Table 2. Summary of the indications for operative delivery (post-operative diagnosis) as seen in Katima Mulilo Hospital, January-December, 2011.

Indications	Frequency of occurrence	Percentage %
Obstructed labour	67	57.3
Postmaturity with failed induction	2	1.7
Pre-eclampsia	17	14.5
Eclampsia	4	3.4
Previous caesarean section	12	10.3
Elderly primigravidarity	3	2.6
Elective caesarean section	1	0.9
Antepartum haemorrhage	2	1.7
Premature rupture of membrane in Retroviral disease	2	1.7
Florid genital warts	2	1.7
Cord prolapse	4	3.4
Fetal distress	19	16.2
Total	135	

Of the faktors associated with labour shown in Table 3, cephalopelvic disproportion (CPD) accounted for 19 (28.4%) followed by abnormal presentation 17 (25.4%) and delayed first stage 9(13.4%). Fetal malpositioning had the lowest proportion of 1(1.5%).

Table 3. Obstructed labour factors as seen in Katima Mulilo Hospital, January to December,2011.

Factors	Frequency of occurrence	Percentage %
Delayed first stage	9	13.4
Delayed second stage	7	10.4
Abnormal presentation	17	25.4
Cephalopelvic disproportion(CPD)	19	28.4
Abnormal lie	4	6.0
Fetal malpositioning	1	1.5
Breech in primigravida	5	7.5
Cervical dystocia	2	3.0
Fetal macrosomia	3	4.5
Total	67	100

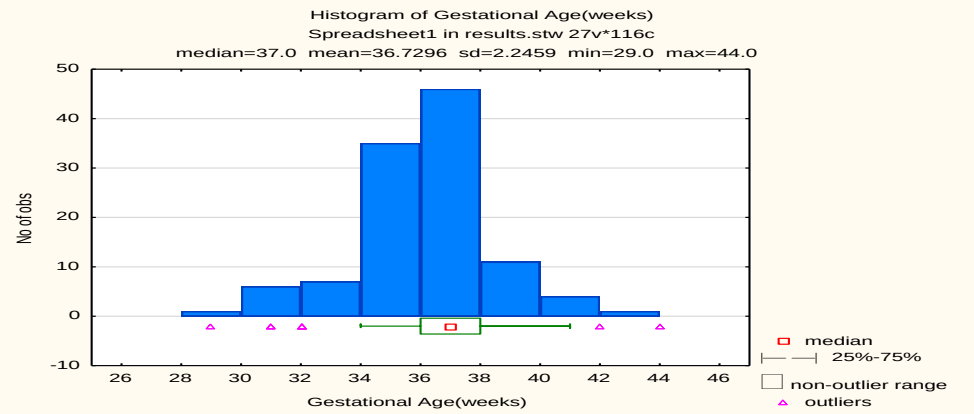
Out of the total 117 patients that had surgery in 2011 as shown in Table 4, 116 (99.2%) patients underwent caesarean section and only I (0.9%) patient had vacuum extraction done on an account of labour obstruction. No patient had forceps delivery.

Table 4. Types of operative deliveries employed in Katima Mulilo Hospital, January-December, 2011.

Serial number	Surgical procedure type	Frequency	Percentage (%)
1	Vacuum extraction	1	0.85
2	Caesarean section	116	99.15
3	Forceps delivery	0	0
4	Number of cases	117	100

The mean maternal age was 25.5 while the mean gestational age was 36.7 weeks (Figure 1) and the mean gravidarity was 2.0. A total of 67% of the women are literate while 33% are illiterate. A total of 51% of the women were single while 49% were married. This shows a slight preponderance of single women in the study. A total of 34 % of the women suffered from retroviral disease (RVD), 3% hypertension (HPT) while 64% had no systemic disease. All the surgical procedures were successfully carried out.

Figure 1. Gestational Age (weeks).

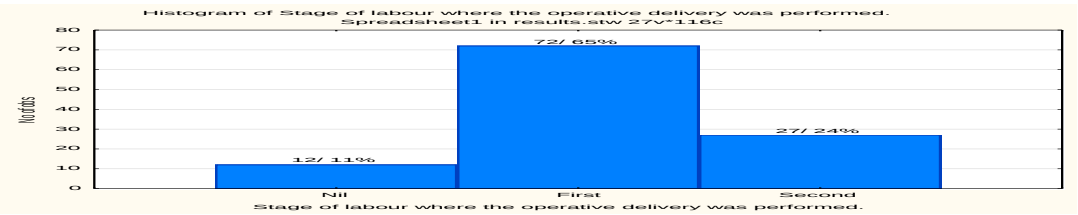


For the operative delivery from the study, no recourse to any other procedure after a failed one was recorded. Mortality following the operative delivery as illustrated above shows 2 (2%) stillbirths, 2 (2%) neonatal deaths and 4 (4%) fresh stillbirths. Most of the subjects, 98%, suffered no morbidity as a consequence of the procedures.

