



## A comparative study on obstetric complications among adolescents at Kasangati Health Centre in Uganda

Master thesis in Medicine  
University of Gothenburg

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## Abstract

**Background.** Uganda is a country with a high proportion of young individuals and where childbearing begins early. Twenty-four per cent are already mothers or pregnant with their first child at age nineteen. Several studies point towards an increased risk of adverse obstetric outcome becoming a mother in young age in low and middle income countries whether other studies state the contrary.

**Aim.** To investigate the frequency of obstetric complications among primiparous women age 19 and below, giving birth at Kasangati, a suburban health centre outside Kampala.

**Methods.** Both a retrospective and a prospective case-control method were used. Semi-structured interviews with questions on the women's living condition and socioeconomic background were also performed. The controls were primiparous women in age 20 to 24 years registered during the same period.

**Results.** It was found that a higher proportion of teenagers had an expected or found complication (35.6 per cent vs 28.9 per cent). However the difference was small and was not found significant. An association between low birth weight and teenage women was found (p-value= 0.003). This finding was supported by the results in the prospective study (p-value = 0.02). Due to uncertainty in determining gestational age, it's difficult to make any further conclusions whether the cause is correlated to intrauterine growth restriction or to premature birth. A tendency towards a higher rate of adverse obstetric outcome like premature birth, prolonged labour, obstructed labour and preeclampsia among teenagers was also found. However none of these differences were found significant.

**Conclusions.** To determine the underlying cause of low birth weight further studies should be made in a setting where more reliable estimation of gestational age and intrauterine growth could be done.

**Keywords:** adolescent, teenager, childbirth, obstetric outcome, obstetric complications, low birth weight

## Abbreviations

ANC – Antenatal clinic

APH – Antepartum hemorrhage

BBA – Born before attendance

EROM – Early rupture of membranes

IUGR – Intrauterine growth restriction

KHC IV – Kasangati Health Centre IV

LBW – Low birth weight

MMR – Maternal mortality ratio

MVA – Manual vacuum aspiration

NVD- Normal vaginal delivery

PPH – Postpartum haemorrhage

SGA - Small for gestational age

SVD – Spontaneous vaginal delivery

UNDP - United Nations, Department of Economic and Social Affairs, Population Division

WHO – World Health Organisation

## Definitions

**Apgar score** – A scale used to evaluating the new born baby's condition. Five criteria (appearance, pulse, grimace, activity and respiration) are evaluated, the values are then summarized into Apgar score ranging from zero to ten. The evaluation is done at 1, 5 and 10 minutes.

**Preeclampsia** – A pregnancy induced high blood pressure  $\geq 140$  mm Hg systolic or  $\geq 90$  mm Hg diastolic after 20 gestational weeks, together with proteinuria  $\geq 0.3$  grams protein / day or a urine dipstick with 2 + or more. In a woman with essential hypertension an increase in systolic blood pressure of  $\geq 30$ mmHg or in diastolic blood pressure of  $\geq 15$ mmHg is required.

**Eclampsia** – Convulsion/s or unconsciousness often preceded by preeclampsia.

**Small for gestational age (SGA)** – Fetus with a weight below the 10th percentile for the gestational age estimated weight.

**Intra uterine growth restriction (IUGR)** – Abnormal poor growth of the fetus indicating underlying pathological process.

**Low Birth Weight (LBW)** – Infants weighing less than 2500 g at the time of birth.

**Early rupture of membranes (EROM)** – Rupture of membranes without onset of labour.

**Prolonged labour** – Labour lasting for more than 24 hours in a primigravida or more than 14 hours in a multipara.

**Obstructed labour** – A state where the presenting part of the fetus cannot progress into the birth canal, despite uterine contractions. Can result in prolonged labour.

**Placenta praevia** – Placenta insertion partially or entirely in the lower uterine segment.

**Premature birth** – Birth before gestational week 37 + 0.



## Introduction

### **Uganda, young age and fertility**

Uganda is a country with a high proportion of young individuals, 11 per cent of the population are females between 15 and 19 years old (1) and childbearing begins early. Twenty-four percent of women in age 15 to 19 are already mothers or pregnant with their first child. In total more than one-third (39 per cent) of the women in age 20-49 have given birth by age 18, and more than half (63 per cent) by age 20. (1) The age specific birth rate in the age group 15 to 19 in Uganda is 134 births per 1000 women. (2) The numbers which are from United Nations, Department of Economic and Social Affairs, Population Division (UNDP) database, they do not provide numbers on birth rate in the age group below fifteen. The total fertility in Uganda is 6.2 children per women.(2) Among the very young adolescents in Uganda, in the age group 12 to 15 year old, 22.8 births per 1000 women occur. The percentage of girls giving birth at age 15 or below accounts for 4.7 per cent in that specific age group. (3)

It's common that women don't seek health care to give birth. Statistics from 2011 show that 44 per cent give birth in a public hospital and 13.4 per cent give birth at a private hospital, while 41.6 per cent give birth at home. (4)

### **Maternal mortality among young women**

Maternal death in the world have declined during the last decade (5). Still death is the final consequent of childbearing in many cases. Maternal conditions is a leading cause of death in young females worldwide, they cause 15 per cent of the 2.6 million deaths that occur in young people age 10-24 every year. The majority, 97 per cent happens in low-income and middle-income countries. (6) The mortality rates are almost fourfold higher in low-income and middle-income countries compared to high-income countries. This difference is particularly pronounced for young women, since the difference between low-income and high-income

countries regarding death among young females is largest when it comes to maternal causes to death. In Africa, maternal mortality is the cause of 26 per cent of female death among women aged 10-24 years.(6) The maternal mortality ratio (MMR) is higher for adolescents 15 to 19 years old compared to women 20-24 years old.(7) A recent study on the most common causes of maternal death concluded that almost 75 per cent was due to direct causes, where hemorrhage was the leading direct cause. Hypertension disorder was the second most common direct cause followed by sepsis and abortion. One quarter was due to indirect causes and among them 70 per cent are from pre-existing disorders like HIV.(8)

### **Maternal mortality in Uganda**

The 20 countries with the largest adolescent maternal deaths are countries in sub-Saharan Africa and Asia and they account for 82 per cent of the world's total. A decline with 53 per cent between 1990 and 2013 in maternal mortality ratio in Uganda is reported from the World Health Organization. In 1990 the maternal death per 100 000 live birth were estimated to 780 and in 2013 the same number was 360 (9), and a recently published report shows that the trend keeps going in the same direction with an MMR at 343(2015) (10).

### **The risk of obstetric and pregnancy complications among teenagers**

Young maternal age has been associated with greater risk of adverse pregnancy outcome. Several studies have been carried out on the subject. Increased risk for both the becoming mother and the new-born babies have been described. However, earlier research shows somewhat contradictory results regarding the risks. In several studies outcome of teenage pregnancy is confounded by parity since first childbearing often is the case in young age. Primiparity on its own is related to an increased risk for adverse obstetric outcome. It is well known that preeclampsia have a higher incidence among women giving birth for their first time compared to women waiting their second or third child.(11) Its therefore not surprising

that some studies (12-14) have shown a higher incidence of preeclampsia in adolescents since pregnancy in teenage years often go hand in hand with first pregnancy, thus when taking parity into consideration the difference is not as evident.

Obstructed labour is caused by a mismatch between the woman's pelvis and fetal size of the presenting part. (11) Obstructed labour can lead to maternal dehydration, infection and exhaustion. It's a serious condition and can cause death through sepsis and hemorrhage. (15) There are suggestions that adolescents have an increased risk for obstructed labour due to their relative immaturity of physiological development of the pelvis. (14) When threatening obstructed labour occur caesarean section have to be performed. Studies comparing the obstetric outcome between teenagers and young adults have not found a larger incidence of caesarean section among teenagers. On the contrary they seem to have a lower risk for caesarean section, which is found both in low- and middle income countries (12) and in high income countries. (16, 17) In some cases this could of course be affected by a larger incidence of operative vaginal delivery (like vacuum and forceps extraction) (18) Others have found that the incidence of caesareans arising from cephalo-pelvic disproportion are highest among the youngest adolescents below 15 years of age (3) probable due to a still growing pelvis.

Studies done on low- and middle income countries show mostly coherent results regarding an increased risk for preterm labour and low birth weight (12, 13, 18, 19). A higher risk for very preterm birth (before week 32+0) among primiparous teenage women in high income countries have also been observed (20) Otherwise studies done on high-income countries show other results, with conclusions that delivery in adolescents in general are less complicated than in older women. (16, 17, 21)

A possible explanation why adolescents have an increased risk for adverse birth outcome is that adolescents are still growing. It is suggested that there is a competition for nutrients

between the still growing woman and the developing fetus which in turn will compromise the growth and development of both mother and the fetus. (22) The problem is greater if the woman is undernourished. Two studies in low income countries have shown that teenage girls have stopped growing when getting pregnant. (23, 24) A recent published study highlights the association between young gynaecological age (age at menarche subtracted from chronological age) and adverse obstetric outcome. (25)

Adverse neonatal outcome seem to increase with younger age. This increases the risk of death for the infant and WHO reports that stillbirths and death in the first week of life are 50 per cent higher among infants born to women aged below 20 than for babies born to mothers aged 20 to 29 years. Looking at the infants first month of life, death during this period are 50 to 100 per cent more frequent among the young mothers compared to older (26).

Possible explanation for adolescents poorer obstetric outcome has been thought to be poorer socioeconomic conditions. (27) Of interest is of course what it means to be a young mother, which is a subject on its own and not something that this research aims to answer. But it is of most importance and the basis for why investigating the relationship between young age and obstetric outcome matter. WHO states that poverty, lower education, being single and engaging in fewer antenatal visits is common among adolescents compared to older pregnant women (28).

### **Kasangati Health Centre level IV**

The health system in Uganda is divided into different levels, where the health centres consist of 5 levels, with more advanced care arising with higher level. A number one level consist of a village health team, while level two are assigned to provide antenatal care and an outpatient department and they don't conduct deliveries like level three. Health centre level 4 are further obliged to provide an operating theatre for emergency surgery and perform emergency caesarean sections. Patients that need more advanced care are referred to the district hospital.

In Uganda there are 111 districts with Kasangati belonging to Wakiso district. Since Wakiso district hospital lie further away than Mulago referral hospital, which is the largest hospital in the country and usually last instance for referral, Kasangati health centre makes an exception and the referrals go to Mulago referral hospital located 10 km away from the health centre.

Health care provided in the country consists of both public, private, NGO-provided/non-profit organization, traditional healers and traditional birth attendants

The clinic in Kasangati is a level IV health centre and it's located fourteen kilometres north from Uganda's capital Kampala and ten kilometres from Mulago referral hospital. The health centre provides an outpatient department, a medical ward, a diabetes clinic, HIV-clinic, a maternity clinic and a theatre with a post-operative ward. Three medical doctors are employed at the clinic and four midwives, as well several physicians, nurses and nursing assistants.

Services are free of charge. Though if medicines are out of stock or the laboratory closed, medication and/or test must be bought outside the clinic by the patient herself. The catchment area population is 460 000 inhabitants (2015), most living in rural or sub-urban setting.(29)

### Maternal care at KHC IV

A total of 2475 deliveries were performed last year at Kasangati Health Centre. The number of deliveries have increased with 520 per cent from year 2011 to 2015, with the greatest increase between year 2011 to 2013. No maternal deaths have occurred during the time period. A decrease of mothers tested for HIV at birth is noted, this is probably due to increased HIV testing during antenatal visits. Interestingly there is a sudden decrease of postpartum hemorrhage (PPH), obstructed labour and high blood pressure in 2013 to 2014 even without any increase of referrals (see table 1).

