

Indications and Immediate Outcomes of Caesarean Section at Primary Health Care Facilities in Rural Tanzania

John Somi^{1*}, Amani Idris Kikula¹, Saidi Ali¹, Fadhln M. Alwy Al-Beity¹, Rafiki Nickson Mjema¹, Paul Emmanuel Ndeki¹, Peter P. Kunambi², Charles Kilewo¹

¹Department of Obstetrics and Gynaecology, Muhimbili University of Health and Allied Sciences, Dar es Salaam, Tanzania

²Department of Clinical Pharmacology, Muhimbili University of Health and Allied Sciences, Dar es Salaam, Tanzania

Email: *johnsomi84@gmail.com, amanikikula@gmail.com, saidiali2011@gmail.com, fadhlundr@gmail.com, rafikimjema123@gmail.com, ndekipaul@gmail.com, ponsianpeter@gmail.com, kilewo1950@gmail.com

How to cite this paper: Somi, J., Kikula, A.I., Ali, S., Alwy Al-Beity, F.M., Mjema, R.N., Ndeki, P.E., Kunambi, P.P. and Kilewo, C. (2024) Indications and Immediate Outcomes of Caesarean Section at Primary Health Care Facilities in Rural Tanzania. *Open Journal of Obstetrics and Gynecology*, 14, 1841-1854. <https://doi.org/10.4236/ojog.2024.1412153>

Received: October 27, 2024

Accepted: December 20, 2024

Published: December 23, 2024

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Abstract

Objective: To determine the indications and immediate maternal and fetal outcomes of caesarean section performed at primary health facilities in 2020. **Design:** Descriptive cross-sectional study. **Setting:** Lushoto District Council is located in the northeastern in Tanga region, Tanzania. **Participants:** All women who underwent caesarean section at primary health facilities from January to December 2020, 782 included in this study and 72 files were missing. **Main outcome Measures:** Indications and immediate maternal and fetal outcomes of caesarean section at primary health facilities. The difference in indications and outcomes of caesarean section between district hospital and upgraded health centres. **Results:** The commonest indications were obstructed labor 29.0%, previous scar(s) 19.9% and fetal distress 17.0%. Obstructed labour indication was more at the upgraded health centres. Most, 89% of women had no post-operative complications. The common maternal complications were hemorrhage 5.7%, transfusion 5.2%, prolonged stay 1.7%. Most babies were alive 95%, term 90% with Apgar score > 7 at 5 minutes 96% and 94% had birth weight ≥ 2500 g. There were no statistically significant differences in immediate maternal and fetal outcomes between health centres and district hospital. **Conclusions:** Obstructed labour was the commonest indication for caesarean section. The immediate maternal and fetal outcomes at the upgraded health centers were comparable to the district hospital level. Clinical audits of indications for caesarean section and prospective studies for late maternal and fetal outcomes of caesarean section performed at primary health facilities to be conducted.

Keywords

Primary Health Facility, Caesarean, Indications, Immediate Outcomes

1. Introduction

Caesarean section (CS) an obstetric surgery, is one of the important signal functions of comprehensive emergency obstetric care (CEmONC). Although rates are globally rising, they are still hugely inaccessible in most underserved rural areas in sub-Saharan Africa [1]. According to Tanzania Demographic Health Survey in 2016 the caesarean section rates in Tanzania is estimated to be 6% with 9.6% in urban and 3.2% in rural areas, where 69% of the population live [2].

Despite being safe, caesarean section deliveries may present with difficulties for the clinician, particularly in low-resource. Most CS done in Lower and Middle Income Countries are performed in settings that do not meet minimum safety and quality standards, increasing complications and morbidities from the procedure [3] [4]. The maternal complications include hemorrhage, blood transfusions, wound infections, caesarean hysterectomies, injury to adjacent organs and maternal death [5]-[10]. On the other hand, caesarean section deliveries especially those done as emergency are connected to iatrogenic premature deliveries of newborns and hence infancy-related respiratory distress, admissions to neonatal intensive care unit, low Apgar scores at birth and longer hospitalization [7] [11]-[14].