A total of 96 (86%) patients had no history of previous operative delivery as against 15 (14%) patients with such history. Cephalopelvic disproportion followed by fetal distress, were found as the main indications for previous operative deliveries. Caesarean section was the only operative intervention undergone by a few who had history of previous operative delivery in the study. A total of 79% of patients had spinal anaesthesia while 19% had general anaesthesia. In 2% of cases, the anaesthesia type was not stated.

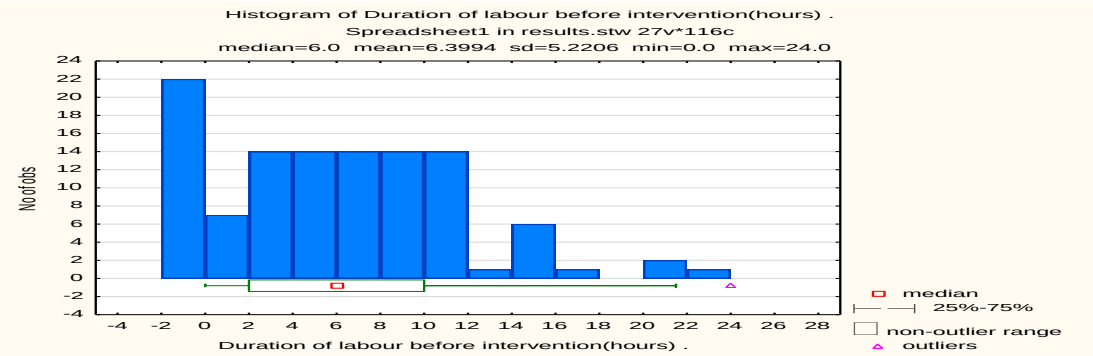
Emergency caesarean section was carried out in 98% of cases, elective caesarean section in 1%, and vacuum extraction also in 1% of cases. Operative delivery was performed at first stage of labour in 65% (75) of cases, 24% (27) at second stage and in 11% (12) of cases, the patients were not in labour (Figure 2).

Figure 2. Stage of labour where the operative delivery was performed.



The mean neonatal birthweight was 3.1Kg, while the mean duration of labour before intervention was 6.3 hours (Figure 3).

Figure 3. Duration of labour before intervention (hours).



DISCUSSIONS

The study looked at obstructed labour as an indication of operative delivery. Forms of labour obstruction, the stages of labour within which they were encountered and the surgical interventions instituted were demonstrated by the study.

The mean maternal age 25.5 years and age range 20-25 years from the study contrast with the findings of Kabakyenga and Ostergren et al in another study in south-western Uganda where the mean maternal age and the age range were 17 years and 15-19 years respectively.[1] However, from the study, a significant proportion of the patients belonged to the age range 15-20.

The mean gestational age in weeks from the study was 36.7 meaning delivery occurred in most cases at or near term. Furthermore, a large number of the patients in this study were literate. Jurdi and Khawaja in a study on caesarean rates in the Arab region observed highly significant associations between population caesarean rates and female literacy.[40] The Arab countries with high female literacy level were found to have high caesarean section rates due to high maternal requests.

Analysis of postoperative diagnosis showed obstructed labour followed by fetal distress and pre-eclampsia as the leading indications for operative delivery and hence caesarean section. Similarities were seen with the findings in a Saudi Arabian hospital where obstructed labour topped the list of the indications for caesarean section followed by fetal distress.[23]This contrasts with the findings of Ajuzieogwu and Amucheazi at a Nigerian Tertiary Institution where previous caesarean section[41] followed by cephalopelvic disproportion (CPD) were the main indications for caesarean section.[25]

