

# Short term perinatal outcome and their correlates among retained second twins, 15 years' retrospective study from northern Tanzania

Zakaria Abdi Masoli (✉ [zackaria.masoli@gmail.com](mailto:zackaria.masoli@gmail.com))

Kilimanjaro Christian Medical University College <https://orcid.org/0000-0002-8693-2671>

**Eusebious Maro**

Kilimanjaro Christian Medical University College

**Gileard Masenga**

Kilimanjaro Christian Medical Centre

**Benjamin C Shayo**

Kilimanjaro Christian Medical Centre

**Bariki Mchome**

Kilimanjaro Christian Medical University College

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## Research article

**Keywords:** Twin pregnancy, retained second twin, perinatal outcome, Tanzania

**Posted Date:** July 16th, 2020

**DOI:** <https://doi.org/10.21203/rs.3.rs-41846/v1>

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# Abstract

**Background :** Second twin delivery has been associated with poor perinatal outcome such as birth asphyxia ,neonatal ICU admission and perinatal death in comparison to the first twin. There is limited information on the perinatal outcome of second twin in Tanzania. This study aimed at determining the perinatal outcome associated with second twin delivery in a tertiary hospital in Northern Tanzania.

**Methods:** A retrospective cross-sectional study was conducted in a Tanzanian northern zone tertiary health facility using existing maternal linked data from medical birth registry. Women with twin deliveries from 2000 to 2015 were recruited. Adverse perinatal outcomes associated with second twin deliveries were estimated using multivariable logistic regression models. A p-value of < 0.05 was considered statistically significant.

**Results :** Retention rate of second twin was 18.6% (n=265). Out of the 265 retained second twins, 54.7% were referral cases, majority of which came from district hospitals. Retained second twins had 1.54 ( 95% CI 1.08-2.20) and 2.49( 95% CI 1.14-5.48) higher odds of lower Apgar scores in the 5 th minute and perinatal death when compared to non-retained twins respectively. Referral cases had poor outcome compared to non-referrals. Retained twin who had caesarean section had lower odds of low Apgar scores in the 5 th minute, perinatal death and Neonatal intensive care admission although this was not statistically significant but clinically significant.

**Conclusion :** Rate of retained second twin is high in this setting, most of which are referral cases. The retained second twin is associated with higher risk for perinatal death and low Apgar score in the 5 th minute. Timely delivery by caesarean section has lower chances of perinatal death, Neonatal intensive care admission and low Apgar scores. Therefore, early diagnosis and/or referral of twin pregnancy coupled with timely and appropriate intervention for delivery of the retained second twin will contribute to reduction in perinatal morbidity and mortality.

## Introduction

Global twin pregnancy rate has increased by 76% from 18.9 in 1980 to 32.1 per 1000 births in 2015(1). The main attributes includes the increased use of ovulation inducing agents, increased maternal age and use of assisted reproductive technology (ART) (2)(3)(4). In the United States of America, 36% of twin pregnancy occur after infertility treatment in the last three decades(5).Other causes include family history of twins, genetical factors, race, rebound gonadotropin in which an individual conceives immediately after stopping contraceptives(6), and advanced maternal age.. Twinning rates ranges from 6–9 per 1000 birth in south and south-east Asian regions to higher incidence of twinning of more than 18 per 1000 birth is found in west Africa (2)(7).

However, perinatal mortality and morbidity like congenital malformations in twin is 5–7 times higher as compared to singleton pregnancy(8)(9)(10). Second twin is found to be more vulnerable to adverse perinatal outcomes due to delivery complications(8)(11) which is attributed to fetal distress from

decreased placental perfusion due to premature separation of the placenta, birth trauma from intrauterine manipulations, increased operative interventions due to mal-presentations(12)(13) and to difficulties in fetal monitoring and the possibility of traumatic delivery following vaginal birth of the first twin. (14).Optimal mode of delivery for the second twin depends solely on the presentation of the twins and present a challenge in a non-cephalic presentation(15).