The majority of Tanzanians enter into healthcare system through primary health care facilities *i.e.*, dispensaries, health centres (HC), and district hospitals (DH) [15]. The Tanzania National Road Map Strategic Plan for Acceleration of Reduction of Maternal and Child Deaths (One Plan II) established a goal of 100% CEmONC capacity for hospitals and 50% for health centres by 2015 in order to expand access to these services. However, by 2015 only 22.2% of all health centres were providing CEmONC services [16]. Therefore, between August 2015 and August 2019, the Tanzanian Government renovated and constructed 350 health centres and 69 district hospitals to provide CEmONC services [17].

Little information is available regarding maternal and fetal outcomes of CS delivery in primary health care facilities. Therefore, this study aims to determine the common indications as well as the immediate maternal and fetal outcomes after caesarean section surgery performed at this level.

2. Methods

2.1. Study Design

A descriptive cross-sectional study.

2.2. Study Setting

Lushoto District Council located in northeastern in Tanzania. The council has one hospital, five health centres and fifty two dispensaries. Previously caesarean

sections were done at the district hospital. By year 2020, the four health centres *i.e.*, Mlalo HC, Mlola HC, Kangagai HC and Kwai HC were renovated including construction of new operating theatres to provide caesarean section. The remaining health centre *i.e.*, Mlola HC was being renovated during the study period. At all facilities the caesarean sections are done by Medical Officer and Assistant Medical Officer.

2.3. Study Participants

All women who delivered by caesarean section at Lushoto District Hospital and the 4 upgraded health centres (within the district-Kangagai, Kwai, Mlalo and Mnazi Health Centres) from 1st January to 31st December 2020.

2.4. Sampling Technique

Study included all women delivered during the study period.

2.5. Ethical Approval

Ethical clearance was sought from the Senate Research and Publications committee of MUHAS Ref No DA.282/298/01.C and the permission to conduct the study and the waiver consent was obtained from the office of District Executive Director of Lushoto District Council Ref LDC/HE/PF.817/55.

2.6. Variables

Primary outcomes;

- Indications for caesarean section at primary health care facilities;
- Immediate maternal outcomes of women who underwent CS at primary health facilities such as hemorrhage, transfusion, infection and prolonged stay;
- Immediate fetal outcomes of women who underwent CS at primary health facilities such as Apgar score, birth weight, gestation age at delivery;

Secondary outcomes;

- Differences in the immediate maternal and fetal outcomes of CS between the Lushoto District Hospital and upgraded Health centers.

2.7. Data Sources and Management

List of women who delivered by CS between 1st January to 31st December 2020 was taken from individual facilities' theatre registers, and then the profiles of the women was taken from Health Management Information System (HMIS) book 12 and 13 registers at maternity wards and from the patient files retrieved from medical records department.

Data was collected by using a tool/checklist that was prepared to include all the variables of the study. The developed tool had questions to record maternal demographic information, obstetric history and clinical factors (maternal age, parity, gestation age at delivery, type of caesarean section *i.e.*, emergency or elective, indication for CS, type of anesthesia, hemoglobin before surgery, cadre of surgeon,

assistant surgeon and anesthetist, pre-operative antibiotic. Maternal outcomes before discharge or referral: no complication, hemorrhage, injury to adjacent organs (bladder, ureters, bowel etc.), blood transfusion, referral, long hospital stay (more than 3 days), caesarean hysterectomy, infection, wound dehiscence and maternal death. The fetal outcomes before discharge or referral were collected: live birth, birth weight, Apgar score at 5th minute and fresh stillbirth.

2.8. Study Size

The minimum sample size was calculated by Cochran formula, where proportion of 50% was used and standard deviate of 95% and standard error of 5% where the minimum required sample size was 384.

2.9. Statistical Analysis

Data were coded and then entered and analyzed by Statistical Package for Social Sciences (SPSS) version 26 (IBM Corp. Released 2019. IBM SPSS Statistics for Windows, Version 26.0. Armonk, NY: IBM Corp). Descriptive statistics were used during analysis. The data were summarized in frequency distribution tables. The proportion of each indication for CS was analyzed to determine the common indications for CS, with the denominator being women who underwent caesarean section. The proportion of each immediate maternal and fetal outcome was analyzed to determine the common immediate maternal and fetal outcomes, with the denominators being women who underwent caesarean section and the newborns delivered respectively. The proportions of immediate maternal and fetal outcomes between district hospital and health centers were compared using chi square and Fisher's exact test, where p value < 0.05 was considered statistically significant.

