds ratio (95% CI)
Low birth weight (N=2366)	10-15	1.652 (0.866-3.152)	1.418 (0.417-4.826)
	16-17	1.483 (1.051-2.092)	1.455 (0.811-2.611)
	18-19	1.364 (1.038-1.792)	0.771 (0.461-1.287)
Pre-term delivery (N=1358)	10-15	2.263 (0.505-10.142)	0.463 (0.038-5.627)
	16-17	2.161 (0.954-4.895)	0.376 (0.078-1.815)
	18-19	1.482 (0.739-2.972)	0.435 (0.119-1.596)
Asphyxia (N=1216)	10-15	0.000 (0)	0.000 (0)
	16-17	2.133 (0.387-11.755)	0.717 (0.051-10.048)
	18-19	3.176 (0.924-10.926)	0.361 (0.028-4.706)
Low Apgar score (N=1859)	10-15	1.820 (0.865-3.828)	0.034 (0.002-0.401)
	16-17	1.639 (1.093-2.458)	0.263 (0.097-0.710)
	18-19	1.201 (0.853-1.690)	0.087 (0.030-0.249)
Neonatal death (N=1358)	10-15	1.831 (0.631-5.313)	0.000 (0)
	16-17	0.663 (0.293-1.500)	0.000 (0)
	18-19	1.786 (1.128-2.828)	0.025 (0.002-0.265)

OR=1 exposure does not affect odds of outcome

OR>1 exposure associated with higher odds of outcome

OR<1 exposure associated with lower odds of outcome

<sup>6</sup> The covariates included in the logistic regression model were marital status, gravida, place of delivery and ANC

## Chapter 5: Discussion

The population under consideration for this study allowed for a comparison of adolescent and adult obstetric outcomes, something few studies have done. The large sample size allowed for evaluation of the relationship between young maternal age and adverse pregnancy outcomes; the large number of individuals available for evaluation made it possible to divide the study population into subgroups with sufficient numbers in each stratum to provide high statistical power. Controlling for confounding factors and the relatively homogeneous population of women studied further strengthen the findings of this study. Unlike most studies on adolescent pregnancy which focus on adolescents aged 15 to 19 years, - with information about pregnancy at younger ages usually only appearing in aggregate statistics -, this study considered very young maternal age (10-15 years). Data was obtained from the ANC and delivery registers, which consisted of information recorded during ANC visits and immediately following delivery respectively. The hospital data in some cases was incomplete or in other cases missing. Information on the place of delivery was only available at Mansa General Hospital. As such the information on deliveries taking place in homes or enroute to a delivery facility was scanty at best. The study did not take into consideration socio economic indicators such as education and employment status as well as behavioural risk factors such as maternal smoking and alcohol consumption.

The adolescent birth rate was found to be 461.9 per 1000 deliveries to mothers aged between 10 and 24 years, which is higher than the national average. This is not surprising given that literature has shown that among rural and poor populations the rates of adolescent pregnancy do tend to be higher. The majority (69.2%) of all the adolescent mothers were in their first pregnancy. The youngest mother in the study population was 11 years old at the time of delivery.

The findings demonstrate a clear trend of higher risk of adverse outcomes, particularly in mothers below 16 years. Given that adolescent mothers are more likely than older mothers to have sociodemographic characteristics associated with adverse outcomes of pregnancy, the confounding effects of marital status, gravida, adequacy of antenatal care and place of delivery were eliminated. The analysis performed confirmed the influence of these confounding factors on reproductive outcomes.

Eclampsia in adolescents is of critical importance considering the untimely access and usage of ANC services which can be used to monitor and manage the condition (Treffers, 2004). If left unchecked, eclampsia poses significant risks to both the mother and baby and can lead to death. According to the findings of this study, adolescent mothers were forty times more likely to develop eclampsia compared to the reference group of mothers aged 20-24 years. Even after adjustment for confounders, mothers aged 10-15 were still at a 30 times higher risk than those in the reference group. This is in line with the findings of other studies (Kongnyuy et al., 2008; Zabin et al., 1998; Arora et al, 1994). It was noteworthy to find that most adolescents do not attend the prescribed 3-4 ANC visits during their pregnancy; at most, they attend an average of 1-2 visits. Given that adolescent pregnancy has been shown to be high risk, this is far from ideal.

