Maternal Complications Associated with Delivery of Babies Weighing 4500 Grams and Above

Dr Ikobho Ebenezer Howell[1], Dr Addah Abednego[2]

[1]Department of Obstetrics and Gynecology,
Niger Delta University Teaching Hospital,
Yenagoa, Bayelsa State, Nigeria. Email address:

[2]Department of Obstetrics and Gynaecology,
Niger Delta University Teaching Hospital

Corresponding author:
Dr Ikobho Ebenezer Howell,
Email: ikobhoebenezer12@gmail.com
Tel: +234 803 705 5273

How to cite this article:

Ikobho E. H, Addah A.: **Maternal Complications Associated with Delivery of Babies Weighing 4500 Grams and Above** NDJMS 2024; 4(2): 8-18

Received: 8th Novemver, 2024 | **Accepted**: 21st December, 2024 | **Published** 28th January, 2025

ABSTRACT

Background: *Fetal macrosomia is delivery of a baby with birth weight of 4000g and above. It is a high risk pregnancy, and it is associated with maternal and fetal complications, especially during delivery.*

Objectives: *To determine whether delivery of macrosomic babies weighing ≥ 4.5kg results in more maternal complications than babies weighing < 4.5kg. It would also determine the socio-demographic characteristics of the women.*

Method and materials: *This was an analytic retrospective cross-sectional study of 200 women who delivered macrosomic babies during the study period; 46 babies weighed ≥ 4.5kg, while 154 (macrosomic) babies who weighed < 4.5kg were used as control.*

Data collected included bio-data, booking status, gestational age at delivery, and birth weight (≥ 4.5kg or < 4.5kg). Data on maternal complications were: episiotomy incision during vaginal delivery, perineal tear (1st, 2nd, and 3rd degree), cervical laceration, estimated blood loss during delivery, and primary postpartum hemorrhage (PPH). Other data retrieved were the mode of delivery, such as: spontaneous vaginal delivery (SVD), caesarean section (CS), and instrumental vaginal delivery (vacuum and obstetrics forceps).

Results: *The prevalence of fetal macrosomia was 7.0%, the mean birth weight was 4.30 ± 0.27 kg, the mean maternal age was 31.64 ± 4.0 years, and the mean gestational age (GA) at delivery was 39.7 ± 0.78 weeks*

Demographic factors that were significantly associated with birth weight ≥ 4.5kg are: Ijaw tribe (p = 0.03), tertiary level of education (P = 0.005), unbooked status (p = 0.02), and postdate (p = 0.0001).

Regarding genital tract trauma, the chances of receiving episiotomy incision was 8 times higher among the women who delivered babies weighing ≥ 4.5 grams, odds ratio = 8.31[1.09, 63.19], p = 0.01. Also, the chances of having 2nd degree perineal tear was 5 time higher, odds ratio = 5.17[1.00, 20.60], p = 0.0.

The rate of vacuum delivery was increased by 6 folds among women who delivered babies weighing ≥ 4.5kg, odds ratio = 6.14[0.80, 47.23], p = 0.03, and the CS rate by 2 folds, odds ratio = 2.79[1.37, 5.68], p = 0.03. The mean blood loss was significantly higher among women delivered by caesarean section t = 14.9 [396.9, 517.2], p = 0.0001

Conclusion: *The maternal complications of fetal macrosomia escalate with increase in birth weight (≥ 4.5kg). Prominent among these are: genital tract trauma, use of instrumental vaginal delivery, and increase in caesarean section rate.*

KEY WORDS: fetal macrosomia, birth weight ≥ 4.5kg, maternal complications.

INTRODUCTION

Fetal macrosomia is delivery of a baby with birth weight of 4000g and above. It is a very common pregnancy complication globally, and it is associated with maternal complications, which usually occur during delivery.[1]

There is controversy surrounding the cutoff mark for the birth weight, as some people prefer to use birth weight ≥4500grams.[1,2] However, literature search has revealed that a birth weight ≥ 4000 gram is more popular.