Table 1. Characteristics of the maternity clinic at KHC IV. Registration for each year counts from 1<sup>st</sup> of July to 30<sup>th</sup> of June. An increase of the total number of deliveries have occurred the last years. (Statistics are obtained from local source at KHC IV.)

	2011-2012		2012-2013		2013-2014		2014-2015	
	Percentage	Count	Percentage	Count	Percentage	Count	Percentage	Count
<b>Admissions</b>	100	648	100	2676	100	3071	100	3318
Referrals in	15.9	103	14.6	392	9.6	295	18.6	616
Referrals out	12.2	79	18	483	13.3	409	11.4	379
<b>Deliveries</b>	73.5	476	75	2011	77	2364	74.6	2475
Deliveries to HIV+	7.6	34	8.4	168	6.5	154	9.3	231
Given ARVs to HIV+	85.3	29	91.1	153	86.4	133	99.6	230
<b>Livebirths</b>	98.9	470	91.1	1833	99	2341	99	2451
Livebirth to HIV+	85.3*	29	167(!)*	281	90.9*	140	91.3*	211
Babies to HIV + that are given ARVs	85.3*	29	86.3*	145	99.3*	152	90.9*	210
Breastfeeding within 1hr (born from HIV+mother)	70.6*	24	86.3*	145	99.3*	152	90.9*	210
<b>Mothers tested for HIV at birth</b>	121 (!)	785	11.2	301	9.5	293	0.5	16
How many of tested women were positive	0.4	3	4.3	13	20.5	6	12.3	2
<b>Asphyxia</b>	0	0	0.2	4	12.7	30	7.8	19
<b>Low birth weight</b>	4.2	20	3.8	77	3.3	78	3.1	77
<b>Fresh stillbirth**</b>	0.8	4	0.5	9	0.3	7	0.5	13
<b>Macerated stillbirths</b>	0.4	2	0.5	9	0.3	7	0.3	8
<b>New born death 0-7 days</b>	0	0	0	0	0.1	2	0.1	2
<b>Maternal death</b>	0	0	0	0	0	0	0	0
<b>PPH</b>	1.2	6	0.6	15	0	0	0.3	7
<b>Obstructed labour</b>	2.9	14	1.0	27	0	0	0.2	4
<b>High blood pressure</b>	0.4	2	0.4	11	0.1	3	0.3	9
<b>Gender based violence causing abortion***</b>	0	0	4.8	1	33	1	Missing	
<b>Other reasons for abortion</b>	100	16	95.2	20	66	2	0.8	22
<b>Caesarean section ****</b>			0.9	19	1.3	32	1.2	31
<b>Instrumental delivery (vacuum or forceps)</b>		0		0		0		0

\*Percentage of deliveries in women with HIV

\*\*Fresh stillbirth is death that could have occurred while giving birth unlike macerated stillbirth.

\*\*\*Abortion = ending of pregnancy before week 22 + 0

\*\*\*\* The surgical theatre was not in work during 2011 – 2012

(!) Unrealistic values

### Work at the maternal clinic

The clinic provides antenatal care, postnatal care, family planning consultation, and special consultation for HIV-positive mothers, assistant during delivery, a maternity ward and a surgical ward. The midwives work in three shifts, on weekdays two midwives work at the clinic, often with one responsible for the care given for the deliveries taking place and if no deliveries, she works at the antenatal care or postnatal care. Often there is one midwife taking care of antenatal visits during the day, and one midwife (often the one taking care of the women in labour) taking care of the postnatal visits, family planning consultation and consultation with HIV-positive women. If there is any patients in need of postsurgical care one also in addition takes care of those patients. Nurse assistants do also assist the deliveries, mostly on their own. But when complication happens she is supposed to get help from the midwife. There is a great workload on both midwives and nurse assistants. The midwives treat several medical conditions of their patients on their own, like suspect infections, they prescribe/recommend medicines for their patients. When a patient have a more severe medical condition they try to consult with the doctor at duty. The women are encouraged to visit the antenatal clinic four times during pregnancy. At the antenatal visits an external examination is done, weight and blood pressure is measured. They receive ferrous tablets and a short consultation is performed.

### Following the labour process

When a pregnant woman arrives to the clinic because it's time to give birth she is first examined, both by palpation of the uterus, the foetus heart is listened for and a vaginal examination is done. No laboratory values are taken routinely. Blood pressure is measured in most cases. If the woman is in labour she stays at the clinic, if not she is told to go back home and come back when she gets signs of labour, though depending on how far away she lives. Partogram (a graphical record illustrating the progress of labour) is not followed during labour, instead findings from examination are written down in the patient's medical passport.

Services are free of charge since it is a public health facility. Though, due to lack of equipment, women need to provide items needed for delivery, like a plastic sheet to cover the bunk, cotton for cleaning, gaze, sterile gloves, razorblades, a bucket and blankets for the baby. If the women needs to be sutured she has to pay for a needle. Women that attend all four antenatal visits receive a “mama kit” on her fourth antenatal visit, which contain some of these items. Women are also told at the antenatal visits to bring a friend/relative to assist at the delivery. Women are generally told to deliver in a lying position. If referral is needed the health clinic can assist with an ambulance. Fuel is paid by the patient.

## Aim

The aim of the study was to answer the question: Do the frequency of obstetric complications differ between primiparous adolescents in age nineteen and younger compared to primiparous women twenty to twenty-four years old at Kasangati Health Centre?

## Medical relevance

The frequency and the spectrum of complications among teenagers have not before been investigated at Kasangati Health Centre. The findings could be useful as a support to develop a more individual care for the young mothers regard to their risk profile. The study can also contribute to already existing knowledge on the subject of teenage mother’s complications due to labour.

## Methods

### Retrospective study

Data from the clinics’ maternity register book from one year were collected starting from the 20th of September 2014 and one year forward. The maternity register was written by hand and there was a loss of women due to difficulty interpreting the writing. In total 510 teenagers were admitted in the maternity register within the time period. Teenagers that were not primiparous were not included (19 per cent). Teenagers that were noted as primiparous but



not in labour were excluded (1.4 per cent). For example pregnant women treated for malaria that were registered in the maternity record. Women were also excluded if the status of parity was missing or could be interpreted in more than two ways (3.9 per cent). Teenagers that had a registration of incomplete abortion or manual vacuum aspiration (MVA) (1.4 per cent) were excluded. There were 21 women registered as primiparous but where age was missing. In total 379 women admitted in labour aged  $\leq 19$  could be included (see table 2). For every teenager included the aim was to include the two following primiparous woman aged 20 to 24 from the register, though it turned out not to be twice as many 20 to 24 year old giving birth for their first time and therefor all 20 to 24 year old primipara woman admitted in labour during the same period were included which gave a total of 418 controls. Mean age in each age group was 18.10 and 21.44 years respectively.

Table 2. All teenagers registered in the maternity register between 20<sup>th</sup> Sept 2014 to 19<sup>th</sup> Sept 2015. With total 379 included and loss of 131 teenagers due to incomplete information or not in labour.

<b>Teenagers in the Maternity register between 20.9.14 – 19.9.15</b>	<b>Count</b>	<b>Per cent</b>
<b>All teenage admissions</b>	<b>510</b>	<b>100</b>
Not primipara	97	19
Parity is missing	20	3.9
Not in labour (i.e. Malaria in Pregnancy)	7	1.4
Incomplete abortion or MVA done	7	1.4
<i>Total excluded among teenagers</i>	<i>131</i>	<i>25.7</i>
<b>Total included:</b>	<b>379</b>	<b>74.3</b>

A gap from 20.5.2015 to 1.7.2015 was found with the specific age most often not noted in the maternity register, only a mark placing the women in the age group 10-19 or 20-24. Therefore in total 7 per cent (n=56) women (5 per cent teenagers (n=19) and 8.9 per cent controls (n=37)) fall out when analysing each age group of 14 years old, 15 year old, 16 year old, 17 year old and 18 year old specifically, but are included when looking at the two age groups.

Table 3. Number and percentage of the two age groups; teenagers and 20 to 24 years old.

Age group	Number	Percentage	Mean age
19 years and below	379	47.60%	18.13
20 to 24 years	418	52.40%	21.44
Total	797	100%	

Table 4. Number and percentage in each age group respectively. Nineteen women (5 per cent) are missing in the year-specific groups due to unspecified age in the maternity register.

Age group	Number and percentage	
14	1	0.26%
15	5	1.32%
16	13	3.43%
17	55	14.5%
18	139	36.7%
19	147	38.9%
Total	360	95.11%

### **Categorisation of complications**

The women were categorised as either delivered at KHC IV, referred antepartum or referred postpartum. Depending on the final diagnosis set in the maternity register the women were categorised in the following groups. Women with the final diagnosis normal vaginal delivery or spontaneous vaginal delivery (NVD or SVD) were divided in two groups, either with healthy infant or unhealthy infant. The women were included in the group unhealthy infant if the baby's condition were notified with grunting, severe grunting, asphyxia, high temperature or if the baby died during the stay at the maternity ward or if the woman had a stillbirth.

If the women were registered as having any complication or if she was referred she was placed in the group complication occurred and/or was referred.

A further categorization was made depending on the type of complication that occurred. The following registrations were categorised as prolonged labour: delay in 1st stage, delay in 2nd

stage, delay in labour, long start, prolonged latent labour, slow progress, cervical dystocia, and poor progress, dystocia of cervix, poor dilatation, bad progress and mild uterine contractions. In the category obstructed labour the following registrations were included: contracted pelvis, narrow outlet, inadequate pelvis, cephalo-pelvic disproportion and borderline pelvis. The category antepartum haemorrhage (APH) included placenta praevia and other antenatal bleeding. Third degree tear was put in the category severe injury. In the group malpresentation; breech presentation, arm presentation, transverse and oblique lie were included. Hypertonic uterus and strong contractions were put in the same group “hypertonic labour”. Further groups were hypertension, preeclampsia (including registrations like preeclampsia, severe preeclampsia and preeclampsia intoxication (PET)) or eclampsia (including eclampsia and convulsions). It was not possible to differentiate between essential hypertonia or pregnancy induced hypertonia.

If the woman had twins or if only noted multiple pregnancy she was placed in the group multiple pregnancy. Birth weight below 2500 g were grouped as low birth weight. Apgar score below 7 at 5 minutes age were grouped as low Apgar score.

Premature birth included all women with a registration “premature birth”. The definition for premature birth is birth before week 37 + 0. Noteworthy is that several women were noted in the column of gestational week a number that indicated that they gave birth before week 37 + 0, but no other comments were done specifying premature birth. A number as low as week 32 was found, but with birthweight corresponding to a mature infant without any other comments. Therefore the reliability for gestational week is weak and only the mothers specifically noted as having a premature birth were included in this group.

The following complication or expected complication were categorised on their own: postpartum hemorrhage defined as blood loss more than 500 ml, early rupture of membranes

(EROM), big baby, “pendulous abdomen” and fetal distress. Pendulous abdomen is a sign of uterine rupture or malpresentation.

### **Assumptions**

If the woman gave birth at KHC IV and the delivery was registered as a normal vaginal delivery (NVD) the assumption that no complication during delivery had happened was made.

If the woman was referred postpartum the assumption that no other complication occurred during delivery except for the one she was referred for was made.

A couple of times it was not clearly stated that the woman was referred postpartum or antepartum, but if information on the infant was registered the conclusion that the delivery had taken place at KHC IV could be done, since there were no follow up on the women that were referred.

If the woman was referred before giving birth the assumption that other possible complication (than the reason for referral) occurred could not be made. Therefore there is less exhaustive information on the women that were referred before they gave birth compared to the woman that delivered at KHC IV or were referred postpartum. The only times that such a presumption (that a complication did not occur) could be done, were if the diagnosis given presuppose certain criteria that excludes the possibilities for other complication. Such a situation is for example if the woman is referred due to obstructed labour (and that is the only reason for referral), then the assumption that EROM (early rupture of membranes) which occurs at least 1 hour before onset of labour, has not happened was made, since it would have already have happened if referring due to obstructed labour. To clarify, if the woman instead was referred due to EROM the assumption that she did not have an obstructed labour could not be done, since it can still occur.