Furthermore, young maternal age was found to be a risk factor for haemorrhage. This may be attributed to an increased risk of placenta abruption in younger mothers (Ananth et al, 1996). Haemorrhage has been shown to be dangerous, particularly in adolescent mothers presenting with anaemia (Bilano et al, 2014). This study also found that younger mothers are five times more at risk for CPD than older mothers. In a similar study (Chahande et al, 2002), adolescent mothers had an almost nine times higher risk for CPD than those above 20 years. CPD has been linked to the immaturity of the pelvic bones and birth canal in younger mothers. This immaturity has also been linked to increased risk of prolonged and obstructed labour, episiotomy, and use of forceps (Zabin et al, 1998).

The study also showed an increased risk for prolonged labour and caesarean section before adjustment for confounding. This data is in line with findings of other studies (Conde-Agudelo et al, 2005; Wadhawan et al, 1982). Caesarean sections today are a timely operative procedure that often save the lives of mothers and babies. Available literature on caesarean sections in adolescents is conflicting with some studies (Bozkaya et al, 1996; Unfer et al,1995) reporting higher rates among adolescents and other reporting lower or similar rates in adolescents compared to older mothers (Yadav et al, 2008; Hidalgo et al, 2005). This makes it difficult to draw a clear conclusion, especially given that indications for a caesarean section are quite subjective among obstetricians. Caesarean sections have been linked to intra- and post-operative complications such as placenta previa and placenta accreta, hysterectomy, and bladder and bowel injury (Clark and Silver, 2011)

Very little information was available on the levels of fistulae. The complete number of fistulae cases were hard to detect as the only centre in the province where women can access treatment on a regular basis is Mansa General Hospital. Women from all over the province with this condition have to wait for indefinite periods to get access to the service. Some patients are lost to follow up due to being referred from one hospital to another, and in cases where funds are unavailable, this is at their own expense. For the period January 2012 to December 2012, 23 women underwent corrective surgery for Fistulae. Of these, 19 were between 20 and 24, and 4 were aged 18-19 years. The available data, however, does not indicate when the condition developed and is in no way representative of the complete picture.

The maternal mortality rate among adolescent mothers was 5 deaths per 1, 000 live births. In comparison to the findings of a previous study in Mansa (Nkata, 1997), this shows a marked decrease in reported mortality, possibly as a result of policies and intervention introduced in the early 2000s to address the high levels of maternal mortality in the country. There was no marked difference in the mortality among adolescent mothers and those aged 20-24years; both age groups recorded a 2% mortality rate. According to the findings of this study, older adolescents (above 15years) were more at risk for maternal death compared to those aged 10-15 years. This can be attributed to the increased risks of eclampsia, haemorrhage, and prolonged labour. Literature further supports these findings and has shown that the increased risk of maternal death in adolescent mothers has been linked to complications during and following pregnancy and childbirth. These include eclampsia, haemorrhage, sepsis and unsafe abortions. Other complications may exist before pregnancy but are exacerbated during pregnancy. A woman's lifetime risk of maternal death – the probability that a 15 year old woman will eventually die from a maternal cause – is 1 in 3700 in developed countries, compared to 1 in 160 in developing countries (WHO 2014).

Literature has shown that adolescent mothers continue to grow during pregnancy and are therefore in competition with the developing foetus for nutrients, to the detriment of the foetus (Scholl et al, 1994). According to the findings of this study, compared with infants born to mothers aged 20 to 24 years, those born to women aged 15 years or younger were almost twice as at risk of low birth weight. They were also faced with a higher risk of pre-term delivery, low Apgar score and neonatal death. These findings are in line with those of other studies (Gupta et al, 2008; Fraser et

al, 1995; Derme et al, 2013). It has been suggested that the higher incidence of low birth weight among adolescent mothers is likely linked to pre-term delivery (Scholl et al, 1989). Notwithstanding, the risk diminished when it was adjusted for confounders, suggesting that the increased risk of early pre-term delivery, low Apgar score and neonatal death among the youngest adolescents can almost entirely be explained by the access to ANC, place of delivery, partner status and gravida. Only low birth weight remained a risk factor for young maternal age even with the effect of confounding. This has been shown to be as a result of the competition for nutrients between the growing mother and the foetus, and may also be attributed to inadequate weight gain during the pregnancy (Casanueva et al, 2006; Naeye, 1981). However, this was not taken into consideration during this study.