Consensus statements from professional organisation suggest an internal podalic version for established second twin with avoidance of combined delivery(vaginal and c/section)(16).However implementation of these guidelines depends on the level of expertise and available monitoring resources thus rendering this recommendation not feasible in limited resource setting. Local data are therefore imperative to inform data driven interventions in the management of twin delivery in this settings as of now caesarean delivery rate has increased in recent time with the aim of reducing morbidity and mortality associated with twin deliveries(17).

Previous hospital-based studies in Tanzania reported the prevalence of multiple gestation ranging from 15–29 per 1000 births.(18)Like other developing countries with with poor health system,the management of twin deliveries is still a challenge (7)for country like Tanzania whereas there is no expertise in twin deliveries in the peripheral health facilities and caesarean deliveries is not readily available which in turn contribute to high neonatal mortality of 21.7 per 1000 birth and thus derail the effort in reaching target for sustainable development goals (SDGs)(19)(6).

Although wide population based evaluations are lacking, twin pregnancy is theoretically known for its higher risk of maternal, fetal and perinatal complications. Although caesarean section is the preferred mode of delivery for triplets and higher order pregnancies, the course for twin pregnancies is not well defined (20). There is disparity in perinatal outcome associated with second twin deliveries between developed countries and limited resourced countries with poor perinatal outcome(21)(1).

Controversy prevail on definition of retain second twin, and a standardised timeframe for active management in the retained of second twin.(22) Moreover, the capability to conduct an active management and monitoring of the second twin may differ on the basis of resources available and expertise. In attempt to provide a regional specific portrait of the effect of the aforementioned aspects of care in second twin delivery that may inform clinical care in this locality, we conducted a retrospective analytical cross sectional study of all twin delivered above 28 at KCMC between 2010–2015 and determine the adverse perinatal outcome associated with second twin delivery.

## Methods

### *Study design*

This was retrospective analytical cross-sectional study using maternal and neonatal linked data from Kilimanjaro Christian Medical centre birth registry.The KCMC medical birth registry was established in 1999 as a pilot and became fully functional in 2000. Its establishment was a result of collaborative

project between KCMC and the medical birth registry of Norway through the University of Bergen. Since its inception, medical records of all women who deliver at KCMC and their new-borns have been collected and stored in medical birth registry.

### *Study setting*

The study was conducted at the department of obstetrics and gynaecology KCMC; the northern zonal referral consultants and teaching Hospitals in Tanzania.. It serves 6 district hospitals within the Kilimanjaro region including other hospitals from nearby regions of Arusha and Manyara. Patients from district hospital are usually referred to KCMC. The National population census 2011/2012, reported Kilimanjaro region to have a total population of 1,759,048 million people (TDHS 205/2016). Twin delivery is conducted with senior resident on duty together with available midwives, with the obstetrician available upon consultation. After delivery, the neonates are attended by a paediatric team and referred to paediatric neonatal ward if complication occurs.

### *Study subject*

All twins delivered at KCMC between 2000–2015 with a gestation age of 28 weeks and above were included. Exclusion criteria included higher order multiple pregnancy, HELLP syndrome, pre eclampsia/ eclampsia, fetal malformations and pre-labour stillbirth.

Operational definition for the retained second twin in this investigation was defined as failure of delivery of second twin within 30 minutes of delivery of the first twin Short term perinatal outcomes included only outcomes that occurred within 24 hours after delivery.

A total of 48,071 deliveries occurred between 2000–2015..We excluded 46534 women based on different criteria as stipulated in *Fig 1*.

### *Data collection*

Socio-demographic and obstetric information for all women delivered at KCMC were recorded in the electronic medical birth registry database. Information for all deliveries that occur at the department of obstetric and gynaecology were prospectively collected and entered in an electronic medical birth registry database. Trained midwives nurses conduct face to face interviews using a standardised questionnaire for all women who deliver at the hospital within 24hours. Information on the neonates who were admitted in the neonatal care unit are recorded in neonatal registry form linked to the mother's information in the birth registry. Beside birth registry, records of each pregnant woman attending our facility are stored as hard copy in the patient's file and soft copy in the electronic hospital management system (EHMS) using unique identification number and thus remaining confidential.