There were no possibility to follow up the women at the referral hospital to confirm the actual outcome of labour.

### **Comments on the registration used at the maternity clinic**

**Parity.** A number of different ways were used to describe the status of parity by the midwives whom made the notes in the maternity register. The following were interpreted as primipara (G stands for gravida, P stands for parity): G1, G1P0, G1P0+1, G2P0+1, 1 and PG, where the last abbreviation was the most commonly used. Abbreviations like G2 were excluded, just like G2+0 since according to working personal it meant gravida 2 with no abortions.

**Gestational age.** Calculation from first day of previous menstruation was done at the first antenatal visit, but new estimations were done later by measure of symphysis-fundus height. When registering the gestational week in the maternity register it was mostly approximated from the symphysis –fundus height or it was self-reported. In cases when ultra-sound had been used, gestational week was taken from its calculation. The gestational age was registered in whole weeks, if 37 was the number noted in the column it meant that 37 weeks of gestation had been fulfilled.

**Apgar.** Apgar score of the new-born were noted in the maternity register. Most commonly noted as X/10, stating that the infant got 10 out of 10 Apgar scores in total. Any interpretation of change in Apgar score could not be done from the information. Though in considerable cases Apgar was noted as X<sup>1</sup>X<sup>5</sup>, in such cases Apgar at both one and five minutes could be assessed. When handling information on Apgar, Apgar noted as X/10 was treated as Apgar after 5 min and compared with X<sup>5</sup>.

### **Prospective study**

Women 19 years old and below, arriving to Kasangati Health Centre to give birth between the time period of 05-10-2015 to 27-11-2015 were included. Observation of the obstetric outcome

was based on a medical protocol (see appendix I. page 58). The women were asked to participate in a semi-structured interview (see appendix I. page 53). Since knowledge in English varies an interpreter participated to translate in Luganda, which is the language most used in the region. At one time, a double translation was needed. At five times no translator was used. The interviews were either carried out before the delivery or after depending on the circumstances. In cases when the delivery couldn't be attended or only partly attended, information was collected from medical records and from midwives that participated. The controls were 20 to 24 year old primiparous women admitted in labour at Kasangati Health Centre and both the semi-structured interview and observations were done with same method as for the teenagers.

The condition of the woman also affected where the interview was performed. A considerable number were carried out in the maternity ward in an environment that made it difficult to avoid other inpatients or sometimes relatives taking part of the answers.

During the time of data collecting, 50 primiparous women 19 years old or younger came to give birth at KHC IV. 60 per cent (n=30) were followed and interviewed. The women lost to follow due to deliveries performed at weekends and nights accounted for 32 per cent (n=16). Though women are recommended to stay at least 24 hours at the maternity ward, it was not always a possibility due to lack of beds. Some women also requested to leave the clinic earlier than after 24 hours. Exclusion because of quick referral to Mulago hospital and therefore not interviewed did also happen and counted for 8 per cent (n=4). Their indications for referral were obstructed labour, breech presentation or fetal distress (2 cases).

Since 40 per cent of the teenagers were failed to follow (in both taking notes on the progress of delivery and interviewing), a comparison between the women that were interviewed and the women that were missed to interview was calculated (see table 5). A difference is noticed, where a higher percentage within the group referrals were not interviewed, 61.5 per cent

compared to 32.4 per cent in the group not referred. To see whether this difference was significant chi-square test was carried out and the difference was not found statistically significant.

Table 5. A comparison between referrals and none referrals in the teenage group. A higher percentage of the ones referred, 61.5 per cent were not interviewed than among the women that gave birth at KHC IV, 32.4 per cent. Chi<sup>2</sup>test (p-value = 0.065).

			Interviewed/not		Total
			Not interviewed	Interviewed	
Total admission	Not referred	Count	12	25	37
		% within not referred	<b>32.4%</b>	67.6%	100.0%
		% within interviewed/not	60.0%	83.3%	74.0%
	Referred	Count	8	5	13
		% within referred	<b>61.5%</b>	38.5%	100.0%
		% within interviewed/not	40.0%	16.7%	26.0%
Total	Count	20	<b>30</b>	50	
	% within outcome	40.0%	60.0%	100.0%	
	% within interviewed or not	100.0%	100.0%	100.0%	

In total 30 teenagers fulfilled the inclusion criteria and were asked to be interviewed and their labour process were followed. No one declined to participate in the interview. 38 women between 20-24 years were included in the control group. The majority 76.7 per cent of the teenagers were interviewed after delivery as in the control group 81.6 per cent. Most of the interviews were carried out with an interpreter, 86.7 per cent among teenagers and 97.4 per cent in the control group (see table 6). The difference in interview characteristics between the two groups were tested with chi-square test and no significant differences were found.

Table 6. Characteristics of interviews. Majority were performed after delivery with interpreter used.

Characteristics of interviews		Age group			
		≤19 years		20-24 years	
		Count	Percentage	Count	Percentage
Time	Completed before delivery	7	23.3%	7	18.4%
	Completed after delivery	23	<b>76.7%</b>	31	<b>81.6%</b>
	Total	30	100.0%	38	100.0%
Interpreter	English used without interpreter	4	13.3%	1	2.6%
	Interpreter present	26	<b>86.7%</b>	37	<b>97.4%</b>
	Total	30	100.0%	38	100.0%

The mean age in the teenage group was 17.9 and in the 20 to 24 year old group it was 21.45 years.

The intention was to use the information from the interviews to sub-divide the groups, but due to small sample size further dividing was not motivated.

### Data analysis/statistics

The data were coded and analysed using IBM SPSS statistic version 23. Due to small sample size < 5 Fischer's exact test were most commonly used. Chi<sup>2</sup>test was used when applicable. Statistical significant p-value was considered when  $p < 0.05$ . Odds ratio were calculated on statistical significant differences with logistic regression.

### Ethics

An ethics approval was obtained from the health office in Wakiso district, Uganda, before the study was initiated at Kasangati Health Centre IV. For the semi-structured interviews verbal informed consent was requested and obtained from all participants who were assured of confidentiality for all information given. The interpreter was not involved in the care given at the maternity clinic. A major part of the study was to follow the labour process and due to great workload at the maternity clinic, taking primarily into account the principle of equal care, there were several occasions were observing without helping out would infringe moral values.



## Results

### Retrospective part

#### Obstetric outcome

A total of 379 teenagers were included in the study. A total of 35.6 per cent (n=135) of the teenagers were referred to Mulago hospital indicating complication. All of the teenagers that were registered with a complication were referred to Mulago hospital. Among all the teenagers 60.4 per cent (n=229) had a normal delivery at Kasangati health centre with a healthy baby and 4 per cent (n=15) had a normal vaginal delivery with an unhealthy baby.

In the control group with a total of 418 women 28 per cent (n=117) were referred to Mulago hospital for further management indicating complication. One per cent (n=4) were registered with an obstetric complication but were never referred. 68.2 per cent (n=284) had a normal delivery with a healthy baby and 2.9 per cent (n=12) had a normal delivery with an unhealthy baby.

Comparing the two groups, a larger percentage of the teenage group (35.6 per cent) had a complication and/or were referred than in the older age group (28.9 per cent). More teenagers had a normal vaginal delivery with an unhealthy or dead baby (4.0 vs 2.9 per cent). The difference was not found significant.

Table 7. Number and frequency of where the delivery took place (KHC IV or referral) and obstetric outcome. Fishers Exact test: (p-value = 0.072)

		Age group			
		age under 19		20 – 24	
		Count	Column N %	Count	Column N %
<b>Maternity register: Outcome</b>					
Referrals or delivered at KHC IV	Never referred	244	64.4%	301	71.9%
	Referrals antepartum	116	30.6%	102	24.4%
	Referrals postpartum	19	5.0%	15	3.6%
	Total referrals	135	35.6%	117	28%
	Total	379	100.0%	418	100.0%
Obstetric outcome	<b>Complication occurred and/or referral</b>	135	35.6%	121	28.9%

	NVD with healthy baby	229	60.4%	285	68.2%
	NVD with unhealthy/dead baby	15	4.0%	12	2.9%
	<b>Total of NVD</b>	<b>244</b>	<b>64.4%</b>	<b>297</b>	<b>71.1%</b>
	Total	379	100.0%	418	100.0%
Birth before attendance	No	376	99.2%	416	99.5%
	BBA	3	0.8%	2	0.5%
	Total	379	100.0%	418	100.0%

### Obstetric complications among teenagers compared with control group

More teenagers than women in their young 20s' either had a confirmed obstetric complication or were referred due to an expected complication (35.6 per cent vs 28.9 per cent). A closer investigation of each complication respectively showed the following results (see figure 1). It was found that in the teenage group there was a higher frequency of prolonged labour (10 vs 6.8 per cent), LBW (10.2 vs 3.7 per cent), obstructed labour (8.1 vs 4.5 per cent), EROM (5.3 vs 3.8 per cent), "poor condition of baby", premature birth (4.2 vs 1.9%), hypertonic labour (2.2 vs 1.3 per cent), malpresentation (1.5 vs 0.9 per cent), multiple pregnancy (1.9 vs 0.3%), "pendulous abdomen" (0.8% vs 0.0 per cent), preeclampsia (6.3 vs 3.9 per cent) and severe eclampsia (0.4 vs 0.0 per cent).

In contrast there was a lower frequency of big baby (5.4 vs 7.9 per cent), APH (0.8 vs 0.9 per cent) PPH (1.5 vs 2.8 per cent), fetal distress (1.5 vs 1.9 per cent), caesarean-section (0.4 vs 1.3 per cent) and hypertension. The differences found were tested with chi-square test or fisher's exact test to find out whether they were significant. LBW was the single complication