Of the factors associated with obstructed labour in this study, cephalopelvic disproportion has the highest contribution followed by abnormal presentation and delayed first stage. The factor least encountered was fetal malpositioning. Interestingly, these findings at Katima Mulilo hospital, northeastern Namibia, where cephalopelvic disproportion was the leading indication of operative delivery contrast with those in a semi-rural hospital in northern Namibia where cervical dystocia followed by a repeat caesarean section as earlier discussed were the main indications for caesarean section[24] but in agreement with the finding of Kabakyenga and Ostergren et al in south-western Uganda.[1] Based on the fact that the weight in kilogram of 79 (68%) fetuses from the study were in the range of 2.5-3.5 kilogram, contracted pelvis other than macrosomia was the reason for cephalopelvic disproportion. This is comparable to the findings of Shimeli and Hailemariam et al in a study on obstructed labour in Jima University Hospital where the birthweight of most of the fetuses

was in the range of 2.5-3.9 kilogram and a similar reason as above adduced for CPD which was also the leading cause of obstructed labour in this hospital.[9]

The systemic disease suffered most by the patients from the study is retroviral disease. Retroviral disease could impart directly on operative delivery especially when it is accompanied with premature rupture of membrane (PROM) which has lasted more than 4 hours in duration or when there is high viral load.[22]

Post-operative mortality from the study manifested as 2 stillbirths the cause of which is unknown and could be thought of to have arisen as a sequelae of the primary caesarean section undergone as increased rate of stillbirth was found in women with primary caesarean section according to O'Neill and Agerbo et.al.[42]

Most of the operative procedures for labour obstruction, from the study, were carried out as an emergency (65%) in the first stage of labour. This contrasts with the finding of a team of health experts who reported in Health Education and Training (HEAT) Program module on Labour and Delivery Care in Ethiopia that obstructed labour most commonly develops after labour has entered into the second stage.[43]

From the study, caesarean section was the main operative procedure employed in nearly all the cases, 98% as emergency. Ventouse was only used in a case. This finding reinforces the assertion that caesarean section is the commonest operative delivery method in use globally and that vacuum extraction is rarely or minimally used. The finding is also in agreement with the results of the studies carried out by Kozhimannil and Arcaya et al in United State of America (USA)[44] and Opoku at Komfo Anokye Teaching Hospital, Ghana.[45] Nevertheless, in USA, there has been a progressive shift away from the use of forceps in favour of vacuum extractor the past 20 years as an indication that forceps delivery is becoming obsolete, an argument supported by a finding of Ali and Norwitz.[46]

Elective caesarean section was carried out in 1% of the cases. There was no clarity from the records whether this was based on patient's demand or otherwise. The result shows that the incidence of elective caesarean section in Katima Mulilo Hospital and Zambezi Region is low as opposed to increasing incidence due to high maternal request[47,48] without a medical indication. From the study, 14% of the pregnant women had history of previous operative delivery only by way of caesarean section. Postoperative diagnosis which gave more reliable indications than those arrived at preoperatively were relied upon in the study.

Perinatal mortality from the procedure is expressed in terms of neonatal deaths which occurred in 2% of all cases accounting for 28.6% of perinatal mortality cases, fresh stillbirth (FSB) seen in 4% of all cases and responsible for 57.14% of perinatal mortality cases, stillbirth encountered in 1% of the studied population constituting 14% of perinatal mortality cases.

The high perinatal death could have arisen from patients from rural areas with no antenatal care (ANC) follow up. This indicates a significant delay in healthcare seeking behaviour or a delay in accessing health facility from the beginning of the pregnancy. This could also be due to delay in providing appropriate intervention during the early stages of pregnancy. The latter reason is buttressed by the fact that on one occasion according to the record from the study, the duration of labour before intervention was 21.5 hours which resulted in a stillbirth.

The perinatal death recorded could have arisen from patients who defaulted antenatal care (ANC) follow up. This may indicate a significant delay in healthcare seeking behavior or a delay in accessing health facility from the beginning of the pregnancy. This could also be due to delay in providing

appropriate intervention during the early stages of pregnancy. The latter reason is buttressed by the fact that on one occasion according to the record from the study, the duration of labour before intervention in terms of caesarean section was 21.5 hours which resulted in a stillbirth.