Delivery of big babies weighing 4000grams and above is a global health challenge, and various rates have been reported in many centers globally. While high rates were reported in Saudi Arabia (19.8%),[3] and Baghdad in Iraq (15.8%),[4] the rates in most centers in Nigeria tends to be lower. In Jos Plateau State it was 2.9%,[5] 2.1% in Sokoto,[6] and 4.7% in Sagamu.[7] Similar rates were reported in other African countries; 2.3% in Tanzania,[8] and 1.9% in South Africa.[9]

Besides poorly controlled gestational diabetes, and genetic factors, most of the risk factors for fetal macrosomia are demographic, and includes: advanced maternal age, high parity, high body mass index (BMI ≥ 30kg/m^2), and weight gain during pregnancy.[10,11,12]

Birth injuries are the most common maternal complications of fetal macrosomia. These include: high episiotomy rate, cervical and vaginal lacerations, moderate to severe perineal tear, with high risk of anal sphincter injury.[13,14,] Other complications are primary postpartum hemorrhage (PPH) and anemia, with high risk of blood transfusion, increased caesarean section rate, and risk of shoulder dystocia.[2,7]

A study at University of Kwa Zulu-Natal, in South Africa reported a high caesarean section rate of 56.6%.[9] Another study at Gillingham in UK reported the odds of maternal complications as: 2.4 [2.0, 3.0] for severe postpartum hemorrhage, 2.3 [1.9, 2.8] for obstetric anal sphincter injury and 10.4 [8.6, 12.6] for shoulder dystocia.[13]

A study in France also reported that at birth weight ≥ 4500 grams, the rate of maternal complications increases, such as: increase in prolonged labour, odds ratio = 1.9 [1.1–3.4], and caesarean section rate, odds ratio = 2.2 [1.3–3.9].[16]

We acknowledge the fact that there are many studies on complications of fetal macrosomia globally, including Nigeria. However, this study intends to focus attention on the complications associated with delivery of babies with extreme birth weight of ≥ 4500 grams and above.

OBJECTIVES

To determine whether delivery of babies weighing ≥ 4.5kg results in more maternal complications of fetal macrosomia, than babies weighing < 4.5kg. It would also determine the socio-demographic characteristics of the women.

METHODOLOGY

Study site

This study was done at the labour ward, and labour ward theatre, department of obstetrics and gynaecology, Niger Delta University Teaching Hospital (NDUTH), Yenagoa in Nigeria.

Study design

This was an analytic retrospective cross-sectional study of 200 women who delivered macrosomic babies during the study period, 46 of these babies weighed ≥ 4.5kg, while 154 weighed < 4.5kg, and were used as control. The study was carried out from January 2016 to December 2023.

Inclusion and exclusion criteria

Women who delivered babies weighing 4000grams and above during the study period, those who had spontaneous vaginal delivery, women delivered by caesarean section, and those who had instrumental vaginal delivery.

EXCLUSION CRITERIA

Women who delivered babies with normal birth weight and preterm babies were excluded.

Data collection

Out of a total of 2840 women who delivered during the study period, 200 women were identified for delivering babies with fetal macrosomia. The case notes of these women were retrieved from the hospital records department, and relevant information was retrieved.

Socio-demographic data retrieved include: maternal age, parity, address (urban, semi-urban or rural), employment status, educational level, religion and tribe. Others were: booking status, and gestational age at delivery.

Data on maternal complications were: episiotomy incision during vaginal delivery, perineal tear (1st, 2nd, and 3rd degree), cervical laceration, estimated blood loss during delivery, and primary postpartum hemorrhage (PPH). Also retrieved was the mode of delivery; spontaneous vaginal delivery (SVD), caesarean section (CS), and instrumental vaginal delivery (vacuum and obstetrics forceps).

Fetal information retrieved was birth weight, categorized as ≥ 4.5kg or < 4.5kg. Data (for each patient) was entered into a research proforma designed for this study.