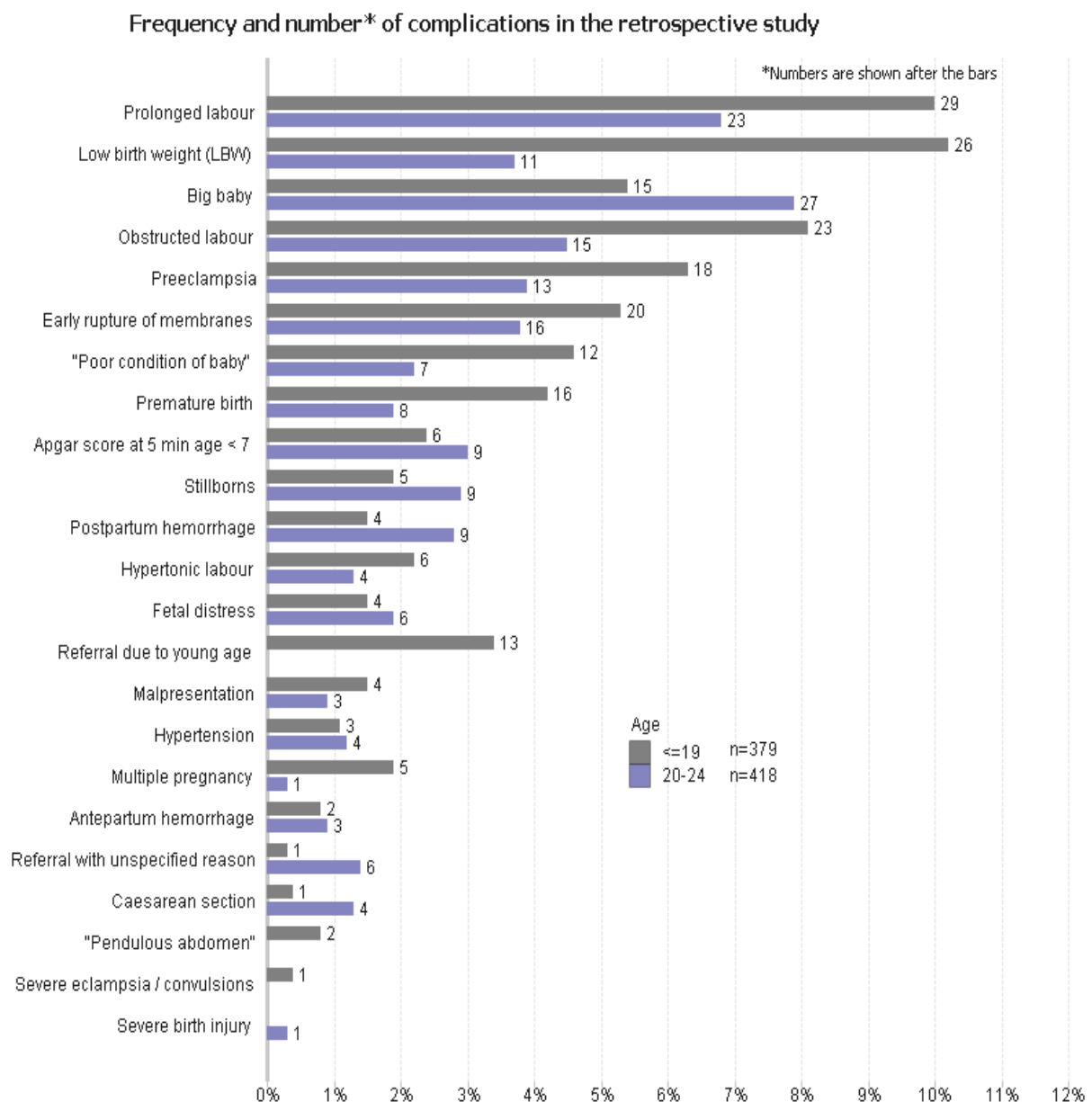


Figure 1. Number and frequency of obstetric complications found during the study period in the teenage group (n=379) and in the 20 to 24 year old group (n=418) respectively. Low birth weight was found significantly higher in the teenage group (p-value = 0.003)

found significantly higher in the teenage group (p-value = 0.003). To measure the strength of association an odds ratio was calculated with logistic regression method with a 95% confidence interval. It was found that the odds ratio for LBW was 2.9 (95% CI: 1.42 – 6.08). Implicating that compared to the 20 to 24 year old group the teenagers' odds for LBW was 2.9 times higher.

### Age-specific analysis

An age-specific analysis was also carried out for each complication, where each age group 14 to 19 were compared to the control group. Figure 2 – 6 show the obstetric complications that occurred or were noted as indication for referral in each age group respectively (the group of 14 year old are not shown in any figure because only one individual was included). In total 5 per cent (n=19) from the age group 19 and below are missing due to a gap in the maternity register where only age-group was marked and no specific age. The number in each age group do therefore not sum up to 379 instead it makes 360 individuals. Only one 14 year old was included from the maternity register, she had a spontaneous vaginal delivery with a healthy baby. Five 15 year olds were found, whereas 40 per cent were referred due to young age, while the remaining (60 per cent) had a spontaneous vaginal delivery with a healthy baby. In the group of 16 year old consisting of 13 individuals more than half (53.6 per cent) were either referred or had a complication during delivery and 46.2 per cent had a normal vaginal delivery with a healthy baby. A considerable higher frequency of obstructed labour was found among the 16 year olds compared to the control group (p-value= 0.084). Looking closer at the group of 17 year old women (n=55) a significantly higher rate (p-value= 0.008) of “poor condition” of baby was found counting for 11.4 per cent in the 17 year old group. Low birth weight was also found with a significant higher frequency counting for 20 per cent (p-value = 0.001) among the 17 year old. 52.7 per cent had a normal vaginal delivery with a healthy baby. In the 18 year old group (n=139) LBW was found with a significant higher rate with

11.8 per cent (p-value=0.008) compared to the 20 to 24 year old group. It was also more common with premature birth 6.5 per cent vs 1.9 per cent (p-value= 0.018). Other age-specific analysis did not show any significant differences when comparing the frequencies of each obstetric outcome.

Referral due to young age with no further reason was a common indication for referral when specifically looking at each age group. In age group 15 year old, 40 per cent of the women were referred due to young age, 15.4 per cent among the 16 year old women and 12.7 per cent among the 17 year old women. Compared to 0.7 per age group 18 year old. No one in the 19 year old group or among the controls were referred due to young age.

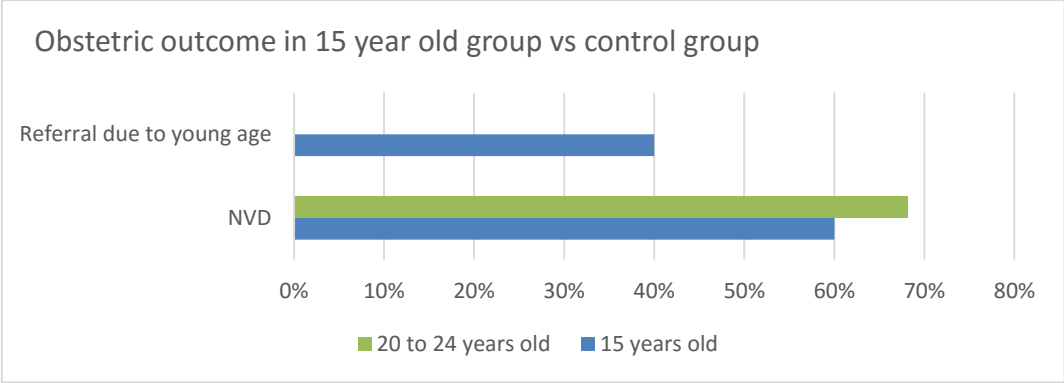


Figure 2. Frequency of obstetric outcome in the 15 year old group (n=5) compared to the 20-24 year old group (n=418). No specific complication occurred in the 15 year old group but 40 per cent were referred due to young age.

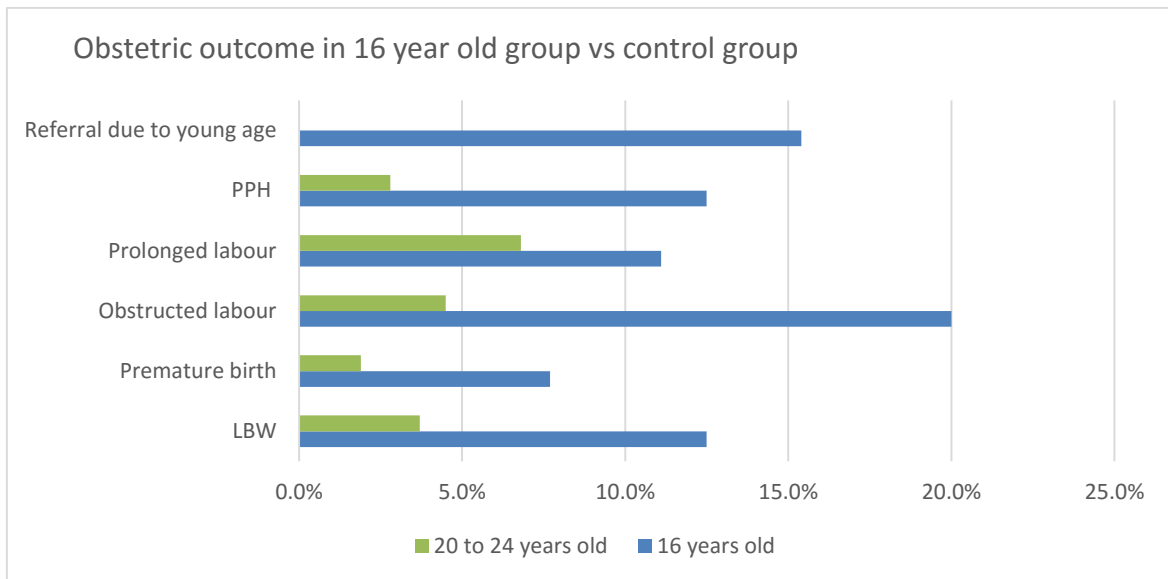


Figure 3. Frequency of obstetric outcome in the 16 year old group (n=13) compared to the 20-24 year old group (n=418). The percentage with NVD is not shown in the figure.

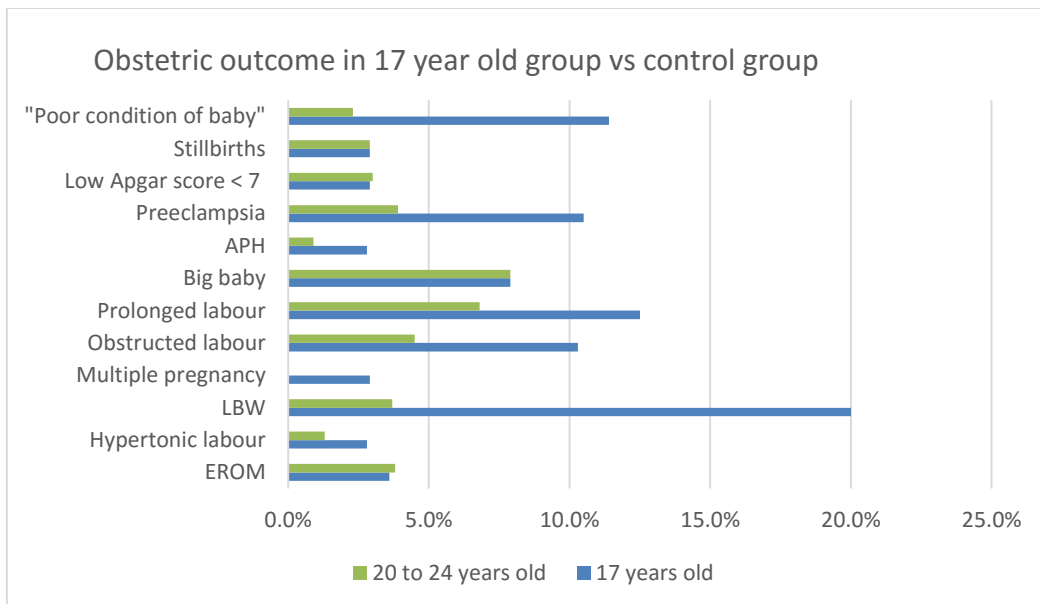


Figure 4. Frequency of obstetric outcome in the 17 year old group (n= 55) compared to the 20-24 year old group (n=418). The percentage with NVD is not shown in the figure.