The causes of neonatal death from the study have been attributed to previous caesarean section and eclampsia while for 2 fresh stillbirths recorded, labour obstruction was implicated. Cord prolapse was implicated in a fresh stillbirth case while fetal distress was implicated in another. Stillbirth has been found to be the sole sequela of obstructed labour in this study. However unexplained asphyxia, obstetric complications like obstructed/prolonged labour, maternal disease like preeclampsia/eclampsia, unexplained antepartum stillbirths after 37 weeks of gestation, and unexplained antepartum stillbirths before 37 weeks of gestation are the major factors associated with perinatal mortality.[49]

CONCLUSION

The study has revealed a high frequency of obstructed labour occurring predominantly in the first stage of labour and cephalopelvic disproportion was found to be the main determinant of labour obstruction. Abnormal presentation, abnormal lie, fetal malpositioning, cephalopelvic disproportion, breech in primigravida, cervical dystocia, fetal macrosomia, delayed first and second stages of labour were found to be the main reasons for obstructed labour at Katima Mulilo hospital. Emergency caesarean section was the operative procedure employed uneventfully in almost all the cases. Previous caesarean section and teenage pregnancy have been found to have contributed to operative delivery.

LIMITATIONS OF THE STUDY

- Some patients' files could not be traced in the records department of the hospital and as a result, incomplete data on patients' parameters like parity, gravidarity, educational level, marital status, systemic diseases, neonatal birthweight, previous operative delivery, stage of labour where the operative delivery was performed among others were recorded on the data collection sheet.
- There is incomplete data on the gestational age (GA) of stillbirth. Lack of data on antepartum/ intrapartum stillbirth was noticed and the causes of stillbirth were unfortunately not documented in the records.
- Data on maternally requested caesarean section was incomplete.

RECOMMENDATIONS

- Early identification of mothers at risk of pregnancy complications through antenatal care screening should be embarked upon.
- Teaching pregnant women to recognize signs of pregnancy complications, timely access to obstetric care, monitoring of labour for fetal distress, and proper newborn resuscitation techniques may reduce some of the categories of deaths.
- Malpositioning, inadequate pelvis and inadequate uterine contraction which are some of the predictors of specific types of labour abnormalities like prolonged latent stage, active first stage disorder, prolonged second stage, descent disorder and obstructed labour should be sought for, identified and addressed urgently.
- Patients should not be late in presenting to the hospital.
- Evidenced-based guidelines/policies to address teenage pregnancy, contraception use, and maternal malnutrition may assist in minimizing morbidity and mortality burden of labour obstruction.

- The study findings will be communicated with stakeholders (clinicians, managers, policy writers) and the community served by this district hospital.

REFERENCES:

1. Kabakyenga JK, Ostergren PO, Turyakira E, et al. Individual and health facility factors and the risk for obstructed labour and its adverse outcomes in South-Western Uganda. BMC Pregnancy Childbirth.2011;11:73. Published online October 14,2011.doi:10.1186/1471-2393-11-73. PMCID: PMC3204267.
2. WHO. The World health report: make every mother and child count. Geneva: World Health Organization; 2005. p. 230. Available from: www.who.int/whr/2005/whr2005_en.pdf
3. Neilson JP, Lavender T, Quenby S, Wray S. Obstructed labour. Br Med Bull. 2003; 67: 191–204. doi: 10.1093/bmb/ldg018.
4. Vogel JP, Pileggi-Castro C, Chandra-Mouli V, et al. Millennium Development Goal 5 and adolescents: looking back, moving forward. Arch Dis Child. 2015; 100 Suppl 1: S43-7. doi: 10.1136/archdischild-2013-305514.
5. Ekanem EI, Umoiyoho A, Inyang-Out A. Study of electrolytes changes in patients with prolonged labour in Ikot Ekpene, a rural community in Niger Delta Region of Nigeria. ISRN Obstet Gynaecol. 2012;2012:430265. Published online 2012 December 17.doi:10.5402/2012/430265 PMCID: PMC3536049.
6. Khan KS, Wojdyla D, Say L, Gulmezoglu AM, Van Look PF. WHO analysis of causes of maternal death: a systematic review. Lance. 2006: 367(9516):1066–74.
7. Alkire BC, Vincet JR, Burns CT, Metzier IS, et al. Obstructed Labour and Caesarean delivery: The cost and benefit of Surgical Intervention. PLoS One.2012; 7(4): e34595.doi:10.1371/journal.pone.0034595.
8. Hofmeyr GJ. Obstructed labor: using better technologies to reduce mortality. Int J Gynaecol Obstet. 2004 Jun;85 Suppl 1: S62–S72. doi: http://dx.doi.org//10.1016/Lijgo. 2014.01.011.
9. Fantu S, Segni H, Alemseged F. Incidence, Causes and Outcome of Obstructed Labour in Jimma Specialized Hospital. Ethiop J. Health Sci. 2010;20(3):145-51.
10. Textbook of Obstetrics and Gynaecology for Medical Students Volume 2, edited by Akin Agboola, Department of Obstetrics and Gynaecology, College of Medicine, University of Lagos, Nigeria.
11. Kaplan A, Forbes M, Bonhoure I, et al. Female genital mutilation/cutting in The Gambia: long-term health consequences and complications during delivery and for the newborn. Int J Womens Health. 2013 Jun 17;5:323-31. doi: 10.2147/IJWH.S42064. Print 2013.
12. Utz-Billing I, Kentenich H. Female genital mutilation: an injury, physical and mental harm.J Psychosom Obstet Gynaecol. 2008 Dec; 29(4):225-9. doi: 10.1080/01674820802547087.
13. Asenova D, Stambolov B. Incidence and indications for caesarean section in the Obstetrics Clinic in the University Hospital of Obstetrics and Gynaecology '' Malchin Dom'' in Sofia. Akush Ginekol (Sofia). Akush Ginekol (Sofiia) 2005;44 Suppl 3:15-17. Bulgarian.
14. Murray CJ, Lopez AD. The Global Burden of Disease-World Health Organization. A comprehensive assessment of mortality and disability from diseases, injuries, and risk factors in 1990 and projected to 2020.Available from: apps.who.int/iris//bitstream/10665/41864/1/0965546608_eng.pdf
15. Lawson J.B and Clin B. "Obstucted labour''.International Journal of Obstetrics & Gynaecology.1965;vol. 72, no. 6, pp. 877–880.
16. Nigerian Demographic Health Survey 2008, NPC FRN, 2009. NPC(Nig.)and ICF .Macro, Nigerian Demographic Health Survey 2008, Abuja, Nigeria, 2009.
17. Ehigiegba A.E, Adeyemo I.S. "Uterine rupture in labour. A continuing challenge in developing countries—the Benin experience," Journal of Medicine and Biomedical Research.2006; vol. 5, no. 1, pp. 44–50.