Data analysis

Data was analyzed using (IBM) SPSS software version 25, and Epi Info statistical software version 7. Results were presented in tables as rates, proportions, and mean with standard deviation. Test of significance was by odds ratio and difference in mean was compared using the independent student's t - test. Confidence interval was set at 95%, and the p value significant at ≤ 0.05.

Ethical approval

Permit to proceed with this study was granted by the ethical committee of NDUTH, with registration number NDUTH/REC/0098/2024

RESULTS

Table 1: Socio-demographic characteristics of the women

Variable	**Categorized birth weight**		**Total**	**Odds ratio**	**Confidence interval**	**P value**
Maternal age	**< 4.5kg, N = 154(77.0%)**	**≥ 4.5kg, N = 46(23.0%)**				
≤ 19 years	2(1.0%)	0(1.0%)	2(1.0%)			
20 – 24 years	12(6.0%)	0(1.0%)	12(6.0%)			
25 – 29 years	42(21.0%)	14(7.0%)	56(28.0%)			
30 – 34 years	66(33.0%)	22(11.0%)	88(44.0%)			
≥ 35 years	32(16.0%)	10(5.0%)	42(21.0%)			
Parity						
Para 0	2(1.0%)	0(1.0%)	2(1.0%)			
Para 1	18(9.0%)	10(5.0%)	28(14.0%)			
Para 2	54(27.0%)	6(3.0%)	60(30.0%)			
Para 3	34(17.0%)	12(6.0%)	46(23.0%)			
Para 4	24(12.0%)	4(2.0%)	28(14.0%)			
≥ Para 5	22(11.0%)	14(12.0%)	36((18.0%)			
Religion						
Christian	152(77.0%)	46(23.0%)	180(90.0%)			
Muslim	2(1.0%)	0(1.0%)	20(10.0%)			
Ethnicity						
Ijaws	78(39.0%)	32(16.0%)	110(55.0%)	0.44	[0.20, 0.96]	0.03*
Igbo	56(28.0%)	10(5.0%)	66(33.0%)			
Yoruba	4(2.0%)	2(1.0%)	6(3,0%)	1.22	[0.21, 6.99]	0.82
Hausa/Fulani	2(1.0%)	0(1.0%)	2(1.0%)			
Other tribes	14(7.0%)	2(1.0%)	16(13.0%)			
Address						
Urban	148(74.0%)	46(23.0%)	190(95.0%)	1.07	[0.21, 5.50]	0.93
Semi-urban	6(3.0%)	2(1.0%)	8(4.0%)			
Rural	0(1.0%)	2(1.0%)	2(1.0%)			
Educational level						
Primary Education	10(5.0%)	4(4.0%)	14(7.0%)	0.71	[0.20, 2.52]	0.59
Secondary Education	20(10.0%)	22(11.0%)	96(48.0%)			
Tertiary Education	70(35.0%)	20(10.0%)	90(45.0%)	0.26	[0.12, 0.57]	0.005*

Patient's Employment status						
Unemployed	90(45.0%)	32(16.0%)	122(61.0%)	0.62	[0.30, 1.25]	0.17
Employed	64(32.0%)	14(7.0%)	78(39.0%)			
Booking Status						
booked	130(65.0%)	32(16.0%)	162(81.0%)			
unbooked	24(12.0%)	14(7.0%)	38(19.0%)	2.37	[1.10, 5.09]	0.02*
Gestational Age at Delivery (GA)						
Preterm (28 – 36 weeks)	0(1.0%)	0(1.0%)	0(1.0%)			
Term (37 – 42 weeks)	146(73.0%)	14(7.0%)	184(92.0%)			
Postterm (> 42 weeks)	0(1.0%)	2(1.0%)	2(1.0%)			
Postdate (> 40 – 41 weeks)	8(4.0%)	6(3.0%)	14(7.0%)	7.82	[2.37, 25.78]	0.0001*

There were 2840 deliveries during the study period, out of these, 200 women delivered babies with fetal macrosomia, giving a rate (prevalence) of 7.0%.