### *Data analysis*

Data were extracted from Microsoft office access (2007). Then transferred to STATA(version 13),where sorting, missing values and duplicates were checked prior to final analysis..

Simple frequencies and percentages were used to summarize categorical variables.

Potential risk factors of the adverse outcome were initially excluded in the initial participant selection. Later in the analysis pre-defined confounders (based on priori) including fetal weight and mode of delivery were controlled in the multivariable logistic regression. Odds ratio and 95% confidence interval for neonatal outcome associated with second twin were estimated using multivariable logistic regression models. Statistical analyses whose results yielded a  $p < 0.05$  was considered statistically significant

### *Ethical consideration*

Ethical clearance to conduct the study was obtained from KCMC Research Ethical Committee with certificate number 2322. Unique number have been used in birth registry rather than names to maintain confidentiality. All ethical issues were taken into consideration as we were using secondary data and patient had already given their consent in birth registry thus waiver of consent principal was used

## **Results**

A total of 1428 set of twins were analysed. The mean age of the mothers was  $29 \pm 5.6$  years. More than half (54.9%) resided in rural areas of North-Tanzania. Majority (65%) had primary education and were married (90.1%) (Table 1).

Retained second twin had poor perinatal outcome. It was associated with 1.54 (95% CI 1.08–2.20) higher odds of lower Apgar scores in 5<sup>th</sup> minute and 2.49( 95% CI 1.14–5.48) perinatal death when compared to non-retained twins. Caesarean delivery of the second twin was associated with lower odds of low 5<sup>th</sup> minute Apgar score 0.72(0.38–1.34),NICU admission has 0.79 (95% CI0.47–1.33),Perinatal death 0.59 (95% CI 0.27–1.28). (Table 2).

Majority 138 (52%) of the retained second twin delivered by caesarean section, followed by assisted vaginal delivery 41%( Figure 2).

## **Discussion**

We found that 18.6% of the second twin were retained. This results found rather similar to retrospective study in Nigeria in which the retention was around 16.7% (23). In contrary to our findings the multicentre study conducted in Europe revealed a retention of 4.8%.(15). This difference could be explained by the difference in intrapartum care between Europe and Africa where twin deliveries receive optimal care with timely interventions in HIC countries while our population constituted a significant proportion of referred cases from lower level health facility with no specialised care..

Our study has demonstrated retained second twin to have significant higher odds of having low Apgar score in the 5<sup>th</sup> minute and higher odds of perinatal death as compared to the non retained second twin. This findings were similar to a study conducted in Mansa general hospital Zambia in which most of the cases were referred from distant lower health facility(24)but different to Ireland study where no statistical significance difference in neonatal death and low Apgar scores(25). This difference in outcome could be explained by the optimal intrapartum care in high and middle income countries as compared to resource constrained present setting.

In this study we found that caesarean section was significantly protective for low Apgar score in 5<sup>th</sup>min, also had lower chances admission to NICU and perinatal death even though the association were statistically insignificant. This findings are in unison with other study which showed higher rate of neonatal death in vaginal delivery 11.9% vs 3.5% LSCS (26) but differ from Indian study which has no significant difference in outcome with regards to mode of delivery of the 2<sup>nd</sup> twin(14).This findings suggests vaginal delivery and fetal manipulation of the second twin may pose significant risk to the fetus. Our findings warrants for further robust prospective investigation to confirm these preliminary results.

## ***Strengths and Limitations***

This hospital based study used a birth registry with large scale dataset collected using a well structured questionnaire was used. A large sample size was obtained thus giving the study more power and making it possible to capture rare outcomes and compare risk factors while controlling for potential confounders

Limitations inherent to the retrospective nature of the study including missing information, mis documentation were similarly encountered herein.