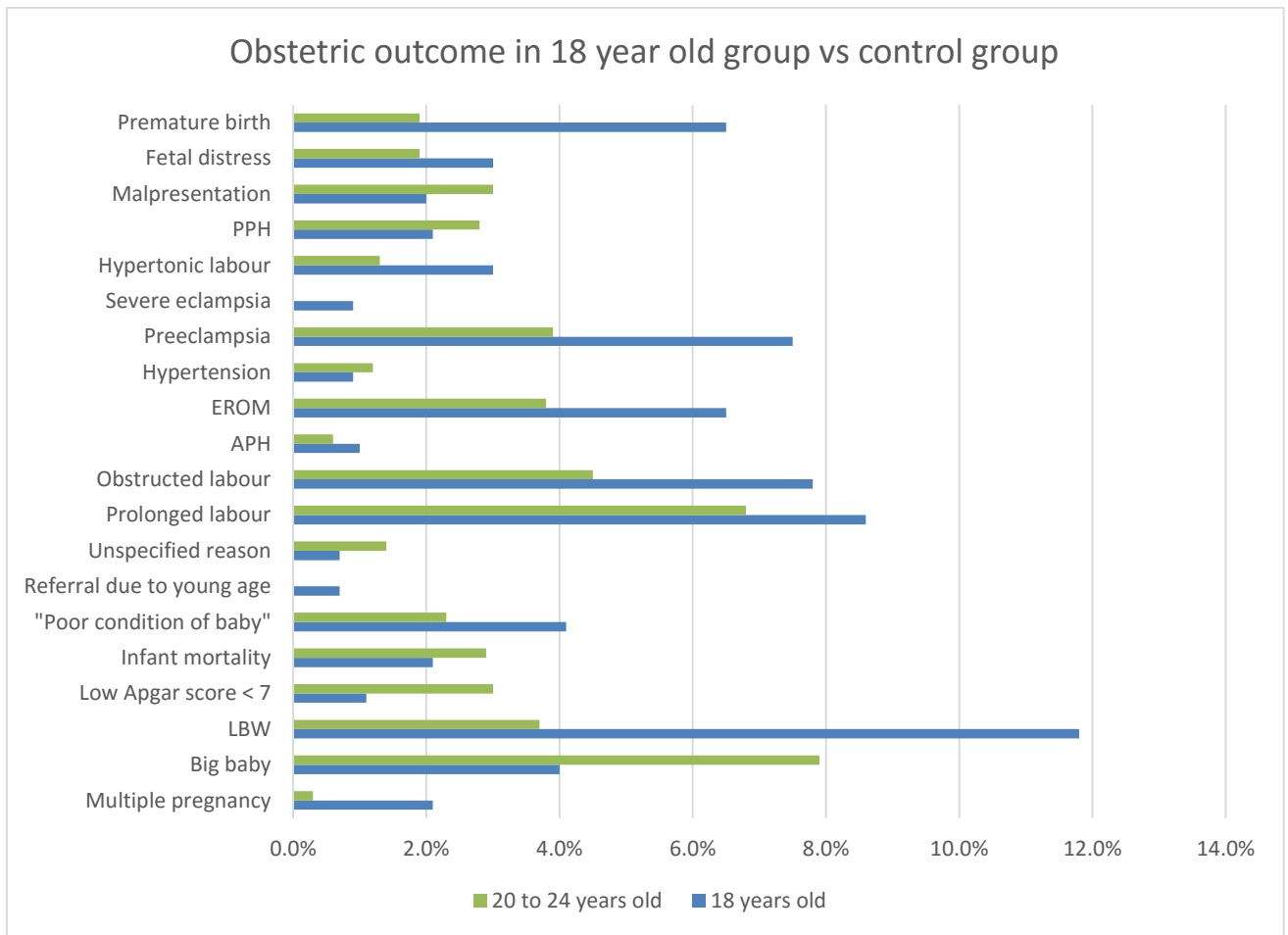


Figure 5. Frequency of obstetric outcome in the 18 year old group (n=139) compared to the 20-24 year old group (n=418). The percentage of NVD is not shown in the figure.

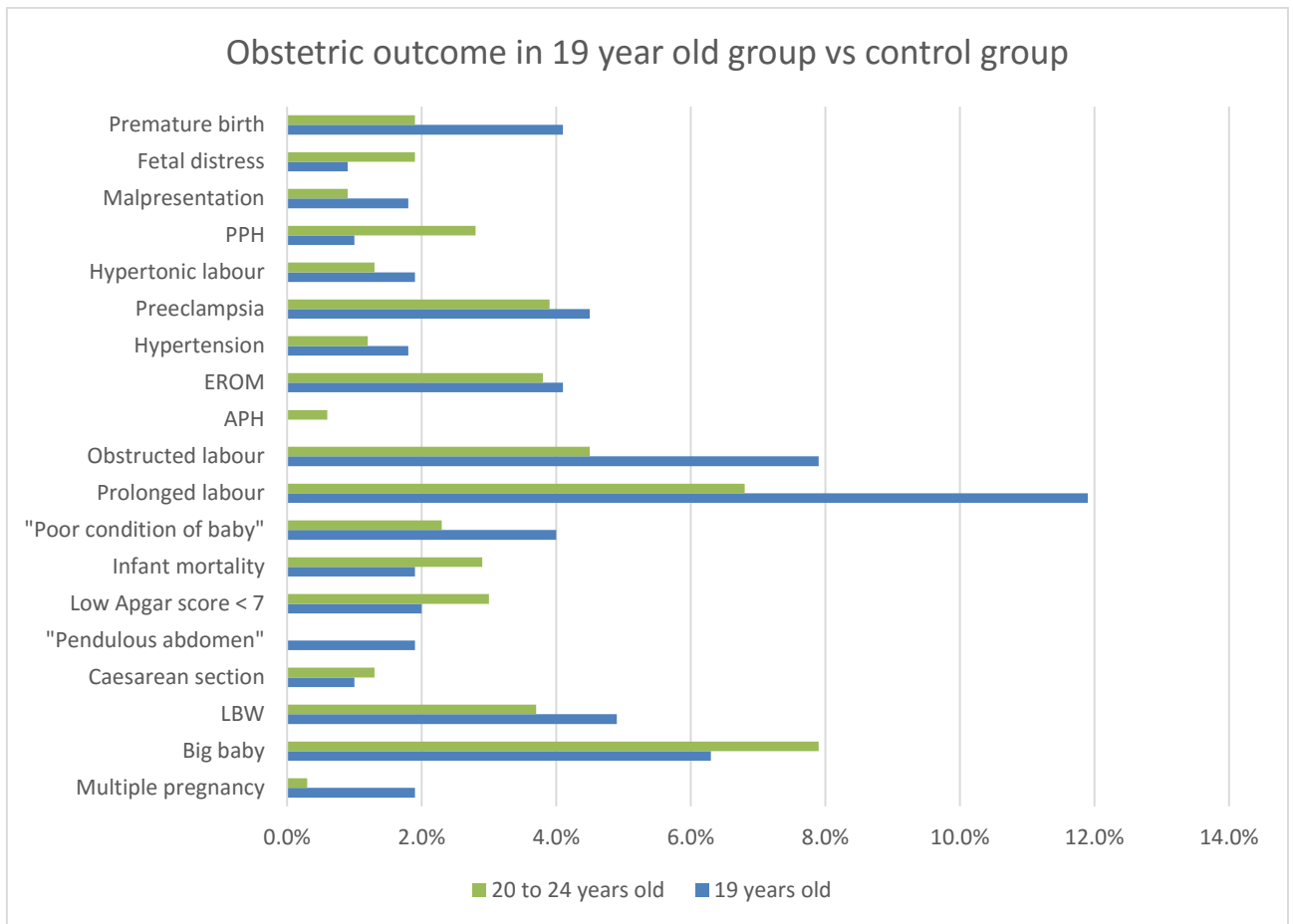


Figure 6. Frequency of obstetric outcome in the 19 year old group (n= 147) compared to the 20-24 year old group (n=418). The percentage of NVD is not shown in the figure.

### Condition of baby and infant mortality

During the time of study 258 alive infants were born at KHC IV in the teenage group. Five women (1.9 per cent) in the teenage group had twins, more than half of them (60 per cent) were referred postpartum. One women (0.3 per cent) in the older group had an expected multiple pregnancy and she was referred antepartum.

Of all infants born in the teenage group 1.9 per cent were stillbirths or died during the stay at the maternity clinic. A larger percentage of infant mortality occurred among the woman in their early 20s´ with 2.9 per cent of stillbirths or death during stay at the maternity clinic. The category poor condition of infant included grunting, asphyxia, high temperature and “unspecified poor condition”. In the teenage group 4.6 per cent (n=12) of the new-born had poor condition of any kind. In the older group the frequency was lower with 2.2 per cent



(n=7). Contrary to “poor condition” a higher frequency, 3 per cent (n=9) of low Apgar score was found in the age group 20 to 24 year old compared to the teenagers where 2.4 per cent had low Apgar score.

Neither the difference in mortality, poor condition of infant or low Apgar score was found significant when analysed with Fishers exact test. Poor condition of baby was the major cause 46.9 per cent (n=15), of referrals postpartum among all women.

Table 8. Frequency and number of the condition of baby, infant mortality and Apgar score below 7 at 5 minutes age.

Neonatal outcome:		Age group					
		age ≤ 19		20 - 24		Total	
		Number	Percentage	Number	Percentage	Number	Percentage
Births	Alive	258	98.1%	306	97.1%	564	97.6%
	<b>Mortality</b>	<b>5</b>	<b>1.9%</b>	<b>9</b>	<b>2.9%</b>	<b>14</b>	2.4%
	Total	263	100.0%	315	100.0%	578	100.0%
Diagnosis	Macerated stillbirth	2	0.8%	1	0.3%	3	0.5%
	Fresh stillbirth	1	0.4%	3	1.0%	4	0.7%
	Stillbirth or intrauterine death	1	0.4%	5	1.6%	6	1.0%
	Neonatal death	1	0.4%	0	0.0%	1	0.2%
	<b>Total poor condition</b>	<b>12</b>	<b>4.6%</b>	<b>7</b>	<b>2.2%</b>	<b>19</b>	3.3%
Condition of baby	Healthy	251	95.4%	308	97.8%	559	96.7%
	Grunting/severe grunting	4	1.5%	3	1.0%	7	1.2%
	Asphyxia	1	0.4%	0	0.0%	1	0.2%
	High temp	1	0.4%	1	0.3%	2	0.3%
	Unspecified	6	2.3%	3	1.0%	9	1.6%
	<b>Total poor condition</b>	<b>12</b>	<b>4.6%</b>	<b>7</b>	<b>2.2%</b>	<b>19</b>	3.3%
	Total	263	100.0%	315	100.0%	578	100.0%
Apgar score	Apgar < 7 at 5 minutes age*	6	2.4%	9	3.0%	15	2.7%

\*For 8 infants Apgar score was not registered which equals 2.6 per cent (n=7) in the teenage group and 0.3 (n=1) in the control group.

## Prospective part

### Characteristics among young adolescents delivering at Kasangati Health Centre Social and economic factors

Semi- structured interviews were carried out with the women admitted in labour.

Characteristics found were that the big majority in both age groups lived within 10 km from the health clinic (86.7 per cent and 94.8 per cent respectively), 50 per cent of the teenagers lived within 5 km compared to 71.1 per cent in the older group. The way of transport to KHC IV was also very similar in both groups. So called “boda boda” (motorcycle) was the transport most frequently used. No significant differences were found in distance or use of transport. Regarding housing condition, no difference that turned out to be significant were neither found comparing source of water or toilet facilitation.

Question on education was asked and since you still are not finished with secondary school until your 18 or 19 for plausible reasons a higher percentage of the younger women had lower education. It is however notable that 16.7 per cent of the teenagers had not finished primary school and adding it together with the women who had not begun secondary school, it sums up to one-third of all the teenage girls. In the 20-24 year old group the frequency who had not started secondary school was 13.2 per cent.

Half of the teenagers were unemployed, a frequency significant higher (p-value = 0.004) compared to the women between 20-24 years old, where the unemployment were 23.7 per cent. When asking for the total income of the whole household, to a lesser extent the teenage group knew the total income, which likely could be associated with the greater unemployment. Otherwise no significant difference was found in income.

A larger percentage of the older women were married. Around seventy-five per cent of the women in both groups were in a relationship but not married (cohabiting), most often living together with their partner (65.5 and 68.5 per cent). Two of the teenager that otherwise lived

by their own had during their pregnancy moved back to their parents' home. Noteworthy is that more teenagers were single, almost 20 per cent compared to only 2.6 per cent among the older.

There were no significant difference in the average number of antenatal visits. The teenagers went to 3.45 antenatal visits compared to 3.64 in the 20 to 24 year old group (p-value= 0.910).

Table 9. Characteristics for women coming to KHC IV to give birth.

