



Is the pregnancy and delivery complication rate leading to operative intervention higher among referral patients compared to non-referral patients at Kilimanjaro Christian Medical Centre, Tanzania?

A study on pregnancy outcome in two patient groups

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Programme in Medicine**



THE SAHLGRENKA ACADEMY

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Degree Project in Medicine
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Abstract

Is the pregnancy and delivery complication rate leading to operative intervention higher among referral patients compared to non-referral patients at Kilimanjaro Christian Medical Centre, Tanzania?

-A study on pregnancy outcome in two patient groups

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Background: Previous degree projects at Kilimanjaro Christian Medical Center (KCMC) have shown high rates of caesarean sections (CS) 40.8 per cent 2016 and 47.4 per cent 2017. The World Health Organization recommend CS rate to stay at 10-15 per cent. The explanation from the clinic has been that the high rate of more complicated referral patients is the reason for the increasing CS rate.

Aim: To analyse whether indications among referral patients are medically more complex compared with reasons for attending the delivery ward among the non-referral patients. To analyse if the rate of delivery complications and the frequency of operative delivery is higher in the referral group than among the non-referral patients.

Methods: This is a descriptive and cross-sectional study. Data were collected at labour ward for 5.5 weeks from delivery records and a medical birth registry with focus on reason for attending, complications leading to intervention and mode of delivery.

Results: 234 women were included, 70.9 per cent Non-Referrals and 29.1 per cent Referrals. Among Non-Referrals the CS rate was 41.6 per cent and among Referrals the corresponding rate was 73.5 per cent. The total CS rate were 50.9 per cent (p-value <0.001). Complication rate among Non-Referrals were 28.9 per cent of all deliveries. Corresponding rate among Referrals were 58.8 per cent. p=0.003.

Conclusions: Reasons for attending delivery ward are more complicated in terms of higher frequencies of maternal diseases and medical complications during pregnancy among Referrals than among Non-Referrals. There was higher rate of complications leading to CS among Referrals than among Non-Referrals. The CS rate has also further increased since last year and is highest among Referrals.

Key words: *Delivery outcome. Complications leading to intervention. Caesarean section. KCMC. Tanzania.*

Abbreviations

CS	Caesarean Section
KCMC	Kilimanjaro Christian Medical Centre
MBR	Medical Birth Registry
TGCS	Ten Group Classification System
ToL	Trial of Labour
VE	Vacuum Extraction
WHO	World Health Organization

Background

Global maternal morbidity and mortality

Maternal morbidity and mortality is still a challenge in the world even though progress has been made during the last decades. According to the World Health Organization (WHO) 830 women die every day during labour or because of causes related to pregnancy, causes that in most cases are preventable. Approximately 303,000 deaths in 2015 due to pregnancy or labour globally. In total 99 per cent of maternal deaths worldwide occur in developing countries. WHO has a maternal programme with the aim to increase the availability, quality and ability to treat complications during pregnancy and delivery. The organization also aims for <70 maternal deaths for every 100,000 live births by 2030 while the numbers were 216 maternal deaths for every 100,000 live births as an average in 2015. The most common cause of morbidity and mortality during pregnancy and labour is hemorrhage, infection, high blood pressure, obstructed labour and unsafe abortion. Despite the fact that maternal death has decreased with 44 per cent between 1990-2015, the mortality rate is thus still too high (1). An effective tool to reduce maternal death is the caesarean section. However, as a risk of short- and long-time complications follow with this intervention there has been an intense debate on the ideal rate of caesarean section.

Tanzania

Tanzania is located in the Eastern Sub-Saharan Africa and is a developing country with 53,470,000 inhabitants (2015) (2). The Gross domestic product per capita in Tanzania was 879 USD 2016 compared to 51,600 USD in Sweden 2016 (3). The life expectancy in Tanzania is 61.8 years compared to 82.4 years in Sweden in 2015 (4). HIV, lower respiratory tract infections and diarrhea are the three most common causes of death in Tanzania among

both sexes and all ages (5). In Tanzania health services are for free when you are under the age of 5, pregnant or over the age of 65 (6).

Maternal health in Tanzania

In Tanzania, the fertility rate is high with 5.5 births per woman in 2011. As much as 51 per cent of births in Tanzania take place at home in 2010 compared to 64 per cent in 1999 (7).

There is also a higher rate of complications during pregnancy and labour in developing countries compared to industrialized countries. The maternal mortality rate in Tanzania during 2015 was 398 deaths per 100,000 live births compared to WHO's aim of <70 maternal deaths per 100,000 live births until year 2030 (8), (1).

Kilimanjaro Christian Medical Centre

Kilimanjaro Christian Medical Centre (KCMC) opened in 1971 and is a referral hospital located in the Kilimanjaro region, in northern Tanzania with a responsibility covering an area inhabited by more than 15 million people. KCMC is one among four Consultant hospitals in

Tanzania. Patients attending KCMC with a referral often arrives from regional or district hospitals. KCMC's registered patients are called Non-Referrals. KCMC is conducted by the state of Tanzania and the Lutheran Church. The Gynecological and Obstetric department

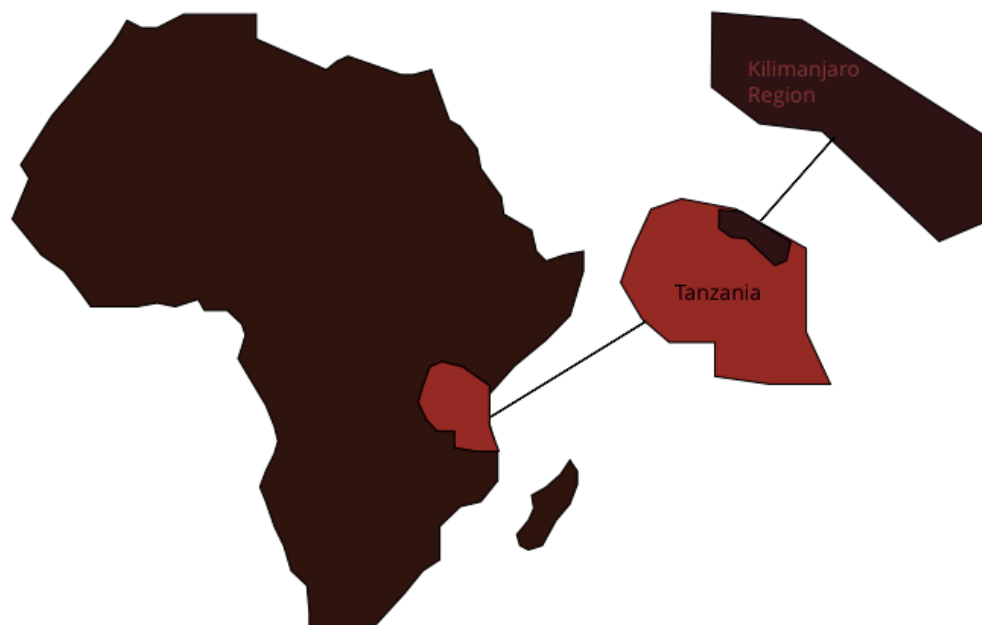


Figure 1. Location of Kilimanjaro Region in Tanzania, Africa.

includes the Delivery unit, the Obstetric unit and the Gynaecology unit. The Obstetric unit has 59 beds and the labour unit has 4 delivery cubicles and two rooms for surgery of which one is for elective caesarean sections (CS) and the other for acute ones. According to the Annual Report 2014 at KCMC there were 3778 deliveries distributed among 2252 vaginal deliveries and 1369 CS, a CS rate of 36.2 per cent. The rate is high even for a university department (9).

In contrast with other health care centers in the country, KCMC charge for health services. Patients with national health insurance don't have to pay and approximately 20 per cent of all patients at KCMC have this insurance. Referral or non-referral patients without national health insurance that won't be able to pay for the health service receive help from the social welfare office. KCMC charge 50,000 Tanzanian shillings (approximately 25 USD) for vaginal delivery and 280,000 Tanzanian shillings (approximately 110 USD) for CS (6).

Labour

Labour and delivery are considered normal if the onset is spontaneous with contractions or rupture of membranes, the child is born spontaneously in cephalic position between gestational age 37 + 0 until 41 + 6 (weeks + days) and both mother and child are in good condition after birth.

There are three stages during labour. In the first stage the mother reaches full cervical dilatation (10 cm) during latent and active phase. During latent phase the contractions are irregular, the cervix is effaced (shortening and thinning) but still open less than 3 cm. During the active phase cervix is at least 3-4 cm open and gets fully dilated due to regular and gradually stronger contractions. Usually the rupture of membranes take place during this phase. Second stage starts when cervix is fully effaced and dilated, and the fetus is descending towards the pelvic floor. During the last part of this stage the mother pushes out the baby. The

third phase starts when the child is born and lasts until placenta and membranes have been expelled (10).

Partograph

To monitor the progress of labour a partograph is filled in during labour. This is a tool, helping the staff to know when to take action due to an atypical progress. Partographs are effective in reducing complications from prolonged labour (11). Different parameters are monitored in the partograph in different time intervals. Plotting the partograph should ideally start in the beginning of the active phase at 4 cm opening of the cervix and the staff shall plot until the third stage of labour has ended. According to WHO the following parameters shall be monitored in the partograph during labour (see Figure 2 and Figure 3):

Parameters	Frequency during latent first stage	Frequency during active first stage
Blood pressure	Every 4 hours	Every 4 hours
Temperature	Every 4 hours	Every 2 hours
Pulse rate	Every 30-60 minutes	Every 30-60 minutes
Fetal heart rate	Every 30 minutes	Every 15 minutes
Contractions	Every 1 hour	Every 30 minutes
Cervical dilation	Every 4 hours*	Every 4 hours*
Head descent	Every 4 hours*	Every 4 hours*
Colour of amniotic fluid	Every 4 hours*	Every 4 hours*
Moulding	Every 4 hours*	Every 4 hours*

**Assessed in every vaginal examination*

Figure 2. Parameters World Health Organization recommend being monitored during first stage and their recommended time interval of examination (11).