18. Jeremiah I, Nwagu V. "The pattern of obstructed labour among parturient in a tertiary hospital in Southern Nigeria," Port Harcourt Medical Journal.2012; vol. 6, no. 1.
19. Yemane B, Vif H. "Prolong labour in rural Ethiopia. A community based study". African Journal of Reproductive Health.1999; vol. 3, no. 2.
20. Petrou S, Khan K. An Overview of the Health Economic Implications of Elective Caesarean section. Appl Health Econ Health Policy. 2013 Dec;11(6): 561-76. Doi: 10. 1007/s40258-013-0063-8
21. Boyle A, Reddy UM. Epidemiology of cesarean delivery: the scope of the problem. Semin Perinatol. 2012 Oct; 36(5):308-14.doi: 10.1053/.semperi.
22. Namibian National Guidelines for Antiretroviral Therapy, Third Edition.
23. Al Rowaily MA, Alsalem FA, Abolfotouh MA. Cesarean section in a high-parity community in Saudi Arabia: Clinical indications and obstetric outcomes. BMC Pregnancy Childbirth. 2014 Feb 28;14:92.doi:10.1186/1471-2393-14-92.
24. Van D.J, Meguid T, Petro V, Van RJ. Caesarean Section in a semi-rural hospital in Northern Namibia. BMC Pregnancy and Childbirth 2007:7:2.doi:10.1186/1471/2393-7-2.
25. Ugwu EO, Obioha KC, Okezie OA, Ugwu AO. A five-year survey of cesarean delivery at a Nigerian tertiary hospital. Ann Med Health Sci Res.2011: 1: 77-83. [PubMed]
26. Schweiz MW. Indications for cesarean section. 1990 Feb 24,120(8); 255-9.
27. Ali.Y. Analysis of caesarean delivery in Jimma Hospital, south-western Ethiopia. East Afr Med J. 1995 Jan;72(1):60-3.
28. Dursun P, Yanik FB, Zeyneloqiu HB, et al. Why women request Caesarean section without medical indication? J Matern Fetal Neonatal Med. 2011Sep;24(9);1133-7.doi: 10.3109/14767058.2010.531327. Epub2011Jun13.
29. Romero ST, Coulson CC, Galvin SL. Cesarean section delivery on maternal request: a Western North Carolina perspective. Maternal Child Health J. 2012 April; 16(3):725-34.doi:10.1007/s 10995-011-0769-X.
30. Yilmaz SD, Bal MD, Beji NK, Uludag S. Women's Preferences of Method of Delivery and Influencing Factors. Iran Red Crescent Med J. 2013 Aug:15(8):683-9. Published online 2013 Aug 5. doi: 10.5812/ircmj.11532.
31. Olivares MA, Santiago RJ, Cortes RP. Incidence and indication for caesarean section at the Central Military Hospital of Mexico. Ginecol Obstet Mex. 1996 Feb;64:79-84.
32. Walker R, Turnbull D, Wilkinson C. Increasing Cesarean section rates: exploring the role of culture in an Australian community.Birth.2004 Jun; 31(2):117-24.
33. Statistisches Bundesamt (Bonn) Gesundheitsberichterstattung des Bundes. www.gbe-bund.de
34. Euro-Peristat. European Perinatal Health Report - Health and care of pregnant women and babies in Europe in 2010. www.europeristat.com/reports/european-perinatal-health-report-2010.html. (last accessed on 9 June 2015)
35. Statistisches Bundesamt (Wiesbaden) Destatis. www.destatis.de/DE/Startseite.html
36. Torkzahrani S. Commentary: Childbirth education in Iran. J Perinat Educ. 2008 Summer;17(3):51–4.doi: 10.1624/105812408x329601. [PMC free article] [PubMed].
37. Caesarean section rate- Health Systems Trust. www.healthlink.org.za/uploads/dhb0809 32.pdf.
38. Ayaba Worjoloh, Rachel Manongi, Olola Oneko, Cathrine Hoyo, Anne Kjersti Daltveit, Daniel Westreich. Trends in cesarean section rates at a large East African referral hospital from 2005-2010. **DOI:** 10.4236/ojog.2012.23053.
39. Chu K, Cortier H, Maldonado F, et al. Cesarean section rates and indications in sub-Saharan Africa: a multi-country study from Medecins sans Frontieres. PloS One. 2012; 7(9):e44484. Doi: 10.1371/journal.pone.0044484. Epub 2012 Sep 4.
40. Rozzet J, Marwan K. Caesarean section rates in the Arab Region: a cross-national study. Health PolicyPlan. Author manuscript, available in PMC. 2006; PMCID: PMC1457106.
41. Ajuzieogwu VO, Amucheazi AO. Re: A Five-year Survey of Cesarean Delivery at a Nigerian Tertiary Hopital. Ann Med Health Sci Res. 2011 Jul-Dec; 1(2): 227.