Characteristics for women at KHC IV		age group			
		under age 19 (n=30)		20-24 years (n=38)	
		Count	Column N %	Count	Column N %
How far away from KHC IV do you live?	less than 1 km	5	16.7%	8	21.1%
	1-5 km	10	33.3%	19	50.0%
	6-10km	11	36.7%	9	23.7%
	11-15km	2	6.7%	2	5.3%
	more than 15 km	2	6.7%	0	0.0%
How do you live?	on my own	1	3.4%	1	2.6%
	with my partner	19	65.5%	26	68.4%
	with my relatives/friends	8	27.6%	9	23.7%
	with my parents	1	3.4%	2	5.3%
	family/friends	0	0.0%	0	0.0%
	no stable place to live	0	0.0%	0	0.0%
Main water source for household	Tap water	15	50.0%	19	50.0%
	Tap water + tank	0	0.0%	1	2.6%
	Tap water + well/pond	0	0.0%	2	5.3%
	Tank	2	6.7%	4	10.5%
	Well/pond	3	10.0%	4	10.5%
	Borehole	8	26.7%	6	15.8%
	Spring	2	6.7%	2	5.3%
Type of toilet	Flush toilet	3	10.7%	4	12.1%
	Pit latrine	25	89.3%	27	81.8%
	Both	0	0.0%	2	6.1%
Marital status	Married - monogamous	2	6.9%	6	15.8%
	Married - polygamous	0	0.0%	0	0.0%
	Cohabiting	22	75.9%	29	76.3%
	Single	5	17.2%	1	2.6%
	Separated/divorced/widow	0	0.0%	1	2.6%
	other	0	0.0%	1	2.6%
	never gone to school	0	0.0%	0	0.0%

Highest level of education	primary - unfinished	5	16.7%	2	5.3%
	primary - finished	5	16.7%	3	7.9%
	secondary - unfinished	17	56.7%	19	50.0%
	secondary- finished	2	6.7%	7	18.4%
	tertiary institution	1	3.3%	5	13.2%
	university	0	0.0%	2	5.3%
Occupation	student	2	6.7%	0	0.0%
	house wife	9	30.0%	10	26.3%
	farmer	0	0.0%	2	5.3%
	government employee	0	0.0%	0	0.0%
	private business employee	1	3.3%	13	34.2%
	self-employee	3	10.0%	4	10.5%
	<i>Total employed</i>	<i>4</i>	<i>13.3%</i>	<i>17</i>	<i>44.7%</i>
	<b>unemployed</b>	<b>15</b>	<b>50.0%</b>	<b>9</b>	<b>23.7%</b>
other	0	0.0%	0	0.0%	
Income in your household (USH)	< 50,000*	1	3.3%	1	2.6%
	50,001 - 100,000	5	16.7%	8	21.1%
	100,001 - 200,000	5	16.7%	4	10.5%
	200,001 - 500,000	6	20.0%	11	28.9%
	500,001 - 1,000,000	2	6.7%	6	15.8%
	Do not know	11	36.7%	8	21.1%

\*1000 USH (Ugandan shilling) = 0.29 USD = 2.5 SEK (16dec2015)

## Pregnancy

Questions on the women's attitude and control over their pregnancy was asked. The results from the two groups were similar with around two-thirds in both groups answering that the pregnancy was planned. On the question whether the pregnancy was wanted or not, 73.3 per cent in the teenage group answered yes and 78.4 per cent answered yes in the 20-24 year group. The proportion of women wanting their pregnancy compared to the proportion who planned it was higher, which of course is a common case. Of more interest is that the majority of the women had never used contraceptives, 80 per cent among the teenagers and 81.6 per cent among the 20-24 year olds. Comments like "I didn't want to be pregnant in the beginning, but then I just went on with it, and I wanted", describes the difficulty in answering

the question on wanted pregnancy in a “yes/no” form. An additional open question was asked for the women that answered that they didn’t want to be pregnant. Among the answers three categories could be found; answers like “it was an accident”, “we didn’t use contraceptives” or “it just happened” were categorised as “accident”. Then answers “my husband wanted” was one group and rape was another, results can be viewed in table 10.

Table 10. Answers regarding wanted/unwanted pregnancy from the semi-structured interview.

Questions on pregnancy		age group			
		under age 19		20-24 years	
		Count	Column N %	Count	Column N %
Did you plan your pregnancy?	No	12	40.0%	16	42.1%
	Yes	18	60.0%	22	57.9%
Did you want to get pregnant?	No	8	26.7%	8	21.6%
	Yes	22	73.3%	29	78.4%
Did the father of your child want you to be pregnant?	No	2	6.7%	4	10.5%
	Yes	28	93.3%	34	89.5%
If not wanting to be pregnant, why did you get pregnant?	Accident	3	37.5%	6	75%
	Husbands wish	3	37.5%	2	25%
	Rape	1	12.5%	0	
	No answer	1	12.5%	1	12.5%
Contraceptive use	Never used	24	80.0%	31	81.6%
	Yes, before I got pregnant	6	20.0%	6	15.8%
	Both before, but also at the time I got pregnant	0	0.0%	1	2.6%

A higher proportion in the teenage group did not wish for their pregnancy 26.7 per cent compared to 21.6 per cent. Among them 50 per cent answered that either their husband wanted her pregnancy or that they were victim of rape. In the 20 to 24 year old group 25 per cent had answered that their husband wanted her to be pregnant.

**Medical history**

The women were asked about previous and current diseases. No one in either of the groups had any known bleeding disorder, diabetes, heart disease, tuberculosis, cancer or any kind of kidney disease or mental illness. The two groups answered the following regarding the diseases asked for; 23.3 per cent in the young group and 18.4 per cent in the older group said they had have diarrhoea during pregnancy. 3.3 vs 5.3 per cent had experienced respiratory infection. 6.7 vs 2.6 per cent had HIV. 36.7 vs 31.6 per cent had malaria during pregnancy. 13.3 vs 21.1 per cent had STD during pregnancy. 3.3 vs 2.6 per cent had a hypertension disorder. None of the differences were calculated to be significant with a p-value below 0.05

### **Tobacco, alcohol or use of narcotic**

None of the women in either group said they smoked tobacco, same for any narcotic use.

Alcohol use during pregnancy was found more frequent in the teenage group where 13.3 per cent and 7.9 per cent had used alcohol. The amount used varied a lot between the women who said they had used alcohol.

### **Obstetric outcome**

Out of the teenagers that came to Kasangati Health Centre IV to give birth 83.3 per cent gave birth at the health centre and 16.7 per cent were referred to Mulago hospital. In the control group 92.1 per cent gave birth at KHC IV and 7.9 per cent were referred (see table 11). No one in either of the groups gave birth before attendance (BBA).

Table 11. Number and frequency where the deliveries took place.

		Delivery took place			
		At KHC IV		Referral to Mulago hospital	
		Number	Percentage	Number	Percentage
Age group	≤19 years	25	83.3%	5	16.7%
	20-24 years	35	92.1%	3	7.9%
	Total	60	88.2%	8	11.8%

Among the teenagers the majority, 73.3 per cent had a normal vaginal delivery without any complications. Referrals among the teenagers accounted for 16.7 per cent indicating complication and 10 per cent had a complication but were never referred (see table 12). When comparing with the women in age group 20 to 24 the total complication/referrals is similar, but the distribution different, fewer were referred and instead more delivered at the health centre. None of the differences were found significant with a p-value below 0.05.

Table 12. Number and frequency of complications and expected complications found.

Outcome	Age group			
	≤19 years		20-24 years	
	Count	Percentage	Count	Percentage
NVD at KHC IV	22	73.3%	28	73.7%
Complication but not referred	3	10.0%	7	18.4%
Referred	5	16.7%	3	7.9%
<b>Total complication/referrals</b>	<b>8</b>	<b>26.7%</b>	<b>10</b>	<b>26.3%</b>
Total	30	100.0%	38	100.0%

### Obstetric complications

The specific complications that occurred can be viewed in figure 7. A noteworthy percentage (10.7 per cent) of the teenagers had preeclampsia. Low birth weight just as in the retrospective study was observed at a higher rate in teenage group. With Fishers exact test the frequency of LBW was found significant higher (p-value = 0.02). In the teenage group 4 out of 22 live infants (18.2 per cent) weighed less than 2500 grams compared to no incidence of LBW in the 20 to 24 year old group. Premature birth (delivered before week 37 + 0) occurred in 34.8 per cent in the young group compared to 31 per cent in the 20 to 24 year old group. In contrary to the retrospective study, prolonged labour were more frequent (though not significantly found) among the primiparous 20 to 24 year old women.

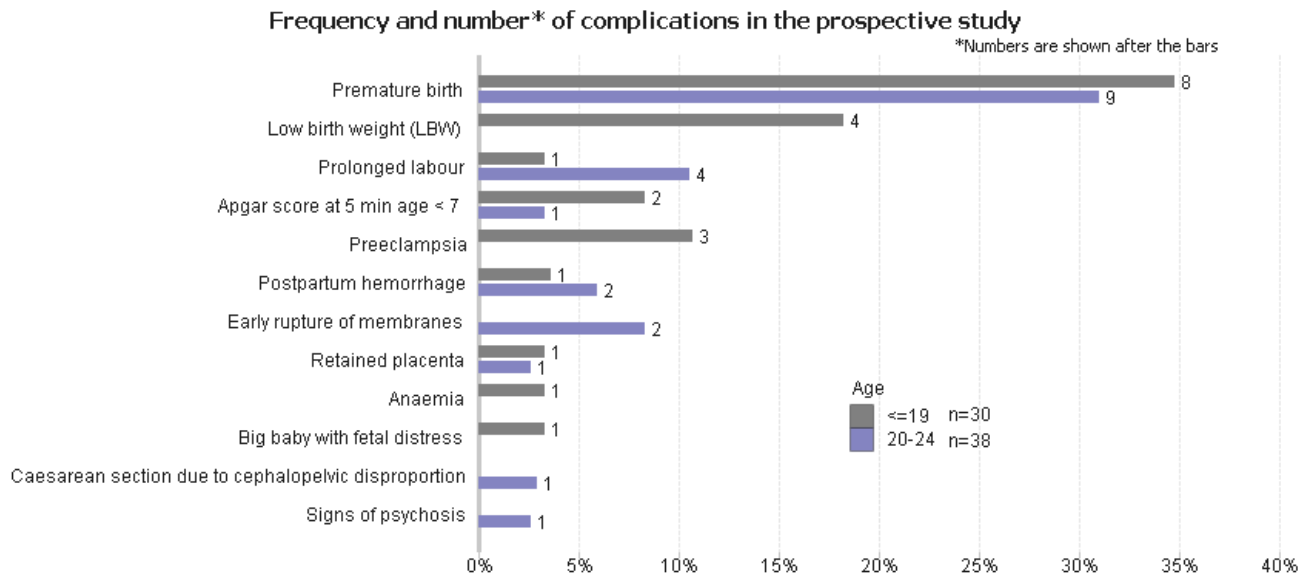


Figure 7. Numbers and frequency of obstetric complications found in the prospective study in both the teenage group ( $\leq 19$ ) and in the 20 to 24 year old group.

### Neonatal outcome

Apgar score and infant mortality were registered to compare the neonatal outcome. One stillbirth occurred, the majority gave birth to live infants, among them two infants (8.3 vs 3.3 per cent in the two age-groups) scored below 7 points counting Apgar score at 5 minutes, both of the babies recovered within 30 minutes.



