

Evaluation of the factors associated with immediate adverse maternal outcomes among referred women in labor at Kampala International University Teaching Hospital.

Hussein Osman Ahmed, Joy Muhumuza and Musiime James Nabaasa

Department of Obstetrics and Gynecology, Kampala International University Teaching Hospital, Uganda.

ABSTRACT

An efficient referral system provides access to treatment and skills by linking different levels of care through appropriate referrals and is an essential component of any health systems. Therefore, this study assessed the factors associated with immediate adverse maternal outcomes among referred women in labor at Kampala International University Teaching Hospital. This was a cohort study conducted among 215 pregnant women above 28 weeks in labor referred from other facilities to Kampala International University Teaching hospital with referral notes who were followed up for 72 hours after delivery. The study excluded self-referrals and was done from September to January 2021. Data were obtained from all the participants using a questionnaire and analyzed using Stata 14.0. The analyzed data was then presented in form of frequency tables and barchart. The factors independently associated with likelihood of adverse maternal outcomes in adjusted analysis at multivariate level were Gestational age < 34 weeks (aRR = 4.4, 95%CI: 1.25- 15.35, p = 0.02), and being with a compromised/unstable condition (aRR = 11.3, 95%CI: 2.58-49.46, p= 0.001). Women with a compromised/unstable condition and those with gestational age less than 34 weeks i.e. between 28-34 weeks were likely to have maternal adverse outcomes among referred women in labor.

Keywords: Adverse, maternal outcomes, referred women and labor.

INTRODUCTION

A Study of obstetric referrals at a tertiary care center in West Bengal revealed that the most frequent age group referred to the hospital was between 20 to 25 years. This could have occurred by chance or due to variability in the sampling procedure. In another study done in Gujarat, the average age of women referred was 23.46±4.1 years. In a similar study, the socio-demographic factors associated with adverse outcomes were participants' age and single status. Participants who were 20 - 29 years of age were 61% protected from getting adverse maternal outcomes compared to those who were less than 20 years of age whereas married women were 79% protected against adverse maternal outcomes than their unmarried counterparts [1]. Adverse maternal outcomes usually increase with age. Evidence from a study conducted in Nigeria in 2012 showed the age of the woman was positively associated with

the occurrence of maternal outcomes. A 2013 Nepal-based study showed that the birth order of the child had more influential and persistent effects, with mothers giving birth to their first-born and second-born children being less likely to experience adverse maternal outcomes [2]. Suffering from intimate violence from the partner during pregnancy has been linked to an amplified risk of antepartum hemorrhage and death among pregnant women [3]. A study on women, poverty, and adverse maternal outcomes in Nairobi found out that urban poor women in Nairobi associated poverty with adverse maternal outcomes [4]. To them, poverty primarily generates adverse maternal outcomes by exposing women to exceedingly hard and heavy workloads during pregnancy and the period surrounding it; to intimate partner violence; as well as to inhospitable and unpleasant treatment

Ahmed *et al*

by service providers [4]. A prospective cohort study on incidence, determinants, and prognostic factors at two referral hospitals in Uganda studied three groups (maternal deaths, near misses, and non-life-threatening obstetric complications) and the results of the study revealed that the 3 groups differed significantly regarding education level [5]. A facility-based cross-sectional study assessed adverse birth outcomes and their associated factors among women who delivered in the North Wollo zone, northeast Ethiopia. Results of the study revealed that living in rural areas was associated with the occurrence of adverse maternal outcomes. Women who lived in rural areas were 1.8 times more likely to get adverse maternal outcomes than their counterparts who lived in urban areas [6].

Objective

To determine the factors associated with immediate adverse maternal outcomes among referred women in labor at Kampala International University Teaching Hospital.

Research Question

1. What are the factors associated with immediate adverse maternal outcomes among referred women in labor at Kampala International University Teaching Hospital?