Moreover inability to capture detailed obstetric information of the twin including chorionicity, intrapartum care including the presentation of each twin, that may influence the outcome and the level of health care provider involved which could have influenced the and perinatal outcome were the main drawbacks of the current investigation.

## **Conclusion**

Second twin delivery is associated with perinatal death and low Apgar score. Delivery by caesarean section has lower clinically significant chances of perinatal death, NICU admission and low Apgar scores. Early diagnosis,referral of twin pregnancy, breech extraction and LSCS of retained second twin, effective health education, ANC are emphasized to reduce perinatal death and low Apgar score. Our findings advocates for a timely detection of complication and referrals for the twin cases especially if referred from low health care facilities for optimal management. Moreover our findings suggest a need for improvement of monitoring and expertise in delivering a retained twin irrespective of its presentation in

this locality. Further analytical prospective study to explore detailed intrapartum factors and its association to the adverse perinatal outcome are warranted.

## Abbreviations

ANC: Antenatal clinic

AOR: adjusted odds ratio

BMI: Body mass index

CI: Confidence interval

COR: Crude odds ratio

KCMC: Kilimanjaro Christian Medical Centre

NICU: Neonatal Intensive care unit

LBW: low birth weight

STATA; Statistic and Data

## Declarations

### *Ethics approval and consent to participate*

Ethical clearance to conduct the study was obtained from KCMC Research Ethical Committee with certificate number 2322. Unique number have been used in birth registry rather than names to maintain confidentiality. All ethical issues were taken into consideration as we were using secondary data and patient had already given their consent in birth registry thus waiver of consent principal was used

### *Consent for publication*

Not applicable

### *Availability of data and material*

The datasets during the current study are not publicly available to protect the participants' anonymity. But it can be freely available from the corresponding author on reasonable request.

### *Competing interest*

The authors declared to have no competing interests.

### *Funding*

No funding was obtained for this study.

### *Authors' contribution*

ZM: Designed the study, performed the analysis and participated in writing the manuscript

EM: contributed in drafting the manuscript

BCS: contributed in manuscript review

GM: contributed in manuscript review

BM: participated in designing the study, reviewing the manuscript.

All authors have read and approved the final manuscript.

### *Acknowledgements:*

We express our sincere gratitude to the collaboration between KCMC and the university of Bergen in Norway for the establishment of the Birth registry that has made this work possible.

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## Tables

**Table 1: Baseline characteristics of study participants**

<b>Variables</b>	<b>Total (1428)</b>	<b>Not-Retained (n=1163)</b>	<b>Retained (n=265)</b>
<b>Age (Mean, SD)</b>	[29; 5.8]		
<b>Age ( years)</b>			
<20	64	49(76.6)	15(23.4)
20-29	686	567(82.7)	119(17.3)
>30+	678	547(80.7)	131(19.3)
<b>Marital status</b>			
Married	1287	1045(81.2)	242(18.8)
Single	141	118(83.7)	23(16.3)
<b>Residency</b>			
Rural	784	631(80.5)	153(19.5)
Urban	587	483(82.3)	104(17.7)
Semi urban	57	49(86.0)	8(14.0)
<b>Referral</b>			
No	715	595(83.2)	120(16.8)
Yes	713	568(79.7)	145(20.3)
<b>Education</b>			
Non-formal	73	57(78.1)	16(21.9)
Primary education	941	759(80.7)	182(19.3)
Secondary and above	414	347(83.8)	67(16.2)
<b>Occupation</b>			
Employed	174	141(81.0)	33(19.0)
Self-employed	837	678(81.0)	159(19.0)
Unemployed	417	344(82.5)	73(17.5)
<b>BMI group</b>			
Underweight	42	38(90.5)	4(9.5)
Normal	832	680(81.7)	152(18.3)

Overweight	394	310(78.7)	84(21.3)
Obese	160	135(84.4)	25(15.6)
<b>Parity</b>			
1	352	299(84.9)	53(15.1)
2-3	359	305(85.0)	54(15.0)
4+	205	163(79.5)	42(20.5)
Unknown	512	396(77.3)	116(22.7)