The neonatal mortality rate among adolescents was 36 deaths per 1,000 live births. Neonatal death was highest among very young mothers (10-15 years old) with 7% mortality recorded, almost double that found among mothers aged 20-24 years. Previous investigations of perinatal mortality in adolescent pregnancy have produced conflicting results. Some studies (Conde-Agudelo et al, 2005; Zabin et al, 1998) have found an increased risk of neonatal mortality among adolescent mothers, whereas others (Smith et al, 2001; Satin et al, 1994) found no increase.

The high prevalence of adolescent births in the region is likely as a result of the rural setting where high poverty levels and lower educational levels are the order of the day, with 64.91% of the population living in abject poverty, 83.8% literacy rates among 15-24 year olds and a ratio of 0.74 girls to boys in secondary education (UNDP 2013). Out of 2795 records reviewed, births to adolescent mothers accounted for 46% of deliveries. The number of adolescents reporting having a partner during ANC was alarming, with as many as 46.9% of 10-15 year olds registered as married in the ANC registers. According to the UN Population Agency (UNFPA 2010), early and forced marriages are common place in Luapula Province, with an estimated incidence of 70% early pregnancy and under-age marriage among adolescents. An exemplary leader is Chief Mushota of Kawambwa district who has put in place punitive measures to dissuade parents from pulling their adolescent daughters out of school and marrying them off, which is especially common when girls fall pregnant.

Despite the numerous efforts of government, UNFPA and other stakeholders as well as programs such as Saving Mothers Giving Life, there is still a clear and pressing need for continued advocacy



against teenage marriage both at government level and community level as well as at reproductive health centres and schools. One of the major challenges facing provision of adolescent health services in Zambia is financing. Currently, youth friendly services do not receive budgetary allocations from MOH, even though these activities are included in the action plans and budgets, and therefore when funds are disbursed, adolescent health activities are not prioritised. The SMGL program was piloted in Zambia in 2012. It is an intensive effort to strengthen health services focused on the critical period of labour, delivery and the first 48hours post-partum. Since its launch, the efforts of SMGL have helped improve maternal health outcomes in Zambia. UNFPA launched its manual for healthcare providers from low-and middle-income countries involved in the prevention and management of fistula in August of 2011, prior to which Zambia did not have a standard training manual. According to the 2014 ZDHS (CSO, 2014), less than 1 percent of women report experiencing fistula-like symptoms, with three-quarters of these women reporting that their symptoms began following a delivery. In 53 percent of the cases, the women reported that they began after a very difficult labour. The survey also highlighted the very small numbers of women that report having fistula-like symptoms.

It can, therefore, be inferred from the study findings that young maternal age is a risk factor for adverse obstetric outcomes especially in the absence of antenatal care, the lack of support of a partner, and depending on gravida and the place of delivery.

## **Chapter 6: Conclusion and Recommendations**

Pregnancy in adolescents has been shown to be linked to high-risk for obstetric outcomes. Debate around the role of socio-behavioural factors and the intrinsic age-related risks in adolescent pregnancy continues to this day. The findings of this study provide support that adolescent pregnancy, especially in mothers younger than 16 years, increases the risk of adverse obstetric outcomes. Other than figures documenting the high adolescent birth rate, Zambia does not currently have age specific statistics on adolescent maternal and perinatal morbidity and mortality that would adequately highlight this problem. Efforts to curb the high number of adolescent pregnancies through policy initiatives as well as reproductive health education and better prenatal and obstetric care targeted at adolescents have been shown to play a major role in reducing overall maternal and perinatal morbidity and mortality rates.

Despite numerous efforts and interventions around adolescent health, adolescent pregnancy and its associated adverse outcomes continue to be a problem in the province. The high levels of adolescent pregnancy in the province are likely as a result of the predominantly rural and poor population. Given this trend, it would be imperative to tailor interventions to reduce unintended pregnancies and address adolescent health needs to the specific population. Where possible, evaluations of these interventions that follow the adolescents into adulthood should be performed. One point of concern found during the study was that although most adolescents do attend antenatal care visits, these fall below the recommended number of ANC visits. Recognising the existence of avoidable factors that play a key role in the outcomes of adolescent pregnancies, such as access to antenatal care, must be the first step in designing and implementing intervention programmes.