3. Results

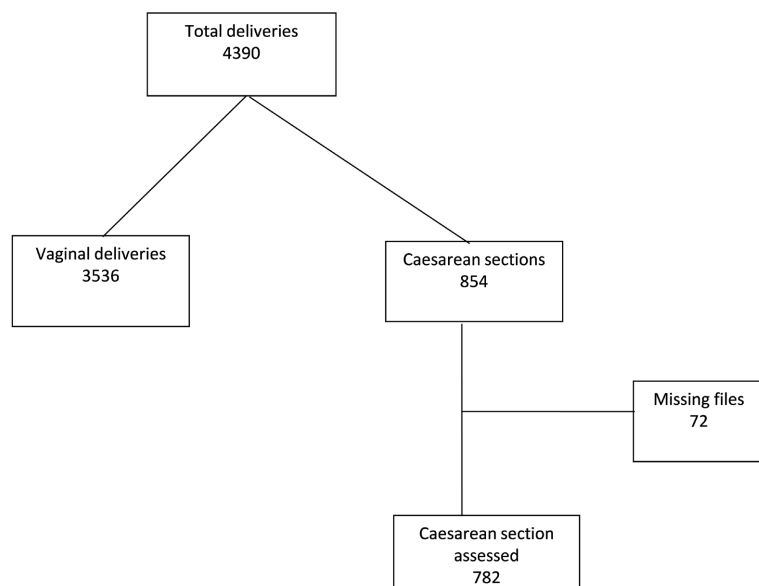


Figure 1. Patient flow chart.

A total of 782 caesarean sections performed during the period of 1st January to 31st December 2020 were included, 679 from district hospital and 103 from health centres. 72 files were missing all from the district hospital (**Figure 1**).

The median age of study participants was 24 years in health centres and 26 years in district hospital. About 16.5% of operated pregnant women at health centres had age below 20 years as compared to 9.4% in district hospital. Most of women had primary education, parity of 1 - 4 and gestation between 37 - 42 weeks. Regarding the type 89.1% were emergency CS, general anaesthesia (ketamine) was used in 99.4% of cases and only 5.6% of cases received preoperative antibiotics (**Table 1**).

Table 1. Maternal socio-demographic and clinical characteristics (N = 782).

Variable	Level of health facility			p-value
	Health centres N (%) n = 103	District hospital N (%) n = 679	Total N (%)	
Age group (years)				
<20	17 (16.5)	64 (9.4)	81 (10.4%)	0.08
20 - 34	69 (67.0)	507 (74.7)	576 (73.7%)	
≥35	17 (16.5)	108 (15.9)	125 (16.0%)	
Median age in years (IQR)	24 (20, 30)	26 (22, 31)		
Level of education				
Primary and below	94 (91.3)	497 (73.2)	591(75.6%)	0.001
Secondary and above	9 (8.7)	182 (26.8)	191 (24.4%)	
Parity				
0	47 (45.6)	244 (35.9)	291 (37.2%)	0.026
1 - 4	47 (45.6)	401 (59.1)	448 (57.3%)	
≥ 5	9 (8.7)	34 (5.0)	43 (5.5%)	
G.A at delivery (weeks)				
≤36	5 (4.9)	71 (10.5)	76 (9.7%)	0.148
37 - 42	97 (94.2)	602 (88.7)	699 (89.4%)	
>42	1 (1.0)	6 (0.9)	7 (0.9%)	
Pre-operative antibiotic				
Yes	13 (12.6)	31 (4.6)	44 (5.6)	0.001
No	90 (87.4)	648 (95.4)	738 (94.4)	
Type of CS				
Emergency	99 (96.1)	598 (88.1)	697 (89.1)	0.015
Elective	4 (3.9)	81 (11.9)	85 (10.9)	
Type of anaesthesia				
General (ketamine)	99 (96.1)	678 (99.9)	777 (99.4)	0.001
Spinal	4 (3.9)	1 (0.1)	5 (0.6)	

The common indications for CS were obstructed labour (29.0%), previous scar (19.9%) and cephalopelvic disproportion (17.0%). There were more obstructed labor in health centres (44.6%). Trial of scar were done at district hospital and all with pre-eclampsia/eclampsia, bad obstetric history were referred from to district hospital (**Table 2**).

Table 2. Indications of caesarean section among pregnant women delivered at health centres and district hospital (N = 782).