( )-Row percent

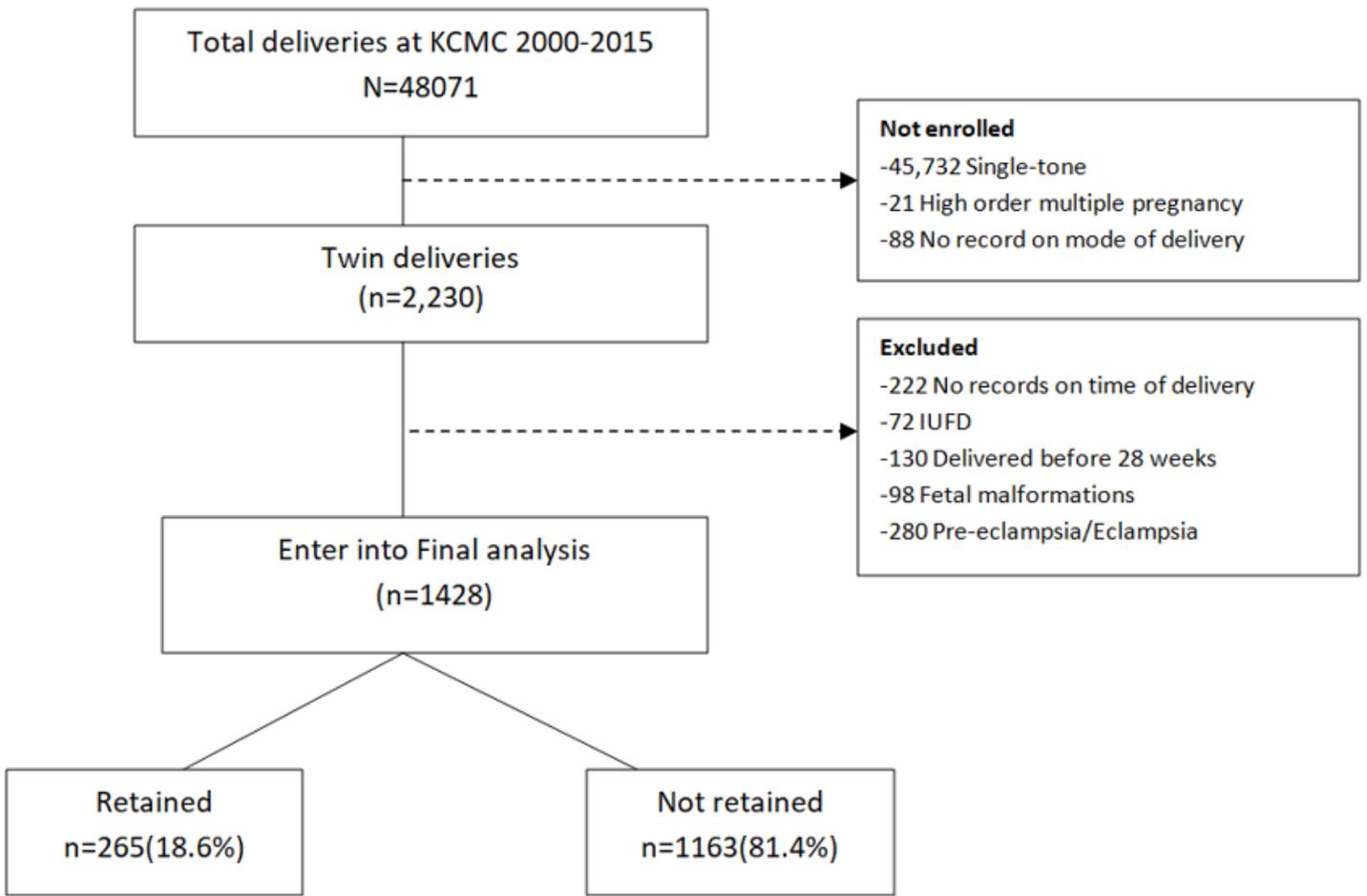
**Table 2:Perinatal outcome of the second twin**