- Cervix dilatation. The dilatation is plotted in the partograph and generate Alert line (lowest wanted speed of cervical opening (1 cm/h)). Action line is a parallel line drawn 4 hours to the right of alert line. Alert line is used to examine whether labour is going as planned. Reaching or crossing the action line is an indication for intervention.
- Descent

- Maternal condition (pulse, blood pressure, temperature. Urine output and testing for protein, ketones, glucose (if available)). Every fluid and drug shall be administered.
- Fetal heart rate
- Moulding
- Colour of liquor
- Uterine contraction: frequency, duration and strength (12).

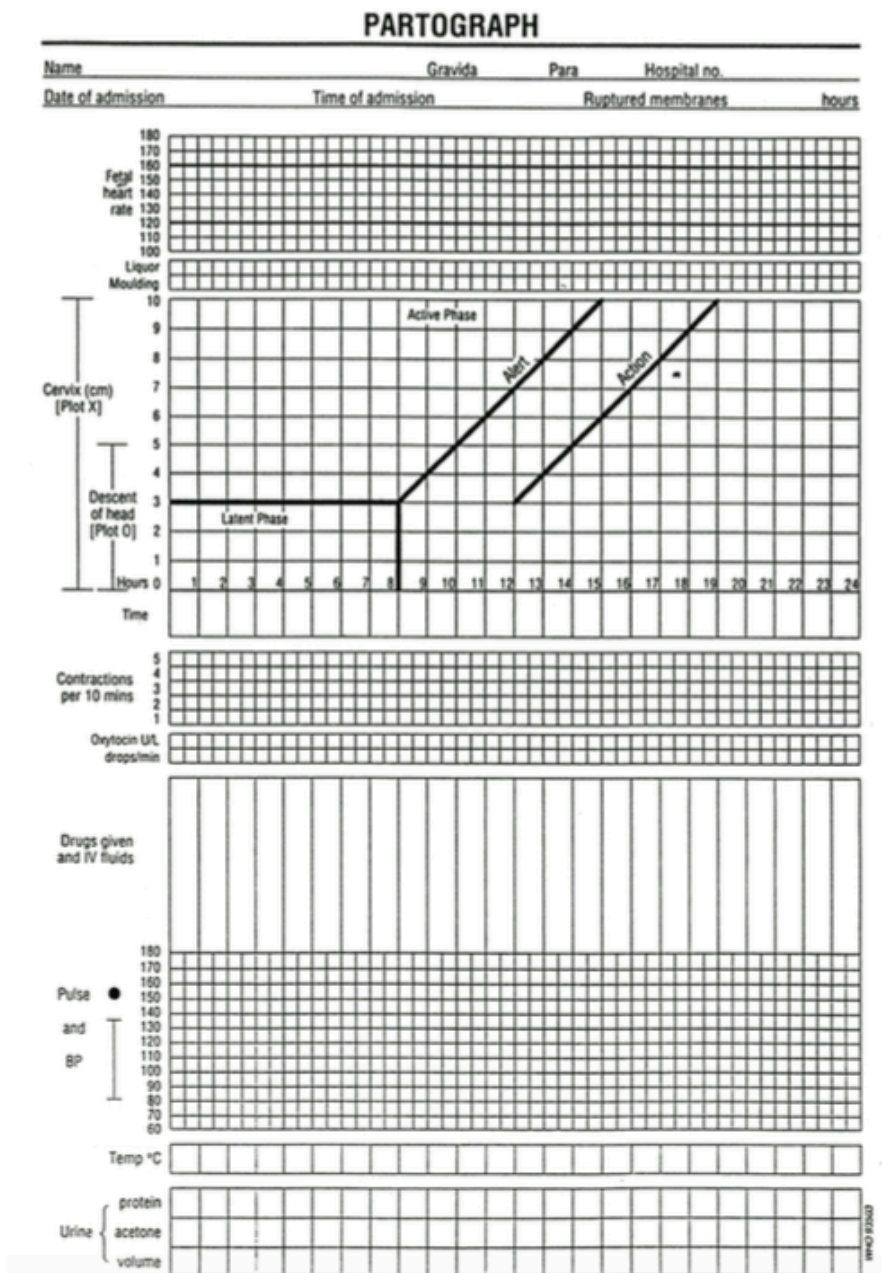


Figure 3. Example of Partograph recommended by World Health Organization (12).

Operative intervention

Depending on the circumstances there are two possibilities to intervene when the partograph indicate an abnormal situation, CS and instrumental vaginal delivery

Caesarean section

Also, CS was historically solely a life-saving procedure. As the procedure has developed into a safer intervention during the years, the indications have been wider. Therefore, trends of increasing CS are seen worldwide both in industrialized and developing countries. If a vaginal delivery threatens the health of mother and/or child, CS on medical indications can be a life-saving procedure. Even though indications nowadays are wider, CS is a major surgical procedure and should always be performed on specified indications to reduce the risk of complications for both mother and child. Repeated (>2) CS significantly increase the risks of complications, including for example uterine rupture, placenta praevia, placenta accrete, bowel injury, ureteral injury etc. (13). Studies have shown a correlation between elective CS without a medical indication and immune disorders among children later in life such as asthma, juvenile diabetes, systemic connective tissue disorders, inflammatory bowel disease, juvenile arthritis, immune deficiencies, and leukemia (14).

Indications for CS might be intercurrent diseases or pregnancy complications such as diabetes (both earlier and gestational), hypertension (both essential and gestational), pre-eclampsia or eclampsia, previous surgery (especially CS or myoma), bad progress during labour, vaginal bleeding with suspicion of placental abruption, uterine rupture, fetal condition or fetal malposition, but also the mother's wish (15). Since 1985 the ideal rate of CS is considered to be 10 – 15 per cent, but WHO also claims: *“Every effort should be made to provide caesarean sections to women in need, rather than striving to achieve a specific rate”* (16).

Instrumental vaginal delivery

The two instruments used are the vacuum extractor (VE) or forceps. Historically the instrumental vaginal delivery was used as a sometimes life-saving procedure for the mother if the child was dead. Indication today for instrumental delivery is bad progress due to inertia or tired mother, but also when an operative intervention is necessary due to threatening fetal asphyxia and a CS should be avoided due to advanced delivery. The frequency of instrumental deliveries in Sweden is 4.8 – 12.0 per cent of all deliveries, of which 93.0 per cent is VE, 6.0 per cent forceps and the rest a combination of both (17).

Episiotomy

Another intervention during normal labour is episiotomy, a surgical incision in the perineum in order to prevent serious tears of perineum. This intervention earlier was a routine procedure during vaginal labour and still is in some countries. The recommendations though are to use the intervention when needed and not as a routine because the intervention causes a trauma to perineum and also require sutures. Indications for episiotomy are for example severe tear anticipated, before vaginal instrumental delivery and/or fetal distress (18).

The Ten Group Classification System

Many clinics worldwide use the Ten Group Classification System (TGCS), created by Dr. Michael Robson. This classification system was created when the rate of CS increased worldwide. TGCS classifies women into ten groups based on their obstetric characteristics (parity, previous CS, gestational age, onset of labour, fetal presentation and number of fetuses). The ten groups are totally inclusive for all birth giving women. The system is prospective which means that all women should be classified before delivery. By analysing which groups that tend to end labour with CS or any other intervention, it is possible to focus on and adapt management for patients in that specific group during labour and also give them

extra support to minimize the risk of caesarean section. Analysis of trends in TGCS should be done in each delivery clinic on a yearly basis (19). WHO propose the TGCS in order to assess, monitor and compare CS rate between different clinics as well as trends of CS rate over time (16).

The groups of Ten Group Classification System:

1. Nulliparous, single cephalic, ≥ 37 weeks in spontaneous labour
2. a. Nulliparous, single cephalic, ≥ 37 weeks, induced labour
2. b. Nulliparous, single cephalic, ≥ 37 weeks, CS before labour
3. Multiparous (excluding previous CS), single cephalic, ≥ 37 weeks, spontaneous labour
4. a. Multiparous (excluding previous CS), single cephalic, ≥ 37 weeks, induced labour
4. b. Multiparous (excluding previous CS), single cephalic, ≥ 37 weeks, CS before labour
5. All multiparous, previous CS, single cephalic, ≥ 37 weeks
6. All nulliparous breeches
7. All multiparous breeches (incl. prev. CS)
8. All multiple pregnancies (incl. prev. CS)
9. All transverse or oblique lie, (incl. prev. CS)
10. All single cephalic, ≤ 36 weeks, (incl. prev. CS) (19).

Medical relevance

In summary, during the past years KCMC has noted an increased rate of CS, especially among referral patients despite attempting to reduce these numbers. 40.8 per cent 2016 (20) and 47.4 per cent 2017 (21). As mentioned above there is a higher risk for complications after CS also in the next pregnancy. Preliminary data shows particularly high frequencies of CS among referrals at KCMC (20). This issue is important to analyse because increased rate of operative deliveries implicate increased risks for both mother and child in the short and long term. If the trends increasing the operative deliveries rate can be identified, these factors

might be prevented for example with improved maternity care and delivery care with the aim to decrease the rate of operative deliveries but also complications related to the operative procedures.

Hypothesis

Rate of operative delivery by caesarean section is still increasing at KCMC due to a lot of referral patients.

Indications for referral to KCMC are medically more complex than reasons for attending delivery ward for non-referral patients.

Complication rate is higher among referral patients than non-referral patients.

Aim

To analyse whether indications among referral patients are medically more complex compared to the reasons for attending the delivery ward among the non-referral patients. To analyse if the rate of delivery complications and the frequency of operative delivery is higher in the referral group than among the non-referral patients.

Material & Methods

Study design

This study is descriptive and cross-sectional. Data was collected for 5.5 weeks at Department of Obstetrics at KCMC in Moshi, Tanzania during February – April 2018.