## Discussion and conclusions

### Young maternal age and low birth weight

The aim of this research was to find out whether it is more common with an adverse obstetric outcome for primiparous adolescents compared to primiparous woman in their early 20's. The study population was teenagers giving birth at Kasangati Health Centre, located 14 km north from Kampala. Both a retrospective and a prospective study was carried out. In spite of the fact that maternal mortality in Uganda is high with a maternal mortality ratio at 343 (10), in neither of the two studies any maternal death occurred. The complication found associated with young age was low birth weight (LBW) (p-value = 0.003) with a 2.9 times increased risk for LBW among teenagers compared to the 20 to 24 year old women. That teenagers have an increased risk for LBW is found in previous studies (3, 18, 19, 30). The results from the prospective study also showed an association between young age and LBW (p-value= 0.02). Low birth weight is a consequent of preterm birth or intrauterine growth restriction or both. (11)

When looking closer in the prospective study it was found that 50 per cent of the infants with low birth weight were delivered before week 37 + 0. In the retrospective study when looking at the total group of women giving birth to an infant with LBW it was found that 18.9 per cent were diagnosed with premature birth, while 81.1 per cent were not. However a discrepancy was found in the maternity register, where a total of 11.3 per cent of all women had given birth before week 37, which by definition says that they delivered preterm. In 74.4 per cent of these cases there was no comment that a preterm delivery occurred and therefore not included in the group premature birth in the study. Of the mothers that gave birth to an infant with LBW, 13.5 per cent were not registered as premature births, though registered as given birth before gestational week 37 + 0. Due to uncertainty in determining gestational age and the information was found to be limit in its reliability, it's difficult to make any further

conclusions whether the cause is correlated to intrauterine growth restriction or to premature birth.

Neither the cause nor the infants' weight was registered when stillbirth had occurred. Since LBW is an indirect cause of neonatal death, the frequency of LBW would reasonable be higher if it could have been taken into account. But since it was a higher frequency of stillbirth in the group with 20 to 24 year old it would probably especially affect that group.

As already discussed above, conclusions regarding the cause of LBW in the teenage group in this study remains unanswered. Earlier studies have shown an increase risk for both preterm labour and small for gestational age among teenagers. One discussion regarding the mechanism is that the growing fetus competes with a still growing teenager resulting in LBW. (22)

Low birth weight in infant is a major indirect cause to neonatal deaths, it contributes to 60 to 80 per cent of all neonatal deaths (4). In this study did LBW also translate into a higher incidence of poorer neonatal outcome? Among the infants with LBW a higher percentage (p-value= 0.002) had low Apgar score compared to the infants with normal birth weight (8.8 vs 0.4). Also comparing the incidence of "poor condition of baby" a higher rate in the group LBW compared to the infants with normal birth weight were registered with either grunting, severe grunting, asphyxia, high temperature or just "poor condition". Also this difference was found statistically significant (p-value= 0.016) indicating that LBW is associated with poor neonatal outcome.

### Other associations between adolescents and obstetric outcome

Besides low birth weight no obstetric complication was found associated with young maternal age when looking at the total group of teenagers. Consistently with other studies a tendency that it's more common with premature birth among teenagers than women 20 to 24 years old was shown in this study. A significant higher frequency of premature birth was found in the

18 year old group (p-value= 0.018). Though due to limits in reliability when determining gestational age, attempts drawing further conclusions should be cautious.

The frequency of preeclampsia was found higher in both studies. Earlier studies show conflicting results regarding the incidence of preeclampsia. Again studies done in high income countries show no correlation with young maternal age, while a few studies in low-income countries have observed a higher incidence (12, 30). Though when adjusting for parity the incidence was not found significant higher in these studies.

Obstructed labour which is one indication for caesarean section was found higher in the teenage group in the retrospective study, though not in the prospective study, whereas only one women in age group 20 to 24 were diagnosed with CPD and had a caesarean. There is no support from previous studies that adolescents have an increased risk for obstructed labour, accept for the women in very young age; fifteen years and below (13). When looking closer to each age-group respectively a considerable higher frequency of obstructed labour was found among the 16 year olds compared to the control group (p-value= 0.084). In the age group of 14 and 15 year old women the sample size was very small (n=1 and n=5) and to be able to draw any further conclusions whether or not the very young adolescents are at a higher risk for obstructed labour further studies must be done with focus on the youngest.

Regarding prolonged labour the two studies showed contradictory results. In the retrospective study a tendency of a higher incidence of prolonged labour in the teenage group was observed, with the highest proportion in the age-group of 17 year old women, 12.5 per cent versus 6.8 per cent in the 20 to 24 year old group. In the prospective study the reverse incidence was found. There is not much support that teenagers compared to women in their early 20`s have any increased risk for prolonged labour. A study suggest the contrary, showing that teenagers have a shorter progress of labour compared to primiparous 20 to 24 year old. (12)

A lower incidence of caesarean section among the teenagers compared to their older counterpart was found in the retrospective study, which is coherent with previous research. Since a considerable proportion of the women with complication or an expected complication were referred the number of women who actually had a caesarean section is reasonable higher.

Looking closer at the neonatal outcome “poor condition” of infant was found with a significantly higher rate (p-value= 0.008) in the group of 17 year old women compared to the 20 to 24 year old women, 11.4 per cent in the 17 year old group versus 2.3 per cent. These finding indicates need for further studies with possibility for dividing teenagers into young and older teenagers.

### Referrals due to young age

When observing the whole group of teenagers a fairly small percentage were referred with indication young age, only 3.4 per cent. But obviously looking age specific the percentage rises. A considerable part of the 15 year old women were referred with only indication “young age” (40 per cent). The rates then drops along with older age. Among the 16 year old and 17 year old women the percentage is however an important part with 15.4 per cent and 12.7 per cent respectively. Among the 18 year old the percentage reduces to 0.7 per cent. Since we don't have more specified information, but can reasonable assume that they might have had specific symptoms that made the midwives refer them, since most of the women in age group 15 and 16 were not referred (60 and 46.2 per cent respectively). A follow up on this women would be of most interest to find out whether or not referring due to young maternal age is the safest way to take care of these women.

### Social aspects of teenagers and pregnancy

From the semi-structured interviews it was found that the teenagers arriving to KHC IV to give birth were to a lesser extent than the women in their 20s' employed, had a lower

educational level and knew less about their household's income. The teenagers were to a lesser extent married and more often single. Most of the women were though living together with their partner. In the teenage group there was a higher rate that didn't want their pregnancy. Among the group of women that had an unwanted pregnancy, it was more common that the teenagers answered that their partner wanted compared to women in their early 20's. It's difficult to draw conclusions from a small material and only cautious attempts should be done. However above findings show a tendency that pregnant teenagers are a vulnerable group which could influence the obstetric outcome. The exposure and consequences of being pregnant in young age, by quitting school and endure shame also highlights the importance of improving the care given to young women.

No earlier study investigating the obstetric outcome in this age group below 19 years have been done at this health care level in Uganda. The knowledge about the risk of maternal death differs considerably depending on where you live, with a fourfold higher rate of maternal deaths in a low-income country compared to a high-income country. The top three causes to maternal death are hemorrhage, hypertension disorder and sepsis. (8) It's therefore reasonable to investigate how obstetric complications differ depending on living conditions.

### Strength and limitations

Interviews were either done antepartum or postpartum, which could affect the answers being given. If the interview was carried out before delivery there might be a risk that the women were inhibited to answer truthfully, thinking that the care giving during labour would be affected. Also the mental state of a women hours before giving birth (for their first time) have affected the answers given, especially questions about their pregnancy. Unfortunately it was difficult to interview all women in an environment where they could be anonymous.

Reasonably this influenced the answers given. It was also noted that the information on age given in the semi-structured interview could differ from the one in the maternity register.

Understanding that there is a lot of shame put on a woman becoming pregnant before age 17 resulting in girls telling that they are older. Since there is no other available method than collecting information on age than verbally, information on young age is not completely reliable.

One weakness of the method used in the prospective part is the obvious reasons that having labour pains made it harder to recruit women before they had given birth. This might have created a selection of the women included in the study, in a lesser extent including the women referred compared to the women that carried out the delivery at KHC IV, with the consequence excluding women with an increased risk of having an obstetric complication. Comparing the women that were excluded a difference is noticed, where a lower percentage within the group referrals were interviewed. Among those not interviewed 61.5 per cent were referrals compared to 32.4 per cent not referrals. In defence of method used this difference was not found significantly higher. Then again this could be due the small number of participants.

There were some difficulties in following the labour process. There were no collective list or record over the women admitted to the maternal clinic. The clinical notes were written in free text in the woman's own antenatal card or booklet and could vary in extent. Date was written, but not always time, which could make it difficult to follow the process of labour. No partogram was followed during labour.

Due to reasons such as access to reliably data studies on this subject is mostly done from larger hospitals in the major cities, this limits the external validity. This study takes place in a setting where it's common with childbearing in teenage years. By performing a semi-structured interview and observing the obstetric outcome it was possible to discuss possible influencing socio-economic factors. By choosing a semi-structured interview design instead of a questionnaire, made it possible to get a qualitative insight.

## Conclusions

In this study it was found that:

- Young maternal age is associated with low birth weight among primipara. There is a need for further research with more developed measurements of gestational age to identify preterm birth and intrauterine growth restriction to find out the cause of low birth weight in this group.
- No other obstetric complication was found associated with young maternal age when comparing the whole teenage group with the 20 to 24 year old primiparous women.
- It is important to implement a clear and united classification system for registration and diagnosis in the maternity register at Kasangati Health Centre IV. For the future it would facilitate the understanding and follow up of the referrals.
- There is a need of feedback from the referral hospital to find out the actual obstetric outcome and to find out what support there is to refer with indication “young age”. Feed-back will increase knowledge on best practices and implement good routines.
- There is a need for more research with larger sample size to enable better age-specific analysis. This would make it possible to find out at what age you can be delivered safely at Kasangati Health Centre. How young is too young?

## Populärvetenskaplig sammanfattning

### **Förlossningskomplikationer hos förstföderskor i tonårsåldern jämfört med förstföderskor i 20 till 24 års ålder**

Har tonåringar som föder barn för första gången oftare komplikationer i samband med sin förlossning jämfört med förstföderskor i 20 till 24 års ålder? I den här studien genomförd på en förlossningsklinik en och en halv mil utanför Ugandas huvudstad Kampala jämfördes förstföderskor som är 19 år eller yngre med förstföderskor mellan 20 till 24 år. I Uganda är befolkningen ung och nästan två tredjedelar har skaffat barn innan de fyllt tjugo år. Två olika metoder användes i studien för att få fram underlag till en jämförelse mellan de två åldersgrupperna. Den ena metoden gick ut på att samla in ett års material från patientjournaler och jämföra förlossningens utfall; huruvida komplikation uppstod, typ av komplikation eller om det var en normal förlossning. Med den andra metoden observerades förstföderskor i de aktuella åldersgrupperna som kom till kliniken för att föda. Efter eller innan förlossningen intervjuades också kvinnorna med frågor om arbete, utbildning, tidigare sjukdomar och om graviditeten var önskad eller inte.

Totalt samlades information från 379 tonåringar och 418 tjugo till tjugofyra-åringar in från journaler. Denna del av studien visade att det totalt sett var fler tonåringar (35,6 procent) än kvinnor i 20 till 24 års åldern (28,9 procent) som fick en komplikation eller blev remitterad på grund utav misstänkt komplikation i samband med förlossning. Dock var skillnaden för liten för att det med god säkerhet ska kunna sägas inte bero på en slump. Jämförelsen visade däremot att tonåringarna oftare än kvinnorna i 20 till 24 års ålder födde barn med låg födelsevikt (mindre än 2500g), 10,2 respektive 3,7 procent. Denna skillnad var statistisk signifikant och det är alltså med mycket liten sannolikhet att skillnaden bara skulle vara en slump. Även den observerande metoden som inkluderade 30 tonåringar och 38 tjugo till



tjugofyra åringar visade på att låg födelsevikt var vanligare hos tonåringar, 18.2 procent.