Based on the findings from this study, the following recommendations are suggested:

1. Further research is required into the role of young maternal age as a risk factor for adverse obstetric outcomes as there is very limited information available currently. This will serve to influence policies and strategies targeted at adolescents.
2. Develop a strategic plan for adolescent health in Zambia as well the creation of a fully operational technical working group on adolescent health.
3. Strengthening of existing youth friendly health services to promote access of ANC for adolescent mothers. Possible options include separate parenting classes and counselling services specifically tailored for adolescent mothers.
4. Strengthening existing policies on teenage marriage as well as engagement of community leaders and chiefs to curb the culture will go a long way in ensuring girls stay in school and are empowered not only economically but also with regards to decisions about their reproductive health. An example can be learnt from Chief Mushota in Kawambwa who has put in place punitive measures to dissuade parents from marrying off their teenage daughters.
5. Increased awareness of the dangers of adolescent pregnancy and advocacy for abstinence can be achieved through community education programmes that encourage the delay of initiation of sexual intercourse, or improve the uptake and usage of contraceptives.
6. Given the low numbers of reported fistulae cases despite, conducting community sensitisation exercises to educate women on the signs and symptoms of fistula may encourage more women to come forward and seek care. Furthermore, the distinct lack of surgeons on hand to offer corrective surgery for the condition only serves to drive the sufferers into further despair and oblivion. Training and deployment of more gynaecologists to repair obstetric fistulae in the other hospitals in the Province as well as around the country, would make the service more accessible to the population.

## **References**

Ananth, C. V., Wilcox, A. J., Savitz, D. A., Bowes, W. A., and Luther, E. R. (1996) **Effects of maternal age and parity on the risk of uteroplacental bleeding disorders in pregnancy.** *Obstetric Gynaecology* **88**(4): pp511-516.

Arora R, Ganguli R, Swain S, Oumachigui A, Rajaram P. (1994) **Determinants of maternal mortality in eclampsia in India.** *Australian and New Zealand Journal of Obstetrics*; **34**(5): pp537–39.

Bilano V. L, Ota E, Ganchimeg T, Mori R, Souza J. P. (2014) **Risk Factors of Pre-Eclampsia/Eclampsia and Its Adverse Outcomes in Low- and Middle-Income Countries: A WHO Secondary Analysis.** *PLoS ONE* **9**(3): e91198.

Bozkaya H, Mocan H, Usluca H, Beser E, Gümüstekin D. (1996). **A retrospective analysis of adolescent pregnancies.** *Gynecologic and Obstetric Investigation.* **42**(3): pp146–150.

Casanueva, E., Roselló-Soberón, M. E., De-Regil, L. M., del Carmen Argüelles, M., and Céspedes, M. I. (2006). **Adolescents with adequate birth weight new-borns diminish energy expenditure and cease growth.** *The Journal of nutrition*, **136**(10); pp2498-2501.

Central Statistical Office (CSO), Ministry of Health (MOH), Tropical Diseases Research Centre (TDRC), University of Zambia, and Macro International Inc. (2009). **Zambia Demographic and Health Survey 2007.** Calverton, Maryland, USA: CSO and Macro International Inc.

Central Statistical Office (CSO), Ministry of Health (MOH), Tropical Diseases Research Centre (TDRC), University of Zambia, and Macro International Inc. (2009). **Zambia Demographic and Health Survey 2014.** Calverton, Maryland, USA: CSO and Macro International Inc.

Clark E. A., and Silver R. M. (2011). **Long-term maternal morbidity associated with repeat cesarean delivery.** *American Journal of Obstetric Gynaecology.* **205**(6):pp2-10.

Conde-Agudelo, A., Belizan, J.M. and Lammers, C. (2005). **Maternal-perinatal morbidity and mortality associated with adolescent pregnancy in Latin America: Cross-sectional study.** *American Journal of Obstetric Gynaecology*. **192**(2): pp342-349.

Derme, M., Leoncini, E., Vetrano, G., Carlomagno, L., Aleandri V. (2013). **Obstetric and perinatal outcomes of teenage pregnant women: a retrospective study.** *Epidemiology, Biostatistics and Public Health*. **10**(4):pp8641-8647.

Fraser A. M., Brockert J. E., and Ward R.H. (1995) **Association of Young Maternal Age with Adverse Reproductive Outcomes.** *New England Journal of Medicine* **332**(1):pp1113-1118 DOI: 10.1056/NEJM199504273321701

Geloo, Zarina, (2003), **Diverse Factors Linked to Maternal Deaths in Zambia**, Reference Bureau, Washington.

Graczyk Kathryn, 2007, **Adolescent Maternal Mortality: An Overlooked Crisis**, page 1, Washington.