Study population

Initially it was planned to include all women giving birth at KCMC Sunday to Thursday for 7 weeks during February – April 2018. Including Fridays and Saturdays there were in total 440 deliveries during this time. 123 were excluded due to weekends. According to the earlier study by Malmborg at KCMC, CS rate was the same during weekends as on weekdays (20). 3 days' patients were excluded due to miscommunication and misunderstandings in the local health service system during the first week.

Also 4 days' patients were excluded due to sick leave (n=63). If Delivery record and/or Medical Birth Registry form (MBR) were missing, women were excluded due to lack of information (n=20). In total 206 were excluded (see Figure 4). Data collection for 5.5 weeks instead of 7 weeks as planned ended up with 234 included women.

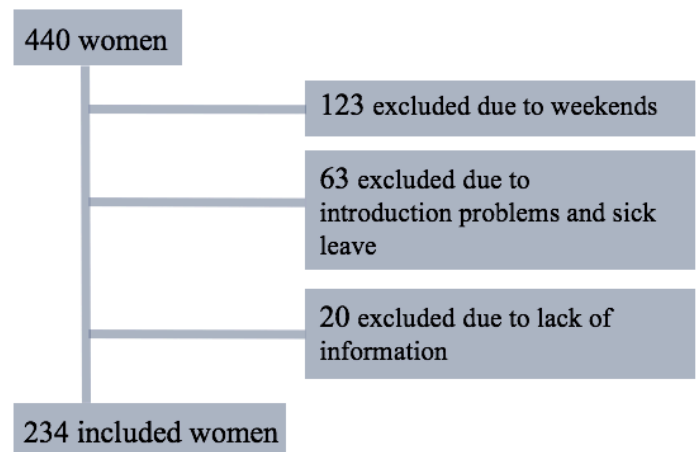


Figure 4. Flow chart of study population. Included and excluded women.

At first it was planned to compare referral patients outside catchment area with patients inside catchment area. However, it turned out that KCMC is not only a referral hospital but also a hospital which you can choose yourself. The possibility to choose and also

the fact that KCMC is a well-known University hospital that entails patients from the entire country and also a few patients from other countries if they can afford. Instead of comparing patients from catchment area with referral patients outside catchment area, the two patient groups were changed to referral patients and non-referral patients (i.e. those patients that have chosen KCMC as their health care facility).

Among the 234 included women there were 166 (70.9 per cent) non-referral patients and 68 (29.1 per cent) referral patients.

Data collection

In the labour unit all deliveries were registered in the delivery book. Information added to the delivery book can be seen in Table 1. Which records needed for data collection could therefore be identified in the delivery book.

Table 1. Variables possible to receive from each delivery in the delivery book.

Date	Time	ANC (antenatal care nr)	Hospital number
Name	Tribe	Address	Age
No. of pregnancies	No. of deliveries	Living children	Fundal height
Gestational age	Fetal heart rate	Date of admission	Sex
Birth weight	APGAR score	Head circumference	Length
Baby condition	Mother condition	Blood loss	Health insurance: Yes/No
Post blood pressure	Mode of delivery	Sign	

Data was collected from the delivery records and MBR which are documents written by hand. The delivery record was filled in before, during and after delivery and contained admission form and partograph (see Appendix 2). Also, operative notes, anesthesia notes, laboratory analyses, information about the newborn, etc. depending on mode of delivery or delivery outcome were documented here. There were 2 nurses at the ward filling in MBR after delivery. Information typed into MBR were taken from delivery records and also by interviewing the mothers (see Appendix 2). The purpose of MBR is improvement work and research.

Data collection was made in the morning before the rounds started, otherwise the records were taken to the rounds and after that to the medical records for storage if the patient was discharged. For access to medical records an expensive ethical approval was needed. MBR, on the other hand were not attached to the records and remained in the department until the end of each month before they were sent to archive department. Data was written into an anonymous protocol and after that added into Microsoft Excel.

Variable analyses

All women were given a main reason for attending the delivery ward and were placed in one group based on that main reason. Some women had >1 reason for attending, see table 4 in results. A main reason was needed for the statistical analyses. After delivery, all women were also divided into groups based on their possible complications and delivery outcome, see Figure 5.

Groups – reason for attending

1. Normal labour symptoms
2. Maternal disease & pregnancy complications₁
3. Fetal & placental complications₂
4. Previous bad obstetric history₃
5. Poor progress₄
6. Previous scar
 - 6a. 1 previous scar
 - 6b. ≥ 2 previous scar

Groups - outcome

1. No complications
2. Maternal disease & pregnancy complications₁
3. Fetal & placental complications₂
4. Previous bad obstetric history₃
5. Poor progress₄
6. Previous scar
 - 6a. 1 previous scar
 - 6b. ≥ 2 previous scar

₁ For example hypertension/pre-eclampsia, anemia, diabetes, etc

₂ Placenta previa, Placenta abruption, Antepartum hemorrhage

₃ Including mother's wish due to earlier bad obstetric experience

₄ Prolonged labour, disproportion, etc.



Figure 5. The figure shows when in the delivery process the groups were defined. The 6 groups were re-defined after delivery.

Statistical methods

IBM® SPSS® was used for statistical analysis. Fisher's Exact Test was used to evaluate whether there were significant differences between non-referral and referral patients. P-value <0.05 was considered significant.

Ethics

Data collection in this project has not influenced the medical treatment or any possible intervention during labour due to data collection after delivery which means it was retrospective. The protocols were anonymous and did not contain personally identifiable information. According to my supervisor at KCMC, an ethical approval was not needed for this degree project as the purpose was quality improvement at the department.

Results

A total of 404 women delivered during 18th of February to 28th of March. 206 patients were excluded (see Methods). Of the included women, 166 were Non-Referrals (70.9 per cent) and 68 were Referrals (29.1 per cent).

Mode of delivery

Table 2. Distribution according to mode of delivery among Non-Referrals and Referrals.

	Non-Referrals	Referrals	Total
Vaginal	97 (41.5)	18 (7.7)	115 (49.1)
CS, Elective	26 (11.1)	9 (3.8)	35 (15.0)
CS, Acute	43 (18.4)	41 (17.5)	84 (35.9)
Total	166	68	234 (100)

Among Non-Referrals 58.4 per cent gave birth vaginally. The corresponding rate of vaginal deliveries among referrals were 26.5 per cent. CS rate between Non-Referrals and Referrals are significant (p-value <0.001). In total, the rate of CS was 50.9 per cent among both Non-Referrals and Referrals compared to 10-15 per cent as recommended (16).

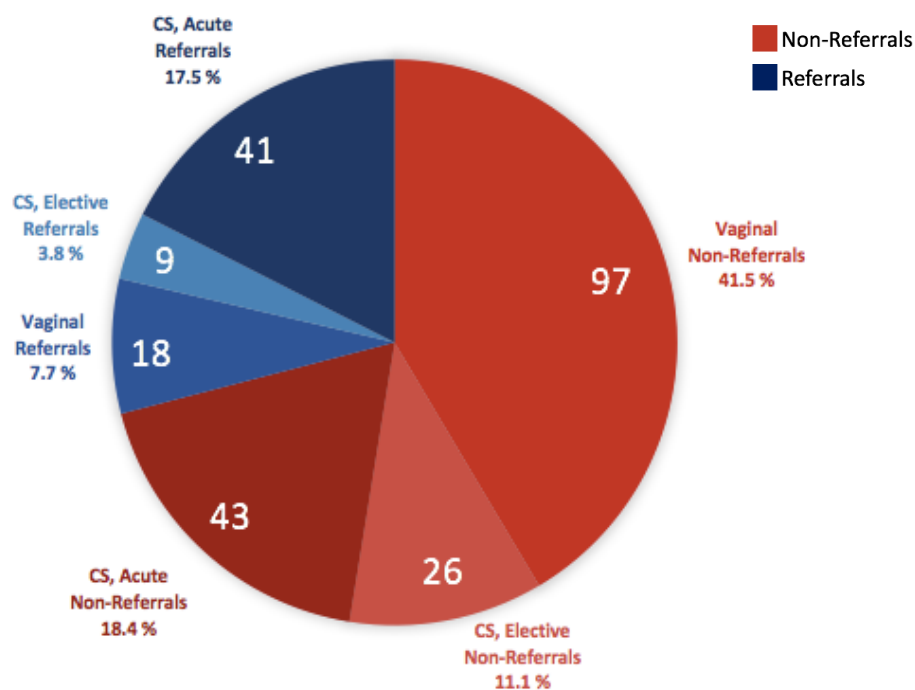


Figure 6. Distribution of total numbers of deliveries in the study group.

Indications for attending delivery ward

Table 3. Reason for attending. Comparison between the reason for attending among Non-Referrals and Referrals to investigate if there is a statistically significant difference. The test does not evaluate each reason (1-6) solely, but the difference between Non-Referrals and Referrals and their reason for attending. 8 patients were missing. There is a significant association between referral rate and reason for attending ($p < 0.001$).

Groups	n	Non-Referrals (per cent)	Referrals (per cent)
1. Normal labour symptoms	136	127 (76.5)	9 (13.2)
2. Maternal disease & pregnancy complications	26	9 (5.4)	17 (25.0)
3. Fetal & Placental complications	29	8 (4.8)	21 (30.9)
4. Earlier bad obstetric history	2	2 (1.2)	0
5. Poor progress	11	0	11 (16.2)
6. Previous scar			
6a. 1 previous scar	11	8 (4.8)	3 (4.4)
6b. ≥ 2 previous scar	11	6 (3.6)	5 (7.4)
7. Missing	8	6 (3.6)	2 (2.9)
Total	<u>234</u>	<u>166 (100.0)</u>	<u>68 (100.0)</u>
P-value	p < 0.001		

The three most common reasons for attending the delivery ward among Non-Referrals were normal labour symptoms (76.5 per cent), a previous scar (8.4 per cent) and maternal disease & pregnancy complications (5.4 per cent), i.e. the majority of the Non-Referrals attended delivery ward due to normal onset of labour. Among Referrals, the three most common reasons for attending delivery ward were fetal and placental complications (30.9 per cent), maternal disease & pregnancy complications (25.0 per cent) and poor progress (16.2 per cent), i.e. the majority of the Referrals attended delivery ward due to complications and not because of normal onset of labour (see Table 3).