Justification of the Study

Women can come across several health-related problems during pregnancy as well as become a victim of death during this process [7]. An efficient referral system provides access to treatment and

MATERIALS AND METHODS

Study Design

This was a cohort study that was hospital-based. The design allowed for describing of the independent variables which were social demographic factors, obstetric and referral factors, maternal conditions and how they associated with the dependent variables that included outcomes such as Admission to ICU, development of anemia with transfusion, APH, PPH, Caeserian hysterectomy and Maternal death with ultimate description of incidence, composite outcomes and factors associated with immediate adverse maternal outcomes among women in

skills by linking different levels of care through appropriate referrals [7]. The referral system is an essential component of any health system which is particularly important in pregnancy and childbirth for providing access to essential obstetric care. In developing countries like Uganda, the majority of the population live in rural areas lacking access to essential obstetric facilities and in such areas, timely referral and interventions to high-risk and complicated obstetric cases can reduce maternal morbidity and avoid maternal deaths. However, lack of a structured referral system is a major hurdle that delays proper management of such cases. Kampala International University Teaching Hospital is a tertiary care hospital, located in western Uganda, which receives and manages a wide spectrum of complicated obstetric cases that are referred from different centers all over the neighboring districts. This study was done as there existed minimum or no data available concerning the immediate adverse outcomes and associated factors among pregnant women in labor referred from other care centers and managed at KIU-TH. This study has contributed to efforts to reduce maternal mortality rates which may occur as a result of the adverse pregnancy outcomes thus the realization of SDG 3. For this goal to be attained, a substantial reduction in perinatal and maternal deaths is required [8]. It also helps in improving maternal and child health based on the factors identified during the study.

labor referred to Kampala International University teaching hospital.

Study Site

The study was conducted at Kampala International university teaching hospital. KIU-TH has a bed capacity of 700, providing specialized services to both outpatient and inpatients. The study was specifically conducted at the department of obstetrics and gynecology at KIU-TH in the maternity unit. The unit offers specialized care and has a 24-hour functioning theatre. Has a team of health workers that comprises of nurses, interns doctors, senior residents, and Specialists. At the study site, several nurses are working in

Ahmed *et al*

shifts, 1 intern doctor and senior housing officers of up to 35. On average there are about 45 patients admitted at any one time in the ward. Averagely 7 to 10 admissions per day depending on the season. It receives an average of 2-3 referrals per day from facilities such as Kitagata, Mitooma, and Kabowhe amongst other facilities found within Bushenyi district and neighboring districts.

Study Area

The study was conducted at Kampala International University Teaching Hospital found in Ishaka Bushenyi Municipality at approximately 60km from Mbarara town along Mbarara Kasese highway. The study population were from the districts of Bushenyi, Rubirizi, Sheema, and Mitooma as well as from the nearby districts.

Target Population

The study targetted pregnant women who stayed around KIU-TH and neighboring districts.

Accessible Population

All pregnant women in labor admitted to the labor ward at KIU-TH

Study Population

All pregnant women in labor admitted at the maternity unit of Kampala International Teaching Hospital who had been referred from other facilities during the time of the study.

Sampling Technique

Consecutive sampling technique was used to enrol all pregnant women in labor referred from other facilities. Both adults and emancipated minors who met the inclusion criteria were enrolled in the study. This technique was essential because participants were selected based on availability and willingness to take part.

Sample Size Determination

Daniel's formula [9] was used to determine the Sample size for the different specific objectives.

$$n = \frac{(Z\alpha + Z\beta)^2 * \square (1 - \square)}{\delta^2}$$

Where,

n = Minimum sample size

Z α = Z-statistic at $\alpha=1.96$; 95% level of confidence

Z β = Z-statistic at $\beta = 0.84$

P = Prevalence of characteristic being estimated

d = Margin error, set at 0.05

Objective One: The sample size of objective one of this study was calculated using the estimated incidence based on a study done in Tanzania by [10] and the value used for P was 6.68%. Which was the incidence of referred obstetric cases.

$$\delta = \frac{(1.96 + 0.84)^2 * 0.0668(1 - 0.0668)}{(0.05)^2}$$

Selection Criteria

Inclusion Criteria:

All pregnant women above 28 weeks in labor referred from other facilities to Kampala International University Teaching hospital with referral notes and who consented were included in this study.

Exclusion Criteria

□ Self-referrals

Data Collection

Training of Research Assistants

The data collection was conducted by the principal investigator under supervision with the help of research assistants.