Indication	Level of health facility			p-value
	Health centres n (%) n = 103	District hospital n (%) n = 679	Total n (%)	
Previous scar(s)	10 (9.7)	146 (21.5)	156 (19.9)	0.005
Obstructed/prolonged labour	46 (44.6)	181 (26.6)	183 (29.0)	0.001
Fetal distress	19 (18.4)	114 (16.8)	133 (17.0)	0.677
Cephalopelvic disproportion	7 (6.8)	34 (5.0)	41 (5.2)	0.448
Antepartum hemorrhage	1 (0.9)	21 (3.1)	22 (2.8)	0.247
Big baby	4 (3.8)	35 (5.2)	39 (4.9)	0.581
Multiple pregnancy	2 (1.9)	17 (2.5)	19 (2.4)	1.000
Pre-eclampsia/eclampsia	0 (0.0)	32(4.7)	32 (4.1)	
Failure of trial of scar	0 (0.0)	47 (6.9)	47 (6.0)	
Malpresentation	14 (13.6)	41 (6.0)	55 (7.0)	0.005
Bad obstetric history	0 (0.0)	17 (2.5)	17 (2.1)	0.149

Table 3. Immediate maternal outcomes of caesarean section between health centers and district hospital (N = 782).

Maternal outcomes	Level of health facility		p-value
	Health centres n (%) n = 103	District hospital n (%) n = 679	
Complication post CS			
No	93 (90.3)	600 (88.4)	0.566
Yes	10 (9.7)	79 (11.6)	
Hospital stays post-surgery			
>3 days	1 (1.0)	16 (2.4)	0.714
≤3 days	102 (99.0)	663 (97.6)	
Excessive blood loss (1000 mls)			
Yes	6 (5.8)	39 (5.7)	0.974
No	97 (94.2)	640 (94.3)	
Blood transfusion			
Yes	4 (3.9)	44 (6.5)	0.306
No	99 (96.1)	635 (93.5)	
Infection			
Yes	2 (1.9)	8 (1.2)	0.629
No	101 (98.1)	671 (98.8)	
Wound dehiscence			
Yes	2 (1.9)	4 (0.6)	0.181
No	101 (98.1)	675 (99.4)	

Most of the women who underwent caesarean section had no post-operative complications. Of those with complications, the common ones at health centres and district hospital respectively were excessive blood loss 5.8% and 5.7%, blood transfusion 3.9% and 6.5%, hospital stay more than 3 days 1.0% and 2.4% and infection 1.9% and 1.2%. There was no statistical significance difference in immediate maternal outcomes between health centres and district hospital (**Table 3**).

The common immediate fetal outcomes at health centres and district hospital respectively were term babies 93.7% and 87.9%, alive 96.4% and 95.3% with Apgar score at 5 minutes were ≥ 7 (95.3%) and (98.4%) majority weighed ≥ 2500 grams (96.4%) and (91.8%). There was no statistically significant difference in immediate fetal outcomes between health centres and district hospital (**Table 4**).

Table 4. Immediate fetal outcomes of caesarean section between health centers and district hospital (N = 815).

Fetal outcomes	Level of health facility		p - value
	Health centres n (%) n = 111	District hospital n (%) n = 704	
G.A at delivery (weeks)			
Preterm (<37)	7 (6.3)	85 (12.1)	0.078
Term (≥ 37)	104 (93.7)	619 (87.9)	
Born alive			
Yes	107 (96.4)	673 (95.6)	1.000
No	4 (3.6)	31 (4.4)	
Fresh stillbirth	3 (2.7)	22 (3.1)	1.000
Apgar score at 5 minutes*			
<7	5 (4.7)	11 (1.6)	0.055
≥ 7	102 (95.3)	662 (98.4)	
Newborn weight (grams)			
<2500	4 (3.6)	58 (8.2)	0.087
≥ 2500	107 (96.4)	646 (91.8)	

4. Discussion

In this study, a total of 782 caesarean sections were assessed. The findings show the commonest indications were obstructed labour, previous scar(s) and fetal distress. Obstructed labor indications were more at health centres whereas previous scar(s) indications were more at the district hospital. Majority of women had no post-operative complications, however of those few with complications, the commonest were post-partum hemorrhage, blood transfusion, infection and prolonged hospital stay more than three days. On the other hand, most of babies were born alive, at term with Apgar score equal or more than 7 at 5 min and body weight more than 2500 g. Furthermore, there was low utilization of spinal anesthesia. There were no statistical significant difference in immediate outcomes of

caesarean section.