Variable	LBW	Low Apgar Score 5 <sup>th</sup> min	NICU	Perinatal death
<b>Retention status</b>				
Not-retained	Ref	ref	ref	ref
Retained	1.07(0.82-1.41)	1.54(1.08-2.20) <sup>αβ</sup>	1.27(0.95-1.68) <sup>β</sup>	2.49(1.14-5.48) <sup>αβ</sup>
<b>Mode of delivery</b>				
Vaginal delivery	Ref	ref	ref	ref
C/S	0.95(0.55-1.64)	0.72(0.38-1.34)	0.79(0.47-1.33)	0.59(0.27-1.28)
<b>Referral</b>				
No	Ref	ref	ref	ref
Yes	1.40(0.80-2.46)	1.13(0.83-1.52)	1.25(0.74-2.12)	1.76(0.79-3.94)

**α-** Statistical significant odds ratio

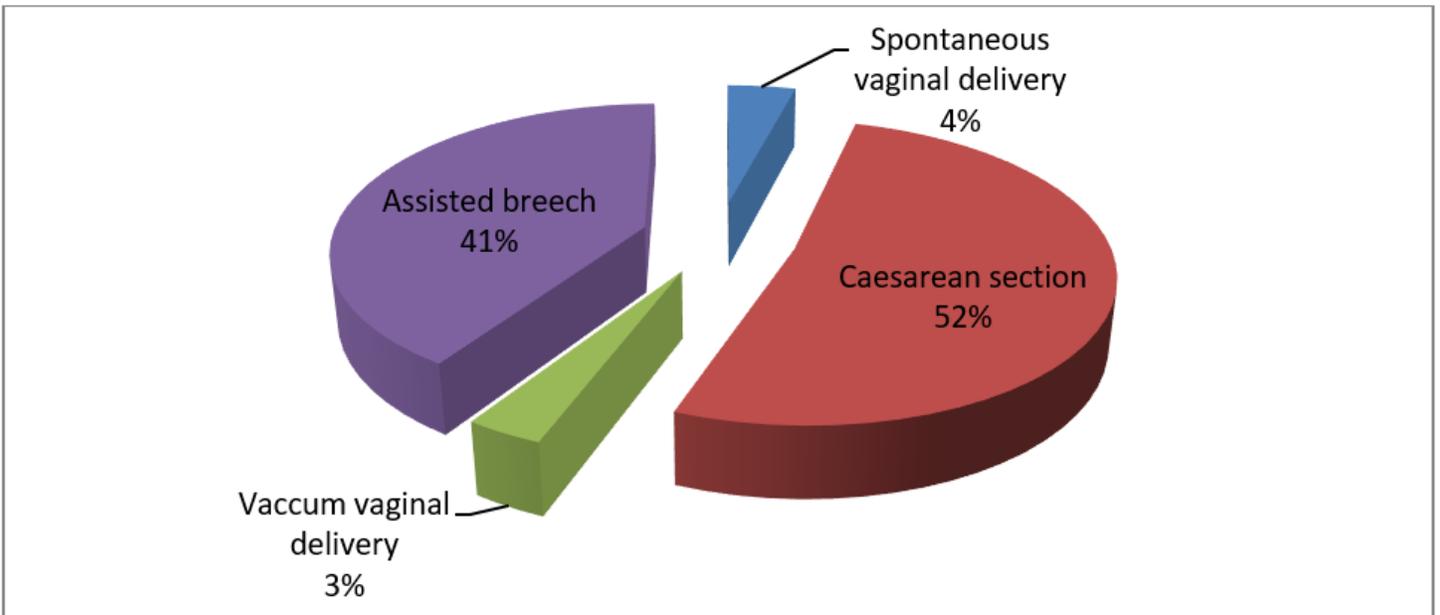
**β-** Odds ratio controlled for the fetal birth weight and mode of delivery

## Figures



**Figure 1**

Schematic flow for selection of study subjects



## Figure 2

The proportion of mode of delivery among retained second twin (n=265)