Data collecting tools

Data from this study came from the questionnaires with close-ended questions.

Pre-testing

The questionnaire interview checklist and other data collection tools were pretested in the Ishaka Adventist Hospital in a similar study population for 2 weeks and necessary adjustments were made before it is used to collect the final data.

Data Collection Procedure

A hospital-based prospective cohort study design was conducted. A total of 215 consecutively selected pregnant women in labor referred from other facilities took part in this study. Relevant information from the pregnant women was filled in the questionnaires after consent. Those who could not fill the questionnaire in the labor suite could do it after delivery within the stipulated time. A structured pre-tested investigator-administered questionnaire was used. Through physical general and

Ahmed *et al*

obstetric examinations conducted and baseline characteristics of blood pressure, respiratory rate, pulse, temperature, and Glasgow coma scale were recorded. Blood sample for complete blood count taken between 48-72 hours in case the clinical diagnosis of APH/PPH and anemia was established.

Quality Control

The Questionnaires were pretested the pre-tested questionnaires were used to enhance the quality of data and their results were not included in the final data analysis. The inclusion and exclusion criteria were strictly followed. The same questionnaire was applied to all participants. The consent form in

ETHICAL CONSIDERATIONS

Informed Consent and Autonomy for Participants

In this research, autonomy was protected by ensuring that any consent to participate in the study is informed or real. Voluntary recruitment was done and informed consent was signed. Informed consent from participants was obtained after fully explaining the details of the study to them in English and local language (copy attached at Appendices III and IV). There was no coercion of any sort. Emancipated minors did not require the presence of their guardians to consent. Participants were not forced to enrol themselves if they did not want to. Participants were free to withdraw from the study at any time they wished without coercion or compromise of care they were entitled to.

Risk and Adverse Events to Study Participants.

Being an observational prospective cohort study, the study participants were only exposed to minimal risks. The expected risk included slight pain that occurred during the drawing of a blood sample for laboratory investigations but the entire procedure was done gently and very cautiously to minimize the risks. Infections could have arisen from the site where blood was drawn from but this was curbed by observing aseptic technique during the process of blood sample collection

Benefits of the Research.

There was no direct benefit from this study. However, the participants benefitted from close monitoring and

both English and Runyakole languages were used. The completeness of the questionnaire was checked before data were exported to Microsoft excel. Each filled questionnaire was cross-checked for inconsistencies and incompleteness before the interview was closed.

Data Presentation and Analysis

Objective One: The incidence rates of immediate adverse maternal among the pregnant women in labor were calculated as the total number of mothers who had immediate adverse maternal outcomes divided by the total number of mothers referred. Results were presented using a bar graph.

appropriate management during the study. Upon completion of the study, the findings are expected to guide stakeholders in formulating guidelines and policies basing on the evidence and recommendations from the study. These will benefit the community, department, the hospital, and the country in general.

Privacy and Confidentiality.

Respondents' names were not included anywhere in the Data that was collected and; they were instead referred to using codes. The participants were interviewed separately from other clients, to maintain privacy and confidentiality.

Selection of Participants.

A consecutive sampling method was used to recruit for the study. Eligibility criteria were strictly adhered to. No bias was given in terms of tribe, interest group, race, or religion.

Incentives and Reimbursement.

Those who consented to take part in the study were neither paid nor given any form of compensation for participating in the study.

Approval Procedure.

The study was carried out only after approval by the Research and Ethics Committee of KIU. Approval was also sought from the administration of Kampala International University teaching hospital where the research was conducted. Approval to carry out the study was acquired from the department of obstetrics and gynecology, the faculty and post graduate directorate and finally the

Ahmed *et al*

KIU University Research Ethics Committee via REC NO: UG-REC- 023 /202009 as attached.

Respect for Community

The procedures involved in this study did not go against the local community's beliefs, traditions, and culture.

Dissemination

Within the study area, the results were disseminated as follows; one copy remained with the principal investigator, one copy was given to the directorate of research and post-graduate training, the supervisors were also availed with one copy each and another copy was taken to the library. For the rest of the world to access the study results, the paper was submitted

for publication in one of the peer review journals.