Table 4. Reasons for attending delivery ward among both Non-referrals and Referrals. There were more reasons for attending than included patients due to combined indications. Therefore, no statistical analysis was done. However, a clear majority of complications was seen in the referral group.

	<u>Non-referral</u> (per cent)	<u>Referral</u> (per cent)
Normal labour symptoms (incl. PROM)	n=135 (83.1)	n=14 (20.6)
Severe Pre-eclampsia	n=1 (0.6)	n=7 (10.3)
Pre-eclampsia-like symptoms	n=4 (2.4)	n=5 (7.4)
Other medical reasons	n=10 (6.0)	n=20 (29.4)
Prematurity	n=18 (10.8)	n=23 (33.8)
Fetal distress	n=1 (0.6)	n=6 (8.8)
Placental complications ¹	n=1 (0.6)	n=7 (10.3)
Intrauterine death	n=0	n=1 (1.5)
Poor progress/Disproportion ²	n=0	n=9 (13.2)
Other poor progress	n=0	n=5 (7.4)
Non-medical reasons ³	n=0	n=5 (7.4)
Total	n=170⁴	n=102⁴

¹Placenta previa, Placenta abruption, Antepartum hemorrhage.

²Malposition, big baby, pelvic deformity.

³Non-medical reasons or technical reasons

⁴More reasons for attending than included women due to combined reasons.

Caesarean section

Among the Non-Referrals the CS rate was 41.6 per cent and among the Referrals the CS rate was 73.5 per cent. In total among both Non-Referrals and Referrals the CS rate was 50.9 per cent. See Table 5 for frequencies. See Figure 7 for distribution of the types of CS among Non-Referrals and Referrals. The majority of elective CS was seen in the Non-Referral group with a rate of 74.3 per cent, compared to 25.7 per cent among Referrals. Rate of acute CS were 51.2 per cent among Non-Referrals 48.8 per cent among Referrals. There's a significant difference between elective and acute CS whether you were Non-Referral or Referral (p=0.025).

Table 5. Frequencies of Elective and Acute Caesarean sections (CS) among Non-Referrals and Referrals. P=0.025.

	CS, Elective (per cent)	CS, Acute (per cent)	Total (per cent)
Non-Referrals	26 (37.7)	43 (62.3)	69 (100)
Referrals	9 (18.0)	41 (82.0)	50 (100)
Total	35	84	119
P-value	<i>0.025</i>		

Complications leading to CS

Distribution of complications leading to CS in 4 groups. In total 48 Non-Referrals had complications leading to CS compared to 40 among Referrals. Among all Non-Referrals this corresponds to 28.9 per cent of all deliveries. Among all Referrals the corresponding rate is 58.8 per cent. There's a significant difference in CS ratio between Non-Referrals (28.9%) and Referrals (58.8%), $p=0.003$ (See Figure 8).

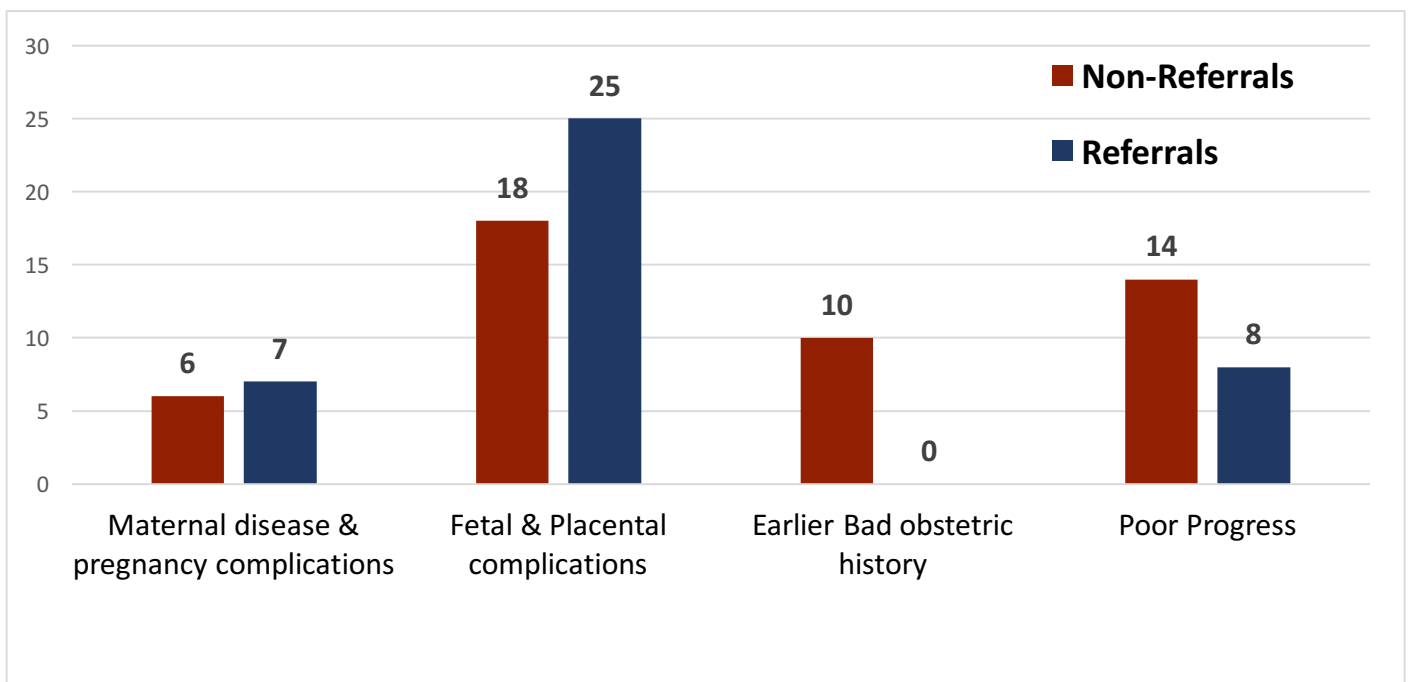


Figure 8. The most common complications leading to CS among Non-Referrals and Referrals. There was a significant association between complications leading to CS whether you're Non-Referral or Referral. $P=0.003$.

The most common group of complications leading to CS among both Non-Referrals and Referrals is fetal and placental complications. In the group of earlier bad obstetric history there were no Referrals. Among women with poor progress the Non-Referrals were in majority. In total 13 Non-Referrals and 14 Referrals had >1 complication leading to CS. That is 27 women with >1 complication leading to CS, which gives a rate of 23.3 per cent among Non-Referrals and Referrals.

“1 previous scar”

In total 18 women with 1 previous scar delivered by CS (group 6a). Among these, 7 women had no additional indication, just 1 previous scar. The remaining 11 were divided into other groups based on their main indication 7 women didn't have any extra indication and therefore the indication for CS was “incorrect”. That means that 7 women could have delivered vaginally that means 7 CS were unnecessary. Distribution of indications among all women with 1 previous scar in Table 6 below.

Table 6. Distribution of 1 previous scar and extra indications.

1 previous scar without other indications	7
1 previous scar + Mother's wish.....	5
1 previous scar + Fetal distress.....	1 ₁
1 previous scar + Previous abdominal surgery.....	2 ₁
1 previous scar + Big baby.....	2 ₁
1 previous scar + Umbilical hernia.....	1 ₁
Total	18

*1*Correct indication

Vaginal delivery

In total 115 women delivered vaginally. 90 women among Non-Referrals delivered vaginally without any complications and 10 women among Referrals delivered vaginally without any complications. The remaining 15 women that delivered vaginally had some kind of complication during delivery (see table 7). There where no significant association between Non-Referrals and Referrals whether they got complications during their vaginal delivery or not (p=0.125).

Table 7. There was no significant association between Non-Referrals and Referrals whether they got complications during their vaginal delivery. P=0.125

	Non-Referrals	Referrals
Gr 2. Maternal disease & pregnancy complications	2	1
Gr 3. Fetal and placental complications	5	3
Gr 5. Poor progress	0	4
Total	7	8
P-value	<i>0.125</i>	

Ten Group Classification System

Classification according to TGCS showed higher numbers of Non-Referral women in group 1-5. In group 7-8 higher numbers of Referral women, however these groups were small. In group 10 (premature) the numbers of women were approximately the same among Non-Referrals and Referrals. The rate, however, was 8.4 per cent among all Non-Referrals and 25.0 per cent among all Referrals. CS as delivery route dominated in the groups with breech lie (group 7), transverse lie (group 9) and prematurity (group 10), (see Figure 9).