Granja, A., Machungo F., Gomes, A., and Bergstrom, S. (2001) **Adolescent Maternal Mortality in Mozambique**, *Journal of Adolescent Health* 28(4) pp 303-306.

Gupta N, Kiran U, and Bhal K. (2008). **Teenage pregnancies: obstetric characteristics and outcomes.** *European Journal of Obstetrics and Gynecology and Reproductive Biology*; **137**: pp165–171.

Hidalgo L. A, Chedraui P. A, and Chavez M. J. (2005). **Obstetrical and neonatal outcome in young adolescents of low socio-economic status: a case control study.** *Archives of Gynaecology and Obstetrics*. **271**(3): pp 207–211.

Kongnyuy, E. J., Nana, P. N., Fomulu, N., Wiysonge, S. C., Kouam, L., and Doh, A. S. (2008). **Adverse perinatal outcomes of adolescent pregnancies in Cameroon.** *Maternal and Child Health Journal*, **12**(2), 149-154.

Kwast B. E, and Liff, J. M. (1988) **Factors associated with maternal mortality in Addis Ababa, Ethiopia.** *International Journal of Epidemiology*; **17**: pp115–121.

Lema, V. M., Changole, J., Kanyighe, C., and Malunga, E. V. (2005). **Maternal mortality at the Queen Elizabeth Central Teaching Hospital, Blantyre, Malawi.** *East African Medical Journal*, **82**(1); pp3-9.

Liran, D., Vardi, I., Sergienko, R., and Sheiner, E. (2012). **Adverse perinatal outcome in teenage pregnancies: is it all due to lack of prenatal care and ethnicity?** *Journal of Maternal-Fetal and Neonatal Medicine*, 1(4), pp 1-4.

McIntyre, Peter; World Health Organization (2006). **Pregnant adolescents-Delivering on global promises of hope**, Oxford, UK page 4-5.

Ministry of Finance and National Planning (2007). **National Population Policy.** Ministry of Finance and National Planning, Lusaka.

Ministry of Health (2011). **Adolescent Health Strategic Plan 2011-2015.** Ministry of Health. Lusaka.

Naeye, R. L. (1981). **Teenaged and pre-teenaged pregnancies: consequences of the fetal-maternal competition for nutrients.** *Pediatrics*, **67**(1), pp146-150.

Neelofur-Khan, Dina; World Health Organization (2007) **Pregnant adolescents-Unmet needs and undone deeds**, page 19-23, WHO Press, World Health Organization, 20 Avenue Appia, 1211 Geneva 27, Switzerland.

Nkata, M. (1997) **Maternal deaths in teenage mothers.** *Journal of Obstetrics and Gynaecology* **17**(4), pp 344-345.

Treffers, P. (2004), **Pregnant adolescents-Issues in adolescent health and development,** page **33-35,** WHO Press, World Health Organization, 20 Avenue Appia, 1211 Geneva 27, Switzerland.

Tsikouras P., Dafopoulos, A., Trypsianis G., Vrachnis, N., and Bouchlariotou, S. (2012) **Pregnancies and their obstetric outcome in two selected age groups of teenage women in Greece.** *The Journal of Maternal-Fetal and Neonatal Medicine* **25**(9): pp1606–1611.

Ronsmans C, and Khalat M. (1999) **Adolescence and risk of violent death during pregnancy in Matlab, Bangladesh.** *Lancet*, 354:1448.

Rosen, James E. (2010), **Position paper on mainstreaming adolescent pregnancy in efforts to make pregnancy safer,** WHO Press, World Health Organization, 20 Avenue Appia, 1211 Geneva 27, Switzerland

Satin A. J, Leveno K. J., Sherman M. L, Reedy N. J, Lowe T. W, and McIntire D. D. (1994) **Maternal youth and pregnancy outcomes: middle school versus high school age groups compared with women beyond the teen years.** *American Journal of Obstetrics and Gynecology;* **171:** pp184-187.

Scholl, T. O., Hediger, M. L., Salmon, R. W., Belsky, D. H. and Ances, I. G. (1989), **Association between low gynaecological age and preterm birth.** *Paediatric and Perinatal Epidemiology,* **3:** pp357–366. doi: 10.1111/j.1365-3016.1989.tb00524.x

Scholl, T. O., Hediger, M. L., Schall, J. I., Khoo, C. S., and Fischer, R. L. (1994). **Maternal growth during pregnancy and the competition for nutrients.** *The American journal of clinical nutrition,* **60**(2), pp183-188.