Study limitations and delimitations

The study was done in only one facility, but results can be generalized to other health facilities found in the region or to the inhabitants in the geographical area of the facility where the study was conducted .Not all the factors which are associated with immediate adverse maternal outcomes were addressed by the study. Notwithstanding these limitations, reliable data and appropriate scientifically sound methods were used during the study henceforth the study findings make an accurate reflection on immediate adverse maternal outcomes among pregnant women in labor referred to tertiary facilities.

Factors Associated with Adverse Maternal Outcomes among Referred Women in Labor at Kampala International University Teaching Hospital.

Maternal Adverse Outcome Variables	Yes	No	RR	95% CI	P-Value
Count (%)	Count (%)				
Age					
<24 years	6 (6.4)	88 (93.6)	Reference		
25-34 years	6 (6.5)	86 (93.5)	1.0	0.32-3.23	0.969
≥ 35 years	3 (10.3)	26 (89.7)	1.7	0.40-7.24	0.478
Residence					
Urban	1 (4.2)	23 (95.8)	Reference		
Rural	14 (7.3)	177 (92.7)	1.8	0.23-14.49	0.572
Religion					
Catholics	5 (6.57)	71 (93.4)	Reference		
Protestants	8 (7.4)	100 (92.6)	1.1	0.36-3.62	0.829
Others	2 (6.4)	29 (93.6)	1.0	0.18-5.34	0.981
Marital status					
Married/Cohabiting	14 (7.30)	177 (92.7)	Reference		
Single/divorced	1 (4.2)	23 (95.8)	0.5	0.07-4.38	0.572
Education					
Secondary +	3 (3.1)	94 (96.9)	Reference		
<Secondary	12 (10.2)	106 (89.8)	3.5	0.97-12.95	0.055
Occupation					
Employed	1 (5.0)	19 (95.0)	Reference		
Unemployed	14 (7.2)	181 (92.8)	1.5	0.18-11.80	0.717

Table 1: Bivariate logistic regression to determine socio-demographic factors associated with adverse maternal outcomes among referred women in labor at Kampala International University Teaching Hospital.

P value = significant value, cRR= Crude Relative Risk, CI= Confidence interval.

Shown in table 1 above is the result of the bivariate logistic regression which was run to determine socio-demographic factors associated with adverse maternal outcomes among the

study participants. Results of the analysis revealed that education had p-values less than 0.2. Thus, education proceeded for the next stage (multivariate stage).

Table 2: Obstetric factors associated with adverse maternal outcomes among referred women in labor at Kampala International University Teaching Hospital.

Maternal Adverse Outcome

Variables	Yes	No	cRR	95% CI	P-Value
Count (%)	Count (%)				
Gravidity					
<5	6(8.8)	62(91.2)	Reference		
5+	9(6.2)	138(93.8)	0.8	0.26-2.26	0.472
Parity					
<5	5(3.9)	124(96.1)	Reference		
5+	10(11.6)	76(88.4)	1.8	0.23-14.49	0.638
Gestational age					
≥34 weeks	5 (3.3)	147 (97.7)	Reference		
<34 weeks	10 (15.9)	53 (84.1)	5.5	1.81- 17.00	0.003
Twins					
Yes	2 (9.5)	19 (90.5)	Reference		
No	13 (6.7)	181 (93.3)	0.7	0.14-3.25	0.631
Malpresentation					
No	2 (8.7)	21 (91.3)	Reference		
Yes	13 (6.8)	179 (93.2)	0.8	0.16-3.61	0.733
No	11 (6.0)	171 (94.0)	Reference		
Yes	4 (12.1)	29 (87.9)	2.1	0.64-7.19	0.217

P-value is significant Value, cRR= Crude Relative Risk, CI= Confidence interval

Shown in table 2 above is the bivariate logistic regression to determine Obstetric factors associated with adverse maternal outcomes among referred women in labor at Kampala International University Teaching Hospital. A bivariate logistic regression was run to establish the obstetric factors associated with adverse

maternal outcomes among the study participants and the results are shown in Table 4 above. Out of the six variables included in the model, only gestational age was had a P-value less than 0.2. Thus, was proceeded for the next stage (multivariate stage) and considered for multivariate analysis. Medical Factors Associated With