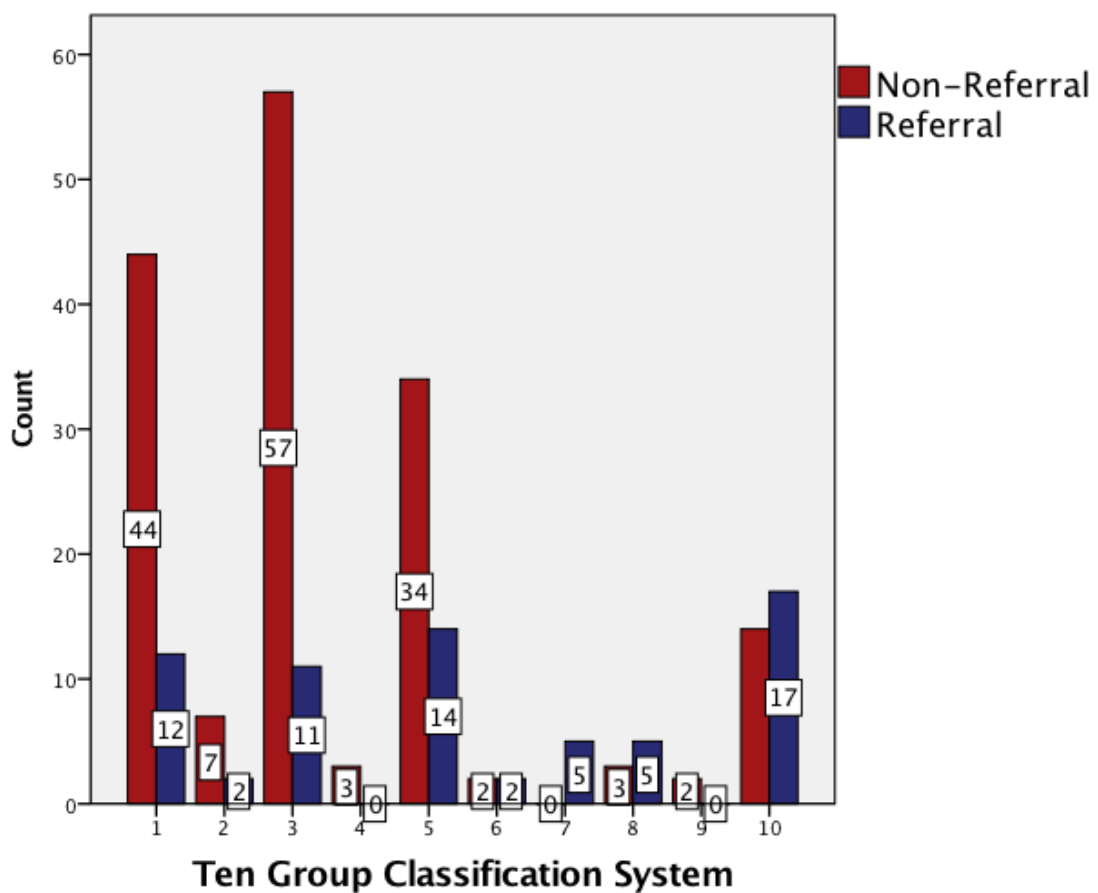


Figure 9. Distribution at arrival of Non-Referrals and Referrals according to Ten Group Classification System.

After knowing delivery outcome, a new classification could be done to see the distribution of CS in the ten groups, see Table 8 and Figure 10.

Table 8. Rate of CS in all 10 TGCS groups.

Group	n, Attending	n, CS	Rate of CS
1	56	20	20/56= 35.7%
2	9	7	7/9= 77.8%
3	68	14	14/68= 20.6%
4	3	2	2/3= 66.7%
5	47	44	44/47= 93.6%
6	4	4	4/4= 100%
7	5	4	4/5= 80.0%
8	8	5	5/8= 62.5%
9	2	2	2/2= 100%
10	31	17	17/31= 54.8%

Most women ending up with CS belongs to group 5 (previous CS) with a rate of 93.6 per cent. Followed by Group 1 (nulliparous with spontaneous labour) and group 10 (premature). In group 6 (nulliparous with breech lie) and 9 (transverse or oblique lie) 100 per cent delivered by CS. Group 7 (breech): 80.0 per cent. Group 10 (premature) 54.8 per cent. For rate in all ten groups see Table 8 above.

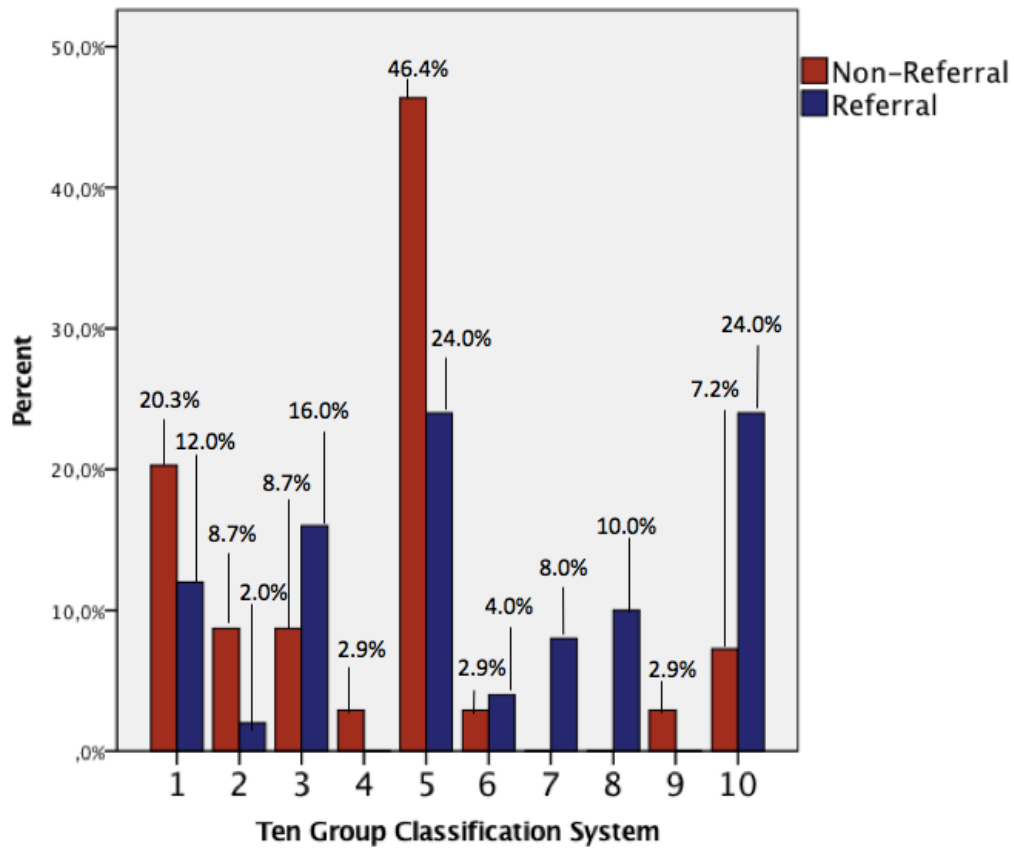


Figure 10. Rate of CS among Non-Referrals (N-R) and Referrals (R) in each group of Ten Group Classification System. N-R n=69, R n=50.

Group 1	–	N-R: 20.3%,	R: 12 %
Group 2	–	N-R: 8.7 %,	R: 2.0 %
Group 3	–	N-R: 8.7%,	R: 16.0%
Group 4	–	N-R: 2.4%,	R: 0%
Group 5	–	N-R: 46.4%,	R: 24.0%
Group 6	–	N-R: 2.9%,	R: 4.0%
Group 7	–	N-R: 0%,	R: 8.0%
Group 8	–	N-R: 0%,	R: 10.0%
Group 9	–	N-R: 2.9%,	R: 0%
Group 10	–	N-R: 7.2%,	R: 24.0%
Total:		N-R 100%	R 100%

Unfortunately, no statistical analysis could be done on TGCS due to that MBR do not differ between induction and augmentation. In order to classify women into TGCS, Information on induction or not is needed. Due to this circumstance numbers presented are probably not completely correct.

Instrumental delivery

	<u>Non-Referrals</u> (per cent)	<u>Referrals</u> (per cent)
Vacuum extractor: n=3	n=2 (2.1*)	n=1 (5.5*)

Forceps: n=0 Intervention not performed at KCMC.

**rate of instrumental delivery among all vaginal delivery in each group.*

In total 3 VE extractions among Non-Referrals and Referrals during 5.5 weeks. That represent 2.6 per cent of all vaginal deliveries.

Episiotomy

	<u>Non-Referrals</u> (per cent)	<u>Referrals</u> (per cent)	<u>P-value</u>
Episiotomy: n=17	n=13 (13.4*)	n=4 (22.2*)	0.417

**of vaginal delivery among each group.*

There is no significant association between Non-Referrals and Referrals whether they get episiotomy during vaginal delivery or not.

Discussion

Summary of main results

A total of 234 women were included and the CS rate have further increased to 50.9 per cent. The main reason for attending the delivery ward among Non-Referrals were onset of normal labour symptoms (76.5 per cent among all Non-Referrals) and corresponding reason among Referrals were fetal and placental complications (30.9 per cent among all Referrals). Fetal and placental complications are the main indication for CS among both Non-Referrals and Referrals. KCMC is a university hospital and it is not surprising that the referrals had a higher rate of complicated diagnosis than the Non-Referrals. In comparison to KCMC's CS rate, Muhimbili National Hospital, a university hospital in Dar es Salaam, Tanzania, had a CS rate of 49 per cent in 2011 (22).

Reason for attending

As the hypothesis claimed, the indications for referral to KCMC are more complicated than reasons for attending delivery ward for non-referral patients. Non-Referrals attended delivery ward mostly due to onset of normal labour symptoms (n=127 (79.4 per cent)). Among Referrals, the most common reasons were fetal & placental complications (n=21 (31.8 per cent)) and maternal disease & pregnancy complications (n=17 (25.8 per cent)). There's also a significant association between whether you're a Non-Referral or Referral and the reason for attending ($p < 0.001$).

Complications leading to CS

The most common complication leading to CS among both Non-Referrals and Referrals is fetal and placental complications. In the group of earlier bad obstetric history there were no Referrals. Among women with poor progress the Non-Referrals were majority. 13 Non-Referrals and 14 Referrals had >1 complication leading to CS. In total 27 women had >1 complication leading to CS, that is a rate of 23.3 per cent among Non-Referrals and Referrals. Aminu M, et al found that the five most common indications for CS in five hospitals in rural Bangladesh were: previous CS (29.4 per cent), fetal distress (15.7 per cent), cephalo-pelvic disproportion (10.2 per cent), prolonged obstructed labor (8.3 per cent) and post-term dates (7.0 per cent). That corresponds to the findings in this study at KCMC. Previous CS is excluded in the data under this heading though. The most common complications leading to CS among the patients at KCMC is fetal and placental complications (fetal distress belongs in this group) followed by poor progress as second common complication (disproportion and prolonged obstructed labour belong to this group). That means that the data in this study pretty much corresponds to Aminu M, et al results.