Smith G. C. S., Pell J. P. (2001) **Teenage pregnancy and risk of adverse perinatal outcomes associated with first and second births: population based retrospective cohort study.** *BMJ*; **323**: pp476-479.

UNDESA (2010), **The Millennium Development Goals Report 2010**, pages 26, 30; United Nations Department of Economic and Social Affairs, New York.

UNDP (2013), **Millennium Development Goals Profile – Luapula province**, page2; United Nations Development Programme, Lusaka.

UNFPA, (2009), **Factsheet: young people and times of change**, (Sourced from [http://www.unfpa.org/public/home/factsheets/young\\_people](http://www.unfpa.org/public/home/factsheets/young_people) , last accessed on 10<sup>th</sup> October 2011)

UNFPA (2004) **State of the World's population**, page 5. New York  
(Sourced from: <http://www.unfpa.org/swp/2004/english/ch9/page5.htm>, last accessed 2<sup>nd</sup> October, 2011)

UNGASS. (2002). **A world fit for children arising out of the Special Session on Children 10 May 2002. Plan of Action, B: Goals Strategies and Actions 1. Promoting Healthy Lives**, Paragraph 37:1. New York.

Unfer V, Piazzè Garnica J, Di Benedetto M. R, Costabile L., Gallo G, Anceschi M. (1995). **Pregnancy in adolescents. A case control study.** *Clinical and Experimental Obstetrics and Gynecology*. **22**(2): pp161–164.

USAID (2009) **Adolescent maternal health**, sourced from [http://www.usaid.gov/our\\_work/global\\_health/mch/mh/techareas/adolescent.html](http://www.usaid.gov/our_work/global_health/mch/mh/techareas/adolescent.html) last accessed on 10th October, 2011)



Wadhawan S, Narone R. K, Narone J. N. (1982). **Obstetric problems in the adolescent Zambian mothers studied at the University Teaching Hospital, Lusaka.** *Medical Journal of Zambia.* **16**(3): pp65-68.

World Health Organisation, (2008), **10 Facts about Adolescent Health**, sourced from [http://www.who.int/features/factfiles/adolescent\\_health/en/index.html](http://www.who.int/features/factfiles/adolescent_health/en/index.html) last accessed on 12th October 2011

World Health Organization (2007) **Adolescent pregnancy – Making pregnancy safer**, WHO Press,Switzerland.(Sourced from: <http://www.advocatesforyouth.org/storage/advyf/documents/fsmaternal.pdf>, last accessed 2<sup>nd</sup> October, 2011)

World Health Organization. (2008). **Making pregnancy safer**, page 4, World Health Organization Press, 20 Avenue Appia, 1211 Geneva 27, Switzerland

World Health Organization. (2005). **World health report 2005: make every mother and child count.** Geneva: WHO. (<http://www.who.int/whr/2005/en/> last accessed on 5<sup>th</sup> October 2011)

World Health Organization. (2014). **Maternal Mortality Factsheet No. 348.** Geneva. WHO

Yadav, S., Choudhary, D., Narayan, K.C., Mandal, R. K., Sharma, A., Chauhan, S., and Agrawal. P. (2008). **Adverse Reproductive Outcomes Associated With Teenage Pregnancy.** *Mcgill Journal of Medicine.* **11**(2): pp141–144.

Zabin S, and Kiragu K. 1998. **The health consequences of adolescent sexual and fertility behaviour in sub-Saharan Africa.** *Studies in Family Planning;* **29**(1) pages 210-32

## Appendix: Ethical clearance and MoH permission letter



THE UNIVERSITY OF ZAMBIA

### BIOMEDICAL RESEARCH ETHICS COMMITTEE

Telephone: 260-1-256067  
Telegrams: UNZA, LUSAKA  
Telex: UNZALU ZA 44370  
Fax: + 260-1-250753  
E-mail: unzaroc@unzn.zm  
Assurance No. FWA00000338  
IRB00001131 of IORG0000774

Ridgeway Campus  
P.O. Box 50110  
Lusaka, Zambia

6<sup>th</sup> September 2013

Your Ref: 008-04-13

Dr. Albertina Morales,  
C/o Mr. Jude Morales,  
Huawei Technologies limited,  
P.O.Box 320007,  
Lusaka.