Table 3: Bivariate logistic regression to establish medical factors associated with adverse maternal outcomes among women referred in labor at Kampala International University Teaching Hospital.**Immediate Maternal Adverse Outcome**

Variables	Yes	No	cRR	95% CI	P Value
Count (%)	Count (%)				
Fever					
No	14 (6.7)	195 (93.3)	Reference		
Yes	1 (16.7)	5 (83.3)	2.8	0.30-25.51	0.365
High blood Pressure					
No	14(7.1)	182(92.9)	Reference		
Yes	1(5.6)	18(94.4)	0.7	0.09-5.81	0.760
HIV					
Negative	12 (6.1)	184 (93.9)	Reference		
Positive	3 (16.7)	16 (83.3)	2.9	0.73-11.25	0.229
Syphilis					
No	13 (6.3)	194 (93.7)	Reference		
Yes	2 (25.0)	6 (75.0)	5.0	0.91-27.12	0.064
Malaria during Pregnancy					
No	14 (6.7)	195 (93.3)	Reference		
Yes	1 (16.7)	5 (83.3)	2.8	0.30-25.51	0.365

P value = significant value, cRR= Crude Relative Risk, CI= Confidence interval.

To establish the medical factors associated with immediate adverse maternal outcomes, a bivariate logistic regression was run and the results are presented in Table 5 above. Syphilis had P value was less than 0.2 (RR 5.0, 95%CI 0.91-27.12, P=0.064).

Thus was proceeded to the multivariate stage and considered for multivariate analysis Referral history factors associated with adverse maternal outcomes among women referred in labor at KIU-TH.

Table 4: Bivariate logistic regression to determine referral history factors associated with adverse maternal outcomes among women referred in labor at KIU-TH.

Maternal Adverse Outcome					
Variables	Yes	No	cRR	95% CI	P-Value
Count (%)	Count (%)				
Delay					
<2 hours	13 (7.9)	151 (92.1)	Reference		
≥2 hours	2 (3.9)	49 (96.1)	0.5	0.10-2.17	0.337
Distance					
<10 km	6 (13.0)	40 (87.0)	Reference		
≥10 km	9 (5.3)	160 (94.7)	0.4	0.13-1.11	0.078
ANC					
Booked	9 (5.7)	149 (94.3)	Reference		
Unbooked	6 (10.5)	51 (89.5)	1.9	0.66-5.74	0.277
Institution of Referral					
District hospital	4 (8.0)	46 (92.0)	Reference		
Other	11 (6.7)	154 (93.3)	0.8	0.25-2.70	0.746
Maternal Condition					
Good/Stable	9 (4.5)	193 (95.5)	Reference		
Unstable /Compromised	6 (46.2)	7 (53.8)	18.4	5.12-66.04	0.001
Mode of Delivery					
Vaginal	11(6.0)	171(94.0)	Reference		
CS	4(13.8)	29(83.2)	2.1	0.64-7.19	0.217

P value = significant value, cRR= Crude Relative Risk, CI= Confidence interval.

Shown in table 6 above is the result of a bivariate logistic regression done to determine the statistical association between the variables under referral history and immediate adverse maternal outcomes. It can be observed from the table that out of the 6 variables under referral history, general condition (RR 18.4, 95%CI 5.12 - 66.04, P=0.001), distance (RR 0.4, 95%CI 0.13-1.11,

P=0.078), and mode of delivery (RR 0.2, 95%CI 0.02-1.37, P=0.096) had p-values less than 0.2. Thus were proceeded for the multivariate stage. Multivariate logistic regression to establish factors independently associated with adverse maternal outcomes among women referred in labor at Kampala International University Teaching Hospital.

Table 5: Multivariate logistic regression to establish factors independently associated with adverse maternal outcomes among women referred in labor at Kampala International University Teaching Hospital.