Caesarean section

The rate of CS has further increased since 2017 to 50.9 per cent. The CS rate was 40.8 per cent 2016 (20) and 47.4 per cent 2017 (21). The referral patients are one of the reasons for a higher rate and they correspond to approximately one third of the patients (29.1 per cent). The rate of CS among Referrals was 73.5 per cent and the rate among Non-Referrals were 41.6 per cent. In total, the CS rate were 50.9 per cent compared to 10-15 per cent as recommended (16). However, it is important to take into consideration that KCMC is a university hospital and higher numbers are accordingly reasonable. Also, a majority of women deliver at home in Tanzania, approximately 51 per cent delivered at home in 2010 (7). That number though, applies throughout the entire country and is probably not representative for Kilimanjaro Region which is a more wealthy region than average. In comparison, the CS rate in Sweden were 17.6 per cent in 2016 with a low rate of home deliveries. Highest rate of CS in Sweden was in Stockholm with a rate of 21.5 per cent and that is approximately 1 out of 5 women (23). It is also important to mention that also the Non-Referrals also had a higher rate of CS than WHO recommend. Referrals are not the only reason for KCMC's high numbers of CS. Repeated CS increase the risk for placenta praevia and placental abruption (24). The rates of these serious complications will probably further increase if the trends of increasing CS continues.

It is also remarkable that so many women attend KCMC for elective CS without referral. The reason for that is unclear, but a hypothesis might be that CS are considered as a privilege that you can undergo if you can afford it. KCMC have a wealthier average than other hospitals in the region.

Instrumental deliveries

The rate of instrumental deliveries were 2.6 per cent of all vaginal deliveries and that corresponds to 3 VE during 5.5 weeks. Forceps is not a method used at KCMC according to

Head of Department Dr S. Mlay. He also informed that VE is performed in low rates according to fear of complications among the staff. In Sweden, the frequency of instrumental deliveries are 4.8 – 12.0 per cent of all deliveries, of which 93.0 per cent is VE, 6.0 per cent forceps and the rest a combination of both (17). According to a study in Uganda published in 2018 they found that VE had better maternal and perinatal outcomes compared to second-stage cesarean delivery. It was less severe maternal outcome in the VE group (0.8 per cent) compared to CS (4.2 per cent). Fetal death was also less common in the VE group (0.8 per cent) compared to CS group (4.4 per cent)(25). This information indicates that increased usage of VE is a good option in order to decrease unnecessary complications that CS might cause.

With education, training and strict indications regarding the use of VE, CS rate can decrease and especially the CS in later stages that may increase the risk of injuries for both mother and child.

Episiotomies

In total 17 episiotomies were performed during 5.5 weeks. That corresponds to 14.8 per cent of all vaginal deliveries. There was no significant association between Non-Referrals and Referrals whether they get episiotomy during their vaginal delivery or not ($p=0.417$).

Ten Group Classification System

Classification according to TGCS showed advantages of Non-Referrals in group 1 and 3. The rate of women in group 5 were approximately the same (20.5 per cent among Non-Referrals and 20.6 per cent among Referrals).

When the women had delivered and the CS rates were verified in each TGCS group, the following was seen. Surprisingly, the rate of CS was higher among the nulliparous

Non-Referrals in group 1 than among the referral nulliparous. The reason for that is unclear. However, no statistical analysis could be performed. It is important to support the nulliparous women to deliver vaginally in order to prevent a first CS. The highest CS rates were found in group 5, which is not very surprising because more than one previous CS is an indication for CS in the next pregnancy. It is important though to support women with 1 previous CS (37 per cent of the group with previous scar) to deliver vaginally. The rate among Non-Referrals is higher than among the Referrals in group 5, one reason for that could be that the Referrals are more disseminated in all ten groups than the Non-Referrals (see figure 10). In group 6 (nulliparous, breech lie) and 9 (transverse or oblique lie) the outcome was CS in 100 per cent. Transverse lie as it is an indication for CS and outcome rate at 100 per cent is therefore an expected number (26). Among breech lies, it is not an absolute indication for CS, even though there has been a lot of discussion concerning this item in the western world. Many countries worldwide now mainly advise CS, especially among nulliparous women with a breech lie (27). If vaginal delivery is planned with breech lie anyway, there are some selection criterias to prevent complications. In Sweden, an x-ray pelvis measurement and estimation of fetal weight is mandatory before vaginal delivery with breech lie (28). According to Saira Dars et al, caesarean section is more safe than vaginal deliveries among breech lies in order to prevent perinatal morbidity or mortality (29). 31 women were in group 10 (premature) and 17 ended up with CS (54.8 per cent) Among these women the most common indication for CS was fetal and placental complications followed by maternal medical reasons. In these cases the CS was iatrogenic.

In summary, the groups the staff should prioritize in order to decrease rate of CS is group 1 and 5, i.e. the nulliparous women and women with previous CS (if <2 CS).

Unfortunately, no statistical analysis could be done on these numbers due to that MBR doesn't differ between induction and augmentation. In order to classify women into TGCS,

induction or not is information needed. The numbers presented are probably not correct.

Methodological considerations

Data collection was done from a medical record system that is different from the ones that are used in Sweden which probably resulted in some loss of data. It is therefore important to take into consideration that the data collection probably was better and more correct in the end of the data collection period compared to the beginning. Due to limit of time for data collection it was not possible to extend introduction to their medical system. It is also important to take in consideration that when the files were taken to rounds the data collection had to be done, this circumstance often led to quick interpretations.

The MBR is a document filled in with information from the delivery records and by interviewing the mothers. In some variables, an interpretation of the documents had to be done. This implies that the reliability is partially uncertain. It was also seen that some information didn't correspond in the delivery records and the MBR, for example what kind of CS that was performed (elective or acute), maternal diseases and complications during delivery, etc.

Another issue might be that the staff knew that this study was performed and therefore filled in the delivery records and the MBR differently than they used to do. The staff also informed that partographs sometimes were filled in after the baby was delivered. That data was then an estimation. The frequency of partographs filled in after delivery is unknown and that also indicates lack of reliability.

Before further studies based on both delivery records and MBR, a comparison between these two documents is needed. During the data collection period, it was noticed several times that delivery records and MBR didn't correspond in terms of complications,

maternal diseases, what kind of CS that was performed, whether the woman was induced or not, etc.

How to move forward?

In order to decrease rate of CS the indications for CS have to be clear. It is important to detect those women with 1 previous scar and support them to go through a vaginal delivery in next pregnancy to avoid a second CS. That is important since after 2 CS all women are recommended to do CS in next pregnancy. To stop this vicious circle, good midwifery is needed so women get the support needed during labour. Mother's wish is one of the most common reasons among women with 1 previous scar that won't try vaginal delivery in next pregnancy. According to Larsson B, et al midwifery-led counselling before delivery improved the confidence among women during labour. This made the entire labour more positive and with less fear (30). Laursen M, et al examined whether fear of childbirth affected delivery outcome in terms of caesarean section, dystocia and/or fetal distress. The outcome of the study was that women with fear of childbirth had increased risk of caesarean section and dystocia but not fetal distress during labour (31). It is therefore important to focus on those women with fear of childbirth in order to give them tools to manage a vaginal delivery and prevent unnecessary CS.

According to Polkowski M, et al instrumental delivery is associated with less short-term complications for mother and child in comparison with CS and is therefore a good option for intervention when indications exist (32). Another study of Benedetto et al, concluded the contrary, with instrumental delivery the highest rate of short-term maternal and neonatal complications were seen (33). A suggestion is to practice more VE at the clinic if correct indications, because that might prevent unnecessary CS and that in turn reduces complications that major surgery can cause. In order to achieve that, the practicing staff must

get training and clear indications for usage of VE. This operation can be used only when the fetal head is almost fully descent against the pelvic floor, otherwise there are risks of fetal injury. It is therefore mandatory to do a proper gynecological examination to see if the fetal head is fully descent.

Also, a correct definition of induction in the MBR is needed. During the data collection period the MBR didn't separate augmentation and induction. When augmentation was performed at the clinic it was filled in as induction. This is important to separate in order to use the MBR for research and improvement work. Since TGCS is recommended by WHO in order to assess, monitor and compare CS rate between different clinics as well as trends of CS rate over time it is important to separate augmentation and induction, otherwise a classification into TGCS can't be done (16). As a suggestion add augmentation: Yes/No to the MBR or focus on to get the correct definition of induction in the MBR.

The partograph is a helpful tool to know when to act due to poor progress of labour. To avoid unnecessary operative intervention is important to plot the partograph as WHO recommend. A well plotted partograph might prevent unnecessary CS but also helpful when deciding if CS really is indicated. The partograph should also be the main labour record, i.e. to evade duplication of documentation (12).

However, Lavender, T et al. had the objective to examine the effect of using Partograph or not and how that affect maternal morbidity and mortality. They found that there were no difference in CS rate or rate of instrumental vaginal delivery whether you plotted a partograph or not during labour (34).

Conclusions

Reasons for attending delivery ward are more complicated in terms of higher frequencies of medical complications during pregnancy among Referrals than among Non-Referrals. There was a higher rate of complications leading to CS among Referrals than among Non-Referrals.

CS rate have further increased since last year and the highest rate of caesareans are among Referrals. More education among the doctors regarding usage of instrumental vaginal deliveries is needed in order to decrease the CS rate. To motivate women to deliver vaginally requires improved maternity care. Further studies are needed to analyze if MBR and delivery records are comparable and reliable. Also, clear definition and separation of the terms induction and augmentation of labour is necessary to be able to classify patients into TGCS and to use this instrument for yearly audit in order to decrease the CS rate.

Populärvetenskaplig sammanfattning

Vilka patienter på Kilimanjaro Christian Medical Centres förlossningsklinik i Tanzania är orsaken till den höga frekvensen av kejsarsnitt?