In this study, the increased obstructed labour as indication for caesarean section in especially at health centres could be due to increased proportion of pregnant women below 20 years than that in Tanzania Demographic Health Survey in 2016 [2]. This was similar to the study done at district hospital in southern Tanzania. The results were higher compared to the study done in public hospitals in Bangladesh and Muhimbili National Hospital in Tanzania [18]-[20]. This could be due to the difference in the levels of the facilities with higher facilities receiving more complex cases as referrals. Previous scar(s) as indication for CS was more at the district hospital, probably because of referrals from the lower facilities for women with previous scar. In Tanzania, women with previous scar are recommended to deliver in hospitals. The results were comparable to study done in Goma, DR Congo [21], but contrary to higher referral facilities such as Muhimbili National Hospital in Tanzania and another tertiary hospital in Pakistan [19] [22]. The findings also show more women had undergone caesarean section due to malpresentation at health centres compared to district hospital, therefore there is a need to evaluate these differences in indications.

Most of the women who underwent CS had no post-operative complications. As in other studies in India and Nigeria, postpartum hemorrhage complicates the most caesarean section procedure [5] [23]. However, the findings were lower compared to the study done at Iringa Regional Referral Hospital in Tanzania [7]. The difference in levels of facility can explain this, the regional hospital handles more complicated cases. The proportion of post-partum hemorrhage in this study seems to be similar between upgraded health centres and district hospital despite the fact more women had the primary surgeries at health centres compared to district hospital, experience of surgeons can explain this finding with district hospital having more experienced surgeons than the health centres. Post-partum hemorrhage also reflects on the increased transfusion rates in our study. However, few patients had received transfusion at health centres due to inadequate blood products health centres, This resulted to about three of patients to be referred district hospital for blood transfusion after surgery.

We observed the other immediate maternal outcomes were comparable between health centres and district hospital as in postpartum complication discussed above. Wound site infection proportions were lower compared to tertiary hospital in Mwanza, Tanzania [24] [25]. The study findings also show lower wound dehiscence; however, these were contradicting findings as majority of women didn't receive pre-operative antibiotics in all facilities but all received antibiotics post operatively. WHO guidelines recommends prophylactic antibiotics for women undergoing elective or emergency caesarean section 30 - 60 minutes before skin incision [26]. The higher proportions of surgical sites were found in a prospective study done in rural settings in Rwanda however, the follow-up was 30 days after surgery [11]. Furthermore, the maternal deaths were lower compared to other studies; a study done Muhimbili National Hospital, a tertiary hospital in Tanzania,

however the study was done among women with previous caesarean delivery and also load of high risk patients at this tertiary hospital is the issue of concern [10]. Another study was done at a district hospital in Nigeria but the hospital had no obstetric unit [11].

On the other hand, more preterm babies were delivered at district hospital due to the fact high risk pregnancies were referred to deliver at district hospital. However, in general the neonatal outcomes were relatively good in both facilities. The result at district hospital were similar to the study done at a referral hospital in northern-eastern Tanzania and in rural Bangladesh [18] [27]. The findings were also similar to a national review of caesarean section deliveries done in Brazil, however, in this review the multiple births were excluded [13]. There were more low birth weight deliveries at district hospital due to above reasons. This finding at district hospital corresponds with studies done at Muhimbili National Hospital in Tanzania, Democratic Republic of Congo and Iran [14] [28] [29]. Therefore, there is a need to strengthen more care for preterm and low-birth-weight among babies delivered at primary health facilities level including Kangaroo mother care

Moreover, most of babies delivered both at health centres and district hospital had Apgar scores equal or more than 7 at 5 minutes. This was despite the fact that fetal distress was the third common indication for CS; thus, this probably because of timely intervention of fetal distress. However, more low Apgar scores at health centres perhaps because there was more obstructed labour than the district hospital, more training on helping babies' breath and neonatal resuscitation should be considered at the health centres. The results in district hospital are comparable to a study done in Nepal in 2020 [30]. More low Apgar score was found other studies done in regional hospital in southern Tanzania and Ethiopia, however these were referral hospital receiving more complicated patients [7] [12]. Furthermore, stillbirths were low, the results were similar to the study done in India [31]. The lower incidence of stillbirths was in study done in Bangladesh however this was a population based study [32].