42. O'Neill SM, Agerbo E, Kenny LC, et al. Cesarean Section and Rate of Subsequent Stillbirth, Miscarriage, and Ectopic Pregnancy: A Danish Register-Based Cohort Study. PLoS Med. 2014 Jul; 11(17): e1001670. Published online 2014 Jul 1. doi: 101371/journal pmed.1001670.
43. Labour and Delivery Care Module: 9. Obstructed Labour. When is labour classed as prolonged in the different stages of labour? Available from: www.open.edu/openlearnworks/mod/oucontent/view.php
44. Kozhimannil KB, Arcaya M, Subramanian SV, et al. Maternal Clinical Diagnoses and Hospital Variation in the Risk of Cesarean Delivery: Analyses of a National US Hospital Discharge Database PLoS Med. 2014 Oct; 11(10): e1001745. Published online 2014 Oct 21. doi: 10:1371/journal.pmed.1001745.
45. Opoku BK. A review of Vacuum Deliveries at Komfo Anokye Teaching Hospital, Kumasi. Ghana Med J. 2006 Mar; 40(1): 14-17. PMID: 17299558.
46. Unzila AA, Errol RN. Vacuum-Assisted Vaginal Delivery. Rev Obstet Gynecol. 2009 Winter ; 2(1): 5-17. PMCID:PMC 2672989.
47. Belizan JM, Althabe F, Cafferata ML. Health consequences of the increasing cesarean section rates. Epidemiology. 2007; 18:485-6. [PubMed].
48. Villar J, Valladares E, Wojdyla D, et al. Cesarean delivery rates and pregnancy outcomes: the 2005 WHO global survey on maternal and perinatal health in Latin America. Lancet: 2006 Jun 3; 367 (9525): 1819-29.
49. Mmbaga BT, Lie RT, Olomi R, et al. Causes of perinatal death at a tertiary care hospital in Northern Tanzania 2000-2010: a registry based study. BMC Pregnancy Childbirth. 2012 Dec 2; 12: 139.doi: 10.1186/1471-2393-12-139.