Maternal Adverse Outcome					
Variables	Yes	No	aRR	95% CI	P-Value
Count (%)	Count (%)				
Education					
Secondary +	3 (3.1)	94 (96.9)	Reference		
<Secondary	12 (10.2)	106 (89.8)	3.4	0.81-13.94	0.095
Gestational age					
≥34 weeks	5 (3.3)	147 (96.7)	Reference		
<34 weeks	10 (15.8)	53 (84.2)	4.4	1.25-15.35	0.021
Syphilis					
No	13 (1.4)	194 (98.6)	Reference		
Yes	2 (25.0)	6 (75.0)	6.5	0.71-59.67	0.097
Distance					
<10 km	6 (13.0)	40 (87.0)	Reference		
≥10 km	9 (5.3)	160 (94.7)	0.4	0.09-1.40	0.065
Maternal Condition					
Good/Stable	9 (4.5)	193 (95.5)	Reference		
Compromised/Unstable	6 (46.3)	7 (53.7)	11.3	2.58-49.46	0.001

P value = significant value, aRR= Adjusted Relative Risk, CI= Confidence interval.

Table 5 shows multivariate logistic regression analysis of factors associated with immediate adverse maternal outcomes among women in labor who were referred to Kampala International University Teaching Hospital. Factors with a p-value less than 0.2 with the occurrence of adverse maternal outcomes at bivariate logistic regression analysis were considered for multivariate analysis. Through a stepwise logistic regression with the removal of the least significant variable in each step and considering factors with biological plausibility such as ANC attendance, gestational age and maternal condition remained

Factors associated with maternal adverse outcomes among referred women in labor

Gestational age

This study established that women with gestational age less than 34 weeks and those with a compromised condition (general status in terms of vital signs) on admission were independently associated with a higher likelihood of maternal adverse outcome among women referred in labor at Kampala

significantly associated with the occurrence of adverse maternal outcomes among the referred women in labor. Participants who had a gestational age less than 34 weeks were 4.4 times more at risk of having adverse maternal outcomes than participants who had a gestational age of 34 or more weeks (aRR 4.4, 95%CI 1.25-15.35, P=0.02). On the other hand, study participants who had compromised general conditions were 11.3 times more at risk of having adverse maternal outcomes than participants who had the good general condition (aRR 11.3, 95%CI 2.58-49.46, P=0.001).

DISCUSSION

International University Teaching Hospital. Similarly, the results of a study conducted by [11] in south-western Uganda at Mbarara Regional Referral Hospital (MRRH) found that women of gestation age < 34 weeks were 1.6 times more likely to have adverse outcomes as compared to those gestation ages > 34 weeks. However contradicting findings were shown by a national cohort study conducted by [12] which revealed that the risk of adverse

outcomes increased in both nulliparous and parous women with advancing gestational age. Generally severely preterm labor of between 28-34 weeks is associated with many complications to both the mother and the fetus.

Maternal condition

In this study women with compromised/unstable condition were more at risk of having adverse maternal outcomes than participants who had stable/good general condition on admission. [13] Reported that the underlying medical factors weaken the immune system usually requiring long-term treatment. This greatly affects the maternal outcome in terms of the general body strengths. [14], reported that sending a high-risk woman for emergency obstetric care to higher-level health facilities was vital. This is because already compromised conditions of mothers in labor escalate

the chance of maternal adverse outcomes. The finding of this study was also in line with the results of a study done by [15] which found that a fairly high number of the referred cases were stable on admission though they did not go further to analyze the association between the condition of the referred mother and occurrence of adverse maternal outcomes. Similarly a study in Mbarara regional referral hospital found out that earlier detection and referral, as well as improvement in initial management at lower level health units and on arrival at the referral site is imperative to improve maternal outcomes. (11). Contrary to what was found in this study, the results of a study conducted by [16] did not establish any significant association between the condition of the referred women in labor and adverse maternal outcomes.

CONCLUSION

Women with a compromised/unstable condition and those with gestational age less than 34 weeks i.e. between 28-34

weeks were likely to have maternal adverse outcomes among referred women in labor.