Kejsarsnitt är ett ingrepp under förlossning som kan vara en livsavgörande operation för både mamma och barn om en vanlig vaginal förlossning inte är möjlig. Kejsarsnitt är dock en stor operation och inte riskfri. Operationen kan medfölja komplikationer på kort och lång sikt för både mamma och barn. För att undvika onödiga risker som ett kejsarsnitt kan medföra är det viktigt att det finns tydliga riktlinjer för när kejsarsnitt är aktuellt och inte.

De senaste åren har frekvensen av kejsarsnitt ökat över hela världen och även på Kilimanjaro Christian Medical Centre (KCMC) i Moshi, Tanzania. Chefen på förlossningsavdelningen anser att den stigande frekvensen kejsarsnitt beror på ett ökat antal patienter som kommer från andra sjukhus på remiss och att dessa patienter är en mer komplicerad grupp än sjukhusets egna patienter.

Då kejsarsnitt medför risker för både mamma och barn är det viktigt att undersöka vad anledningen till de stigande siffrorna beror på. Denna studie gick ut på att samla in information om varför remisspatienterna remitterades till KCMC, eventuella komplikationer, anledningen till eventuellt kejsarsnitt, etc. Denna information användes sedan

för att undersöka huruvida remisspatienterna var en mer komplicerad grupp patienter.

Under studietiden uppmättes frekvensen av komplikationer högre hos de patienter som kom från ett annat sjukhus på remiss (58.8%) jämfört med sjukhusets egna patienter (28.9%). Totalt uppmättes en kejsarsnittsfrekvens på 50.9%. Hos de patienter som kom från ett annat sjukhus på remiss var frekvensen 73.5% och sjukhusets egna patienter hade en frekvens på 41.6%. Detta är höga siffror, då World Health Organization rekommenderar en frekvens på 10-15%. Dock är en något högre siffra acceptabel på universitetssjukhus som KCMC då universitetssjukhus generellt hanterar svårare fall. Det framkom även att frekvensen av komplikationer var högre hos de patienter som kom från ett annat sjukhus på remiss (58.8%) jämfört med sjukhusets egna patienter (28.9%).

Slutsatsen är att remisspatienterna på KCMC är mer komplicerade patienter än sjukhusets egna patienter. Det förelåg en högre andel komplikationer bland remisspatienterna och även en högre frekvens av kejsarsnitt. Att remisspatienterna är orsaken till den höga frekvensen av kejsarsnitt är dock inte enda orsaken, då andelen kejsarsnitt hos sjukhusets egna patienter också översteg WHO's rekommenderade frekvens på 10-15%.

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Appendix

Appendix 1 – Protocol for data collection

Referred for delivery: Yes No **Nr:** _____

Reason for referral alt. reason for attending hospital:
_____.

Referred from: home Regional hospital District hospital Other : _____.

Referred during labour: Yes No

Body weight: _____ kg **Body height:** _____ cm **Age:** _____ y/o.

Serious diseases: Diabetes Hypertension Heart disease Epilepsy
Malaria Anemia Gynecological diseases Liver diseases
Kidney diseases Lung diseases Tuberculosis Sickle cell

Diseases and complications during present pregnancy, including accidents: Yes No
If yes:
Preeclampsia, mild ($\geq 140/90$ mmHg after w20 + proteinuria $\geq 0,3$ g/day).
Preeclampsia, severe ($\geq 160/110$ mmHg and/or proteinuria ≥ 5 g/day).
Gestational diabetes Gestational hypertension Bleeding Anemia
Malaria HIV/Aids Hepatitis Eclampsia Other infections

Antenatal care in this pregnancy: Yes No
If Yes, number of visits: _____.

Pregnancy week at arrival: premature mature (37+0–41+6) post mature

Last recorded antenatal visit: _____ days before arrival.

Complications since last antenatal visit: _____.

Parity (previous delivery): First delivery Previous delivery
If previous deliveries, add
no. of deliveries: _____.

Previous vaginal delivery: Yes No

At birth: Single birth Multiple birth If multiple, add no. of children: _____.

Presentation: Cephalic Breech Transverse Other : _____.

Previous CS: Yes No

Blood pressure: _____ / _____ mmHg **Temperature:** _____ °C

Proteinuria: Yes No **Blood glucose:** _____ mmol/l.

Cervical effacement: at arrival: Yes No
at decision of CS: Yes No

Cervical opening: at arrival: No Yes : _____ cm.
at decision of CS: No Yes : _____ cm.

Amniotic fluid: Clear Discolored **Fetal sounds:** Normal* Affected
(*premature: 120-160 beats/min, mature: 110-150 beats/min).

Induction of labour: Yes No
If Yes, Amniotomy Prostaglandin Oxytocin

Mode of delivery: Spontaneous Vacuum, vaginal Forceps, vaginal CS elective
CS others Assisted breech Destructive operative

First stage, duration: _____ hours.

Second stage, duration: _____ hours.

Third stage, duration: _____ hours.

Given indication when CS: _____.

Correlation with Partogram: Yes No

Diagnosis: _____.

Indication when vaginal operation: _____.

Diagnosis: _____.

Complications during delivery: Yes No

If yes,

PROM Aggravated preeclampsia/eclampsia Placenta previa

Fever Placental abruption Other bleeding before birth

Slow progress of labour Disproportion 3-4 degree tear

Threatening fetal asphyxia Other complication : _____.

Blood loss: <500 ml

500-999 ml

1000-1499 ml

1500-1999 ml

>2000 ml

Specify blood loss:

Atony

Laceration

Other : _____.

Blood transfusion: Yes No

Time intervals: Travelling time to KCMC: _____ hours.

Time from arrival to delivery: _____ hours.

Time from start of active phase (4 cm) to delivery: _____ hours.

Time from arrival to decision of intervention*: _____ hours.

(*CS, Vacuum, Forceps)

Birth weight: _____ grams.

APGAR score: 1 min: _____ points. 5 min: _____ points. 10 min: _____ points.

Referral to neonatal unit: Yes No

The Ten Group Classification System (TGCS)

1. Nulliparous, single cephalic, ≥ 37 weeks, spontaneous labor
2. Nulliparous, single cephalic, ≥ 37 weeks, induced or cesarean before labor
3. Multiparous (excl prev CS), single cephalic, ≥ 37 weeks, spontaneous labor
4. Multiparous (excl prev CS), single cephalic, ≥ 37 weeks, induced/CS before labor
5. Previous cesarean, single cephalic ≥ 37 weeks
6. All nulliparous breeches
7. All multiparous breeches (including previous cesareans)
8. All multiple pregnancies (including previous cesareans)
9. All abnormal lies (including previous cesareans)
10. All single cephalic, ≤ 36 weeks (including previous cesareans)

Appendix 2 - Admission form and Partograph

**KILIMANJARO CHRISTIAN
MEDICAL CENTRE**



KCMC

RECORD OF LABOUR

NUMBER: _____
Surname: _____
Other Names: _____
Address: _____
Date of Birth: _____
Tribe: _____

ADMISSION DATE _____ TIME _____ BY WHOM _____
ADMISSION (Reason of admission etc) _____

FROM _____ HOME / HOSPITAL TRANSFER / ANTENATAL WARD / CLINIC
SUMMARY OF ANTENATAL _____
ABNORMALITIES _____

LMP					EDD:				
OBSTETRIC HISTORY:					Living Children:				
Gravida:					Para				
YEAR	COMPLICATIONS	METHOD	WT	ALIVE	YEAR	COMPLICATIONS	METHOD	WT	ALIVE

EXAMINATION
General Condition _____
Temperature _____
Blood pressure _____
Oedema _____
Urine: Protein _____ Acetone _____
Height: _____
Ho - estimation of present _____
Last Recorded A/N _____

Fundal Height _____
Size of Fetus _____
Lie _____
Presentation _____
Liquor: Membranes intact
Clear
Meconium Stained
If membranes Ruptured: Date _____
Time _____

BLOOD GROUP:

INITIAL VAGINAL EXAMINATION AND PELVIC ASSESMENT
Date _____ Time _____
Cervix: State _____
Dilatation _____
Presenting Part _____
Level _____
Position _____
Moulding _____
Caput _____
Membranes / Liquor _____

examiner _____
BONY PELVIS - (Cross out which does not apply)
Sacral Promontory Not / Just / Easily Reached
Sacral Curve: Flat / Normal
Lachial Spines: Prominent / Normal
Subpubic Angle: Narrow / Normal
Sacral Tuberosities: No. of Knuckles
Summary _____
Consultant's / Registra's Opinion _____

AM 57

RECORD OF LABOUR

SPECIAL
INSTRUCTIONS

NAME _____ NUMBER: _____ PARA _____ GRAV _____ DATE _____

FETAL HEART RATE	180																									180
	170																									170
	160																									160
	150																									150
	140																									140
	130																									130
	120																									120
	110																									110
	100																									100
	90																									90
	80																									80

DURATION OF RUPTURE OF MEMBRANES _____ Hrs.

LIQUOR (L, C, M) MOULDING _____

C
E
R
V
I
X

D
I
L
A
T
I
O
N

10																								
9																								
8																								
7																								
6																								
5																								
4																								
3																								
2																								
1																								
0																								

DURATION OF LABOUR _____ Hrs.

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
---	---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

	5																								
	4																								
	3																								
	2																								
	1																								

CONTRACTIONS PER 10 MINUTES

UP TO 20 SECS

20 - 40 SECS

MORE THAN 40 SECS.