Bland de äldre kvinnorna fanns inga med låg födelsevikt. Dock var materialet litet. Resultatet stöds av tidigare forskning som också visat på en högre risk för låg födelsevikt hos barn till tonåringar. Låg födelsevikt beror antingen på att barnet föds för tidigt eller att fostrets tillväxt är nedsatt. På grund av osäker datering av kvinnornas graviditetslängd är det svårt att dra några slutsatser kring orsaken i denna studie.

Från intervjuerna framkom att de två grupperna i många avseenden var lika, men att tonåringarna i större uträkning var arbetslösa. Det fanns även en tendens att fler hade lägre utbildning, var ogifta och hade oönskade graviditeter.

Mer forskning behövs för att kunna fastställa orsaken till varför tonåringar oftare föder barn med låg födelsevikt. Det vore önskvärt med en uppföljning av de tonåringar som skickades till ett större sjukhus för att ta reda på huruvida remitteringsförfarandet av tonåringarna på Kasangati Health Centre genomförs på bästa sätt. De flesta tonåringar i denna studien var 18 och 19 år gamla, för att inhämta säkrare resultat om de allra yngsta tonåringar krävs ytterligare studier med ett större urval.

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# Appendix I – Questionnaire for semi structured interview and medical protocol

## Questionnaire

This is a survey that is included in a study on complications associated to labour among young women at Kasangati Health Centre IV. It would be very appreciated if you would like to participate by answering the following questions in this survey.

You will be anonymous and no one will be able to see your specific answers. Either you choose to participate or not will not in any way affect your care being given at Kasangati Health Centre IV.

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Patient/ID no: \_\_\_\_\_ Verbal consent: \_\_\_\_\_

- 1) **How old are you?** \_\_\_\_\_ (years)
- 2) **Is this the first time for you giving birth?**  
yes  no   
If no, how many times before have you been given birth? \_\_\_\_\_
- 3) **How did you arrive to Kasangati Health Centre IV?**  
Walking   
By bicycle   
By bodaboda   
By car   
By bus/taxi   
Other (please specify): \_\_\_\_\_

### Living condition

- 4) **How far from Kasangati Health Center IV do you live?**  
Less than 1km (<0,6miles)   
1-5km (0,6-3,1miles)   
6-10km (3,7-6,2 miles)   
11-15km (6,8-9,3 miles)   
More than 15km (>9,3miles)
- 5) **How do you live?**  
On my own   
With my partner   
Living in the home of my relatives/friends   
Living in the home of my partners relatives/friends   
No stable place to live   
Other: \_\_\_\_\_

6) Number of people in your household: \_\_\_\_\_

7) In your household...

a. What is your source of water?

Tap water  Springs  Well/pond  Borehole  Other: \_\_\_\_\_

b. Do you have a toilet at home? yes  no

c. If yes, what type of toilet do you have? Flush toilet  Pit latrine

### **Marital status**

8) What is your marital status?

Married – monogamous

Married - polygamous

Cohabiting

Single

Separated/Divorced/Widowed

Other? (please specify): \_\_\_\_\_

### **Education and work**

9) What is the highest level of education you have?

Never gone to school

Primary school

Finished  Unfinished

Secondary school

Finished  Unfinished

Tertiary institution

University

10) What is your occupation?

Student

House wife

Farmer

Government employee

Private business employee

Self-employed

Unemployed

Other? (please specify): \_\_\_\_\_

Employed, state type of work: \_\_\_\_\_

11) What is the total income/month in your whole household (Ush)?

<50 000

50,001-100,000

100,001-200,000

200,001- 500,000

500,001-1,000,000

>1,000,000

Do not know

## **Pregnancy**

The following questions is about your pregnancy, some questions may be difficult to answer but please try to answer as much as you can.

**12) Did you plan your pregnancy?**

Yes  No

**13) Did you want to get pregnant?**

Yes  No  If no, why did you get pregnant? \_\_\_\_\_

**14) Did the father of the child wish for you to be pregnant?**

Yes  No  Do not know

**15) Do you use contraceptives?** (e.g. condom, birth control pills etc)

a. Before getting pregnant? Yes  No  Do not know

b. At the time when you got pregnant? Yes  No  Do not know

**16) Have you attended antenatal meetings?**

a. Yes  No  How many? \_\_\_\_\_

b. If No, what was your reason for not attending? \_\_\_\_\_

**17) Have you been pregnant before?**

a. Yes  No

b. How many times? \_\_\_\_\_

**18) Have you had a miscarriage?** (loss of child before week 28)

a. Yes  No

b. How many times? \_\_\_\_\_

## **Previous pregnancy**

If you have given birth before please answer the following questions. If you have not given birth before you can go directly to medical background.

Regarding your earlier pregnancy/ies and/or labour:

**19) Was it complicated?** Yes  No

a. If yes, in what way? \_\_\_\_\_

**20) Did you have a postpartum bleeding?** Yes  No

**21) Did you get severe lacerations?** Yes  No

**22) Did you have hypertension?** Yes  No

**23) Did you have a caesarean?** Yes  No

## **Medical background**

**24) Do you have any of the diseases listed below? (you can mark more than one option)**

- Diabetes
- Hypertension disorder
- Kidney disease
- Cancer
- Heart disease
- Sickle cell anemia
- Bleeding disorder ( i.e. haemophilia)
- Diarrhoea
- Respiratory infection
- HIV
- Malaria
- STD (like chlamydia, gonorrhea, HPV, Syphilis, genital herpes)
- Tuberculosis
- Mental illness
- Other, please specify: \_\_\_\_\_

**25) If you have diabetes...**

- a. When did it start? Before your pregnancy  During your pregnancy
- b. If it started before, please state the number of years with diabetes: \_\_\_\_\_
- c. Do you have treatment with insulin? Yes  No
- d. If yes, state the number of years with treatment: \_\_\_\_\_

**26) Have you had urinary tract infection during pregnancy?**

- a. Yes  No
- b. If yes, how many times during your pregnancy? \_\_\_\_\_
- c. Was it completely treated? Yes  No

**27) Do you take any medication regularly?**

- a. Yes  No
- b. If yes, what kind / name? (if more than one, please write down all of them in the box below)

Medicine	Dosage	During current pregnancy (Yes/No)

**28) Have you visited anyone for medical care regarding your pregnancy before coming to KHC IV?**

- No
- Yes, another hospital (please specify which) \_\_\_\_\_
- Yes, village health team /community health worker
- Yes, private health facility
- Yes, government health center
- Yes, pharmacy/self-prescription
- Yes, traditional birth attendants
- Yes, Other (please specify) \_\_\_\_\_

**Tobacco, alcohol and narcotic**

**29) Do you smoke tobacco?**

- a. Yes  No
- b. For how many years? \_\_\_\_\_
- c. Number of cigarettes per day: \_\_\_\_\_
- d. Have you smoked cigarettes during pregnancy? Yes  No

(1 Standard drink = 1 can beer (330 ml) at 5% or 1 glass wine (140 ml) at 12% or 1 shot spirits (40 ml) at 40%)

**30) Have you used alcohol during pregnancy?**

- a. Yes  No
- b. How often have you had a drink containing alcohol during pregnancy?  
Monthly or less  2-4 times a month  2-3 times a week  4 or more times a week
- c. Approximately how many *standard drinks* do you drink each time you drink? \_\_\_\_\_

**31) Have you used any narcotics (i.e cannabis, marijuana, psychoactive substances) during pregnancy?**

- a. Yes  No
- b. What is the name of the narcotic used? (you can write down more than one): \_\_\_\_\_  
\_\_\_\_\_
- c. Approximately how many times during your pregnancy? \_\_\_\_\_



**Nutrition**

**32) How often have you had a meal of food during your pregnancy?**

- a.  $\geq 3$  times per day
- b. 1-2 times per day
- c.  $< 1$  time per day

**33) Before you became pregnant, how often did you have a meal of food?**

- a.  $\geq 3$  times per day
- b. 1-2 times per day
- c.  $< 1$  time per day

**34) What was your body weight before pregnancy? \_\_\_\_\_ kg**

**Arrival to Kasangati Health Centre IV**

**35) What were your reasons for coming to Kasangati Health Centre IV?**

Contraction  Loss of water  Bleeding  Other \_\_\_\_\_

# MEDICAL PROTOCOL

## General

Age\_\_\_\_\_ Gravida\_\_\_\_\_ Parity\_\_\_\_\_

## Antenatal Information

Weight loss during pregnancy

High BP during pregnancy

Low weight gain during pregnancy

Massive weight gain during pregnancy

Antenatal meeting	1	2	3	4	5	6	7	8
G-week								
Weight								
BP								

Past surgical history: Operations (type)\_\_\_\_\_

## **Fetus**

Large for gestational age

Small for gestational age

## Delivery

Date of delivery\_\_\_\_\_ Time\_\_\_\_\_ Birth attendant \_\_\_\_\_

Number of completed gestational weeks \_\_\_\_\_

General condition \_\_\_\_\_

Singelton\_\_\_\_\_ Twins\_\_\_\_\_

## **Delivery starts**

Spontaneously  Induction  Sectio before pain onset  Acute or elective

Premature rupture of membranes (beyond 37 weeks gestation) **PROM**

Preterm premature rupture of membranes (prior 37 weeks gestation) **PPROM**

## **Fetal position**

Vertex presentation

Straight Occiput anterior

Right occiput anterior (ROA)

Left occiput anterior (LOA)

Straight Occiput posterior

Right occiput posterior (ROP)

Left occiput posterior (LOP)

Brow presentation

Face presentation

Breech presentation

Oblique presentation

Transverse presentation

Fetus heart rate: Normal / abnormal / not found / not listened for

## Delivery ends

Vaginal  Sectio  Vacuum

## Medication given

Pitocin(Oxytocin)  Dosage\_\_\_\_\_ Ergometrine  Dosage\_\_\_\_\_ Misoprostol  Dosage\_\_\_\_\_

Other:\_\_\_\_\_

Lab values taken: (Hb, TPc, B-glucosis, u-glucosis, u-protein)\_\_\_\_\_

## Obstetric labour complication

### Prolonged delivery

- First stage (cervix >3 cm/regular contractions >3/10 min / loss of water)
- Second stage (cervix is fully dilated)

Treatment received\_\_\_\_\_

### Dystocia

- Primary (from the beginning weak contractions)
- Secondary (going from normal contractions to weak)

### Placenta

Complete  Uncomplete

Placenta Previa  Placenta Accreta

Presence of placenta seen at ultrasound

Treatment received\_\_\_\_\_

### Cephalopelvic disproportion

### Delivery injury

Cervix tear

Vaginal tear

Perineal rupture:

- Type I (skin/mucosa membrane)
- Type II (perineal muscles)
- Type IIIa (injury reaching less than half of the external sphincter)
- Type IIIb (external sphincter)
- Type IIIc (external and reaches the internal sphincter)
- Type IV ( both external and internal sphincter, reaching the anal mucosa)

Episiotomy

### Postpartum bleeding

- Mild (500-1000ml)
- Severe (1000ml or more)

Treatment

received\_\_\_\_\_

### Eclampsia /pre-eclampsia

- Mild – Moderate (BP  $\geq$  140/90 and >0,3 g protein in urine /day or 2+ Urinstick)
- Severe (BP >160/110 or protein in urine or CNS-symtoms)

Convulsions

Unconscious

Uterine rupture

Uterus inversion

Hematoma

Asphyxia

Other specified complication during labor:

\_\_\_\_\_

Infection during delivery \_\_\_\_\_

Referral to Mulago hospital  reason\_\_\_\_\_

## Child

Apgar score\_\_\_\_\_ Birth weight(g)\_\_\_\_\_ Breastfeeding  $\leq$  1hrs  Premature birth(w)\_\_\_\_\_ Mortalit