5. Strength and Limitations

This study had some limitations, there some missing files due to poor record keeping; short time of observation and the study was done at rural settings it cannot be generalized to facilities in urban settings and higher level facilities. Lastly the long-term complications were not assessed. Despite limitations encountered, this is important study as it provides necessary information on the performance of primary health facilities providing caesarean section services.

6. Conclusion

The results from the study show that obstructed labour was the commonest indication for caesarean section at primary health facilities. There was no difference in immediate maternal and fetal outcomes of caesarean section between the district hospital and the upgraded health centres. Clinical audits of indications for

caesarean section and prospective studies for late maternal and fetal outcomes of caesarean section performed at primary health facilities to be conducted.

Acknowledgement

We acknowledge all members of the academic staff in the Department of Obstetrics and Gynaecology at Muhimbili University of Health and Allied Sciences and Muhimbili National Hospital for their valuable contributions. Also we acknowledge the District Executive Director at Lushoto District Council for the support during the study.

Funding

This study received financial support from the Ministry of Health in Tanzania.

Authors' Contributions

- J.S conceptualized the study, participated in data collection, data analysis and prepared the first draft of the manuscript. P.P.K participated in data analysis. P.E.N participated in data analysis and writing of manuscript.
- A.I.K participated in conceptualizing the study, provided technical guidance in development and data analysis and reviewed the manuscript draft. A.S, F.A.A and C.K provided technical guidance in data analysis and development of the manuscript. All authors read and approved the final manuscript.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Appendix

Appendix 1. Data Collection Tool

Serial number..... File number.....

- 1) Name of facility.....
- 2) Level of facility
 - a) Health center
 - b) District Hospital
- 3) Date of surgery (dd/mm/yyyy) .../.../...
- 4) Age of patient.....
- 5) Education level.....
- 6) Gravidity.....
- 7) Parity.....
- 8) Gestational age.....
- 9) Previous caesarean section
 - a) 0
 - b) 1
 - c) ≥ 2
- 10) Indication of CS
 - a) Previous scar
 - b) Obstructed labour
 - c) Fetal distress
 - d) Cephalopelvic disproportion
 - e) Antepartum hemorrhage
 - f) Other, mention...
- 11) Type of Anesthesia
 - a) General anesthesia
 - b) Spinal anesthesia
 - c) Both
- 12) Cadre of anesthetist
 - a) Medical attendant
 - b) Registered nurse
 - c) Clinical Officer
 - d) Assistant Medical Officer
 - e) Medical officer
- 13) Type of caesarean section
 - a) Elective CS
 - b) Emergency CS
- 14) Cadre of surgeon
 - a) Assistant Medical Officer
 - b) Medical Officer
 - c) Other, specify...
- 15) Cadre of assistant surgeon
 - a) Medical attendant

- b) Registered nurse
 - c) Clinical officer
 - d) Assistant medical officer
 - e) Medical officer
 - f) Other, specify
- 16) Pre-operative antibiotic given
- a) Yes
 - b) No
- 17) Hemoglobin level before surgery..... go to question 18
- a) Yes
 - b) No
 - c) Unknown
- 18) If yes, Hb level.....g/dl

Immediate maternal outcomes

- 19) Maternal outcomes
- a) No complication Yes..... No.....
 - b) Hospital stays post-surgery > 3 days
 - c) Excessive blood loss: >1000 mls Yes..... No.....
 - d) Blood transfusion: Yes...units.... No.....
 - e) Injury to another organ: Yes... specify..... No.....
 - f) Infection: Yes..... No.....
 - g) Wound dehiscence: Yes..... No.....
 - h) Caesarean hysterectomy: Yes..... No.....
 - i) Reoperation: Yes..... No.....
 - j) Referral to another facility: Yes..... No.....
 - k) Death: Yes..... No.....
 - l) Other, specify....

Immediate fetal outcomes (*applies for twin pregnancy)

- 20) Fetal outcome Fetal outcome*
- a) Alive..... go to 21 a) Alive.... go to 21
 - b) Fresh stillbirth b) Fresh stillbirth
 - c) Macerated stillbirth c) Macerated stillbirth
- 21) Apgar score at 5 min Apgar score at 5 min*
- 22) Birth weight..... g Birth weight*.....g

END