DRUGS AND I.V. FLUIDS

OXYTOCIC DROPS/MINUTE

PULSE

BLOOD PRESSURE

URINE { PROTEIN

ACETONE

VOLUME

TEMPERATURE

CHILD

Date of Birth _____ Time of Birth _____

METHOD OF DELIVERY _____

Weight _____ Sex _____ APGAR _____

Method of Resuscitation _____

SUMMARY OF LABOUR

First Stage: Duration _____ Second Stage: Duration _____

Third Stage: Duration _____ Placenta & Membranes _____

Blood Loss _____ Reasons for PPH _____

Perineum _____ Repair by _____

Delivered By _____ Supervision By _____

Appendix 3 - Medical Birth Registry



KCMC Medical Birth Registry

1 Basic information concerning mother

1.1 Mothers date of birth: Age: 1.2 Mothers name:

1.4 Hospital number: 1.3 Address:

1.6 Birth number: 1.5 Date of interview:

1.8 Date of admission: 1.7 Interview by:

Referred for delivery: 1 Yes 2 No (Self referral) If yes: ⇒ Referred from: 1 Home 2 Regional hospital 3 District hospital 4 Other, specify:

Reason for referral: Referred during labour: 1 Admitted in labour 2 Admitted before labour

1.9 Official date of discharge: 1.10 Date leaving hospital:

1.11 Current residence: 1 Rural 2 Urban 3 Semi urban 1.12 Mothers childhood residence: 1 Rural 2 Urban 3 Semi urban

Area of mother's residence: Area of mother's childhood residence:

1.13 Highest educational level: 1 None 2 Primary (1-7) 3 Secondary (8-11) 4 Higher (12+) 1.14 Current occupation: 1 Housewife 2 Farmer 3 Service 4 Business 5 Professional 6 Student 7 Others ⇒

1.15 Current marital status: 1 Married 2 Single 3 Widowed 4 Remarried 5 Divorced 6 Polygamous family Age at first marriage: Add wife number:

1.16 Regular menstrual periods: 1 Yes 2 No Age at menarche: 1.17 Genital mutilation (Circumcision): 1 Yes 2 No If yes, at age: If yes, type: 1 Type one 2 Type two 3 Type three 4 Other types

1.18 Mother's tribe: 01 Chagga 02 Pare 03 Masai Other 1.19 Religion: 1 Catholic 2 Protestant 3 Muslim 4 Others ⇒

2 Questions concerning the father of the child:

2.1 Father's name: 2.2 Father's age:

2.3 Current occupation of father: 01 Farmer 02 Business 03 Skilled worker 04 Unskilled worker 05 Service 06 Official 07 Professional 08 Student 09 Unemployed 10 Other ↓

2.4 Father's educational level: 1 None 2 Primary (1-7) 3 Secondary (8-11) 4 Higher (12+) 2.5 Father's tribe: 1 Chagga 2 Pare 3 Masai 4 Others ⇒

3 Questions concerning home conditions:

3.1 Source of drinking water: 1 Tap water 2 Well 3 River 4 Spring 5 Other, specify

3.2 Boiling of drinking water: 1 Yes 2 No 3.3 Distance to water, if not tap: 1 Less than 1 km (less 1/2 hour walk) 2 More than 1 km, specify in km:

3.4 Home toilet: 1 Pit latrine 2 Flush 3 Others ⇒

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others' health before and during present pregnancy

1 Body weight (kg): before pregnancy:

- Serious diseases: 01 Diabetes, 02 Hypertension, 03 Heart diseases, 04 Epilepsy, 05 Malaria

Have you ever practised family planning: 1 Yes, 2 No

If yes, what kind of prevention: 01 Pills, 02 Injections, 03 IUD, 04 Condoms

Antenatal care in this pregnancy: 1 Yes, 2 No

Number of visits:

L.M.P.:

0 Do you smoke? 1 Yes, 2 No

Chewing tobacco: 1 Yes, 2 No

1 Do you drink alcoholic beverages? 1 Yes, 2 No

If yes, Every day, 2 More than once a week, 3 Once a week, 4 Occasionally

2 Drugs on regular basis? 1 Yes, 2 No

If yes, 1 Modern, 2 Traditional

Did you take any drugs at time of conception or during first trimester: 1 Yes, 2 No

5 Blood group (Abo) Rh:

Hb measurement done: 1 On Admission, 2 Last visit to ANC

HIV test recorded: 1 Yes, 2 No

If yes, result: 1 Negative, 2 Positive

6 Diseases and complications during present pregnancy, including accidents: 1 Yes (specify below), 2 No

01 Gestational diabetes, 02 Diabetes, 03 Hypertension, 04 Preeclampsia, mild, 05 Preeclampsia, severe, 06 Eclampsia

4.3 Blood transfusions: 1 Yes, 2 No

- 06 Anaemia, 07 Gynaecological disease, 08 Liver disease (jaundice), 09 Kidney disease, 10 Lung disease

Months trying to get pregnant:

- 09 Abstinence, 10 Traditional, 11 Other specify ↓

If yes: First medical appointment date:

If date unknown, estimate first appointment: 1 0-12 week of gestation, 2 13-20 week, 3 21-30 week, 4 After 31 week

4.9 E.D.D. Based on clinical estimate: 1 Yes, 2 No

Smoking during this pregnancy: 1 Yes, 2 No

Chewing tobacco during this pregnancy: 1 Yes, 2 No

Did you also drink alcoholic beverages during this pregnancy? 1 Yes, 2 No

If yes: 1 Every day, 2 More than once a week, 3 Once a week, 4 Occasionally

Did you take any drugs during this pregnancy: 1 Yes, 2 No

If yes, specify: 1 Modern, 2 Traditional

Drugs for infertility: 1 Yes, 2 No

VDRL status: 1 Positive, 2 Negative, 3 Unknown

Treatment during this pregnancy: 1 Yes, 2 No

Specify: 13 Gynaecological disease, 14 Thromboembolic disease, 15 Heart disease, 16 Tuberculosis, 17 Lung disease, 18 Infections, specify ↓, 19 Others, specify ↓

5 Questions concerning the delivery

5.1 At birth: 1 Single birth, 2 Multiple birth

5.2 Complications during delivery: 1 PROM, 2 Bleeding > 500 ml, 3 3-4 degree tear, 4 Abrupton of placenta, 5 Placenta previa, 6 Other complications

5.3 Induction of labour: 1 Yes, 2 No

If yes: 1 Amniotomy, 2 Oxytocin, 3 Prostaglandin

5.4 Others: 1 Episiotomy, 2 Symphysiotomy

5.5 Analgesia: 1 Yes, 2 No

5.6 Anaesthesia: 1 General, 2 Spinal/Epidural

5.7 Gestational age at birth clinical estimate: 1 Good, 2 Fair, 3 Bad, 4 Maternal death

5.8 Blood Loss (ml):

5.9 Mother's health after delivery: 1 Live born, 2 Female, 3 Unknown, unsp.

6.1 Date of delivery:

6.2 Time of delivery:

6.3 Sex: 1 Male, 2 Female, 3 Unknown, unsp.

6.4 Birth weight (Gram):

6.5 Length (Cm):

6.6 Head circum:

6.7 Presentation: 1 Cephalic, 2 Breech, 3 Transverse, 4 Other

6.8 Status: 1 Live born, 2 Live born transferred to paediatrics dept, 3 Stillborn, 4 Neonatal death

6.9 If stillborn: 1 Dead before labour, 2 Dead during labour, 3 Unknown, unsp.

6.10 Apgar 1min score: 1 5 min, 2 10 min

6.11 Mode of delivery: 1 Spontaneous, 2 Vacuum, vaginal, 3 Forceps, vaginal, 4 CS elective, 5 CS others, 6 Assisted breech, 7 Destructive operative

6.12 Failed intervention: 1 Vacuum, 2 Forceps

6.13 Does the child have any of these conditions? 1 Birth defects, 2 Injuries, 3 Diseases, 4 HIV Positive

Status on 2 child (For multiple births - not for singletons, if more than twins add extra copy of this page)

6.1 Date of delivery:

6.2 Time of delivery:

6.3 Sex: 1 Male, 2 Female, 3 Unknown, unsp.

6.4 Birth weight (gram):

6.5 Length (cm):

6.6 Head circum:

6.7 Presentation: 1 Cephalic, 2 Breech, 3 Transverse, 4 Other

6.8 Status: 1 Live born, 2 Live born transferred to paediatrics dept, 3 Stillborn, 4 Neonatal death

6.9 If stillborn: 1 Dead before labour, 2 Dead during labour, 3 Unknown, unsp.

6.10 Apgar 1min score: 1 5 min, 2 10 min

6.11 Mode of delivery: 1 Spontaneous, 2 Vacuum, vaginal, 3 Forceps, vaginal, 4 CS elective, 5 CS others, 6 Assisted breech, 7 Destructive operative

6.12 Failed intervention: 1 Vacuum, 2 Forceps

6.13 Does the child have any of these conditions? 1 Birth defects, 2 Injuries, 3 Diseases, 4 HIV Positive

7 Previous pregnancies including abortions in chronological order

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
Preg.no	Year	Outcome	Months	Birth weight	Sex	Lactation months	Delivery where	Attended by	Mode	ANC	Alive/Death	Cause of death	Age
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14

- C1 Pregnancy number.
- C2 Year of pregnancy. (Birth or other termination) PP: Present pregnancy.
- C3 Outcome of pregnancy. (L) Live born, (S) Stillborn, (A) Spontaneous abortion, (I) Induced abortion, (E) Ectopic. (M) Molar, (T) Twins or other multiples*, (O) Other
- C4 Months of gestation at birth or other termination.
- C5 Birth weight in grams
- C6 Sex: (M) Male, (F) Female, (U) Unknown
- C7 Lactation: In months
- C8 Delivered where: (1) At home, (2) At hospital, (3) At health post, (4) During transport, (5) Other / unknown
- C9 Attended by whom: (R) Relative, (N) Nurse, (M) Midwife, (D) Doctor, (T) Traditional birth attendant
- C10 Mode: (S) Spontaneous, (V) Vacuum, (F) Forceps, (C) Cesarean section, (B) Breech, (O) Other, (9) Unknown
- C11 Antenatal care: (Y) Yes, (N) No
- C12 Child's current status: (A) Alive, (D) Dead
- C13 Cause of death: Specify
- C14 Age: (1) Less than one week, (2) Less than one month, (3) Less than one year, (4) More than one year

* Multiple births (Twins, Triples ...) are filled in on subsequent lines