REFERENCES

1. Maawiya, H. A., Ogutu, O., Osoti, A., Ayieko, P., Kireki, O., Koigi, P. K., Kosgei, R. J., Kihara, A. B., Gwako, G. N., Kilonzo, M. K., Ndavi, P. M. and Odawa, F. X. (2018). Factors Associated With Adverse Pregnancy Outcomes among Home and Health Facility Deliveries in Lamu County, Kenya: A Comparative Cross Sectional Study. University of Nairobi, College of health sciences, Department of Obstetrics and Gynaecology. JOGECA 2018; 30(2).
2. Karkee, et al. Determinants of facility delivery after implementation of safer mother programme in Nepal: a prospective cohort study. BMC Pregnancy Childbirth. 2013; 13:193. <http://www.biomedcentral.com/1471-2393/13/193>
3. Bloom, T., Bullock, L. F. C., Sharps, P., Laughon, K., and Parker, B. J. (2010). Intimate partner violence during pregnancy. Family Violence and Nursing Practice, 155-180.
4. Izugbara, C. O. and Ngilangwa, D. P. (2010). Women, Poverty and Adverse Maternal Outcomes in Nairobi, Kenya. BMC Women's Health, 10, Article No. 33. <https://bmcwomenshealth.biomedcentral.com/articles/10.1186/1472-6874-10-33>. <https://doi.org/10.1186/1472-6874-10-33>
5. Nakimuli, A., Nakubulwa, S., Kakaire, O., Osinde, M. O., Mbalinda, S. N., Nabirye, R. C., Kakande, N. and Kaye, D. K. (2016). Maternal near misses from two referral hospitals in Uganda: a prospective cohort study on incidence, determinants and prognostic factors. BMC Pregnancy and Childbirth,
6. Kassahun, E. A., Zeleke, L. B., Dessie, A. A. (2019). Factors associated with unintended pregnancy among women attending antenatal care in Maichew Town, Northern Ethiopia, 2017. BMC Res Notes 12, 381. <https://doi.org/10.1186/s13104-019-4419-5>

7. WHO. (2016). Mother-baby package: implementing safe motherhood in countries: a practical guide (WHO/FHE/MSM/94.11; 1).
8. WHO. (2018). WHO recommendations: intrapartum care for a positive childbirth experience. World Health Organization.
9. Daniel's formula (2009). *Tango Masters of Formula 3*; Location, Circuit Park Zandvoort, Netherlands ; Course, 4.307 km (2.676 mi).
10. Pembe, A. B., Carlstedt, A., Urassa, D. P., Lindmark, G., Nyström, L., and Darj, E. (2010). Quality of antenatal care in rural Tanzania: counseling on pregnancy danger signs. *BMC Pregnancy and Childbirth*, 10(1), 35.
11. Lugobe, H. M., Rose, M., Musa, K., Ian, W., David, C. A., Carmel, M., Samson, O., Blair, J. W. and Adeline, A. B. (2020). Risks of adverse perinatal and maternal outcomes among women with hypertensive disorders of pregnancy in southwestern Uganda. Published: October 28, 2020.
12. Kortekaas, J. C., Kazemier, B. M., Keulen, J. K. J., Bruinsma, A., Mol, B. W. and Vandebussche, F. (2020). Risk of adverse pregnancy outcomes of late- and postterm pregnancies in advanced maternal age: A national cohort study. *Acta Obstet Gynecol Scand.*, 99(8): 1022-1030.
13. Downey, D. B. and Condrón, D. J. (2020). Fifty years since the Coleman Report: Rethinking the relationship between schools and inequality. *Sociology of Education*, 89(3), 207-220. <https://doi.org/10.1177/0038040716651676>.
14. Hussein, H. K., Abu-Zinadah, O. A., Elshal, M. F. and Elnaggar, M. H. (2012). Effect of excess dietary copper on proliferation and differentiation of the proerythroblasts and erythrocytes in rats. *African Journal of Biotechnology* 11(22), pp. 6187-6191.
15. Hussein Osman Ahmed, Joy Muhumuza and Musiime James Nabaasa (2022). Factors associated with Immediate Adverse Maternal Outcomes among Referred Women in Labor attending Kampala International University Teaching Hospital. *IAA Journal of Applied Sciences* 8(1):117-125.
16. Hussein Osman Ahmed, Joy Muhumuza and Musiime James Nabaasa (2022). The composite immediate adverse maternal outcomes among women in labor referred to Kampala International University Teaching Hospital. *IAA Journal of Scientific Research* 8(1):149-156.