Dear Dr. Morales,

RE: RE-SUBMITTED RESEARCH PROPOSAL: "ADVERSE OBSTETRIC OUTCOME IN ADOLESCENT PREGNANCY: A PREVALENCE STUDY OF MATERNAL-PRERINATAL MORTALITY AND MORBIDITY IN MANSA AND KAWAMBWA DISTRICTS OF LUAPULA PROVINCE, ZAMBIA" (REF: 008-04-13).

The above mentioned research proposal was re-submitted to the Biomedical Research Ethics Committee with recommended changes 17<sup>th</sup> may 2013. The proposal is approved.

#### CONDITIONS:

- This approval is based strictly on your submitted proposal. Should there be need for you to modify or change the study design or methodology; you will need to seek clearance from the Research Ethics Committee.
- If you have need for further clarification please consult this office. Please note that it is mandatory that you submit a detailed progress report of your study to this Committee every six months and a final copy of your report at the end of the study.
- Any serious adverse events must be reported at once to this Committee.
- Please note that when your approval expires you may need to request for renewal. The request should be accompanied by a Progress Report (Progress Report Forms can be obtained from the Secretariat).
- **Ensure that a final copy of the results is submitted to this Committee.**

Yours sincerely,

  
Dr. J.C Mupfali

All correspondence should be addressed to the  
Provincial Medical Officer  
P.O. Box 210019 Lusaka

REPUBLIC OF ZAMBIA  
MINISTRY OF HEALTH  
07 JAN 2014  
DISTRICT MEDICAL OFFICER  
KAWAMBWA DISTRICT HEALTH OFFICE  
P.O. BOX 210019 LUSAKA

REPUBLIC OF ZAMBIA  
DEPARTMENT OF HEALTH  
07 JAN 2014  
ADMINISTRATION  
P.O. BOX 210019 LUSAKA

*Handwritten:* MHP/7/1/4

REPUBLIC OF ZAMBIA  
MINISTRY OF HEALTH  
MINISTRY OF COMMUNITY DEVELOPMENT,  
MOTHER AND CHILD DEPARTMENT  
07 JAN 2014  
DISTRICT COMMUNITY MEDICAL OFFICER  
KAWAMBWA DISTRICT HEALTH OFFICE  
P.O. BOX 210019 LUSAKA

Medical Office  
Luapula Province  
P.O. Box 210019  
MANSA

5<sup>th</sup> January 2013

Mrs Albertina N. Moraes  
C/o Mr Jude Moraes  
Huawei Technologies Limited  
P.O. BOX 320007,  
LUSAKA

*Handwritten:* Attention Medical officer in charge kindly permit the holder access for research at your institution

*Handwritten:* Approved to be granted for her research see N.O.

Dear Mrs Moraes,

**ADVERSE OBSTETRIC OUTCOME IN ADOLESCENT PREGNANCY: A PREVALENCE STUDY OF MATERNAL - PERINATAL MORTALITY AND MORBIDITY IN LUAPULA PROVINCE.**

The above captioned matter refers.

The Provincial Medical Office is pleased to inform you that you have been allowed to carryout this research study in the province subject to ethical approval.

The Provincial Medical Officer would be interested to be availed your research findings as well as well as wishing you all the best in your studies.

*Handwritten:* In charge maternity please circulate the information

Dr. A.K.Chibwe  
Clinical Care Specialist  
For/Provincial Medical Officer  
**LUAPULA PROVINCE**

REPUBLIC OF ZAMBIA  
MINISTRY OF HEALTH

*Handwritten signature:* [Signature]

02 / Jan 2014  
LUAPULA PROVINCE  
P.O. BOX 210019  
MANSA

REPUBLIC OF ZAMBIA  
MINISTRY OF COMMUNITY DEVELOPMENT,  
MOTHER AND CHILD DEPARTMENT  
02 DEC 2013  
DISTRICT COMMUNITY MEDICAL OFFICER  
KAWAMBWA DISTRICT HEALTH OFFICE  
P.O. BOX 210019 LUSAKA

REPUBLIC OF ZAMBIA  
MINISTRY OF HEALTH  
06 .01. 2014  
DISTRICT COMMUNITY MEDICAL OFFICER  
KAWAMBWA DISTRICT HEALTH OFFICE  
P.O. BOX 210019 LUSAKA

*Handwritten:* The changes - Mansa Health facilities please check the data returned by the learner this letter