The mean birth weight was 4.28 ± 0.29kg, the minimum was 4.0kg and the maximum was 5.5kg. The mean maternal age was 30.98 ± 4.4 years, the median parity was para 3, and the mean GA at delivery was 39.5 ± 0.98 weeks

Majority of the patients were Ijaw tribe; Yenagoa where this study was done is located in the heart of Ijaw tribe. However, significantly more babies weighing ≥ 4.5kg were delivered by Ijaw women, p = 0.03. Other significant factors are tertiary level of education (P = 0.005), unbooked status (p = 0.02), and postdate (p = 0.0001).

There was no significant association with the patient's address (urban or rural), and employment status, P = 0.93, and 0.17 respectively.

Table 2: Maternal complications, and the effects of increase in birth weight

Variable	Categorized birth weight		Total	Odds ratio	Confidence interval	P value
	< 4.5kg, N = 154(77.0%)	**≥ 4.5kg, N = 46(23.0%)**				
Episiotomy						
Episiotomy	24(12.0%)	1(0.5%)	25 (12.5%)			
No episiotomy	130(65%)	45(22.5%)	175(87.5%)	8.31	[1.09, 63.19]	0.01*
Perineal tear						
No perineal tear	124(62.0%)	40(20.0%)	164(82.0%)			
Perineal tear present	31(15.5%)	6(3.0%)	37(18.5%)	0.60	[.23, 1.54]	0.28
Type of perineal tear						
1st degree perineal tear	21(10.5%)	2(1.0%)	22(11.0%)	0.30	[0.01, 1.31]	0.09
2nd degree perineal tear	4(2%)	4(2%)	8(4.0%)	5.17	[1.00, 20.60]	0.03*
3rd degree perineal tear	6(3%)	0(0.0%)	6(3.0%)			
Cervical laceration						
No laceration	146(73%)	45(22.0%)	191(95.5%)			
Laceration present	8(4.0%)	1(0.5%)	9(4.5%)	0.41	[0.05, 3.33]	0.38
Mode of delivery						
Spontaneous vaginal delivery (SVD)	86(42.0%)	14(7.0%)	100(59.0%)			
Caesarean section	66(33.0%)	30(15.0%)	96(48.0%)	2.79	[1.37, 5.68]	0.003*
Vacuum extraction	2(1.0%)	2(1.0%)	4(2.0%)	6.14	[0.80, 47.23]	0.05*
PPH for CS						
PPH present	10(5.0%)	2(1.0%)	12(6.0%)	0.38	[0.07, 2.17]	0.26
No PPH	78(39.0%)	6(3.0%)	82(94%)			
Total	88(44.0%)	8(4.0%)	96(48.0%)			
PPH for SVD						
PPH present	6(3.0%)	2(21.0%)	8(4.0%)	0.45	[0.08, 2.49]	0.34
No PPH	80(40.0%)	12(6.0%)	92(46.0%)			
Total	86(43.0%)	14(7.0%)	100(50.0%)			
Blood transfusion						
No blood transfused	136(68.0%)	42(20.5%)	178(87.0%)	0.72	[0.23, 2.24]	0.56
blood transfused	18(9.0%)	4(2.0%)	10(5.0%)			
Total	154(77.0%)	46(23, 0%)	200(100.0%)			
Mean blood loss	434.3 ± 322.4	501 ± 263.7		t = 1.29	[-35.72,169.73]	P = 0.19
	Mode of delivery					
Mean blood loss (in mls)	**SVD**	**CS**				
	232.4 ± 202.3	689.5 ± 224.3	t = 14.9	Mean difference = 457.1	[396.9, 517.2]	0.0001*

The chances of not receiving episiotomy incision was 8 times higher among the women who delivered babies weighing less than 4.5 grams, odds ratio = 8.31[1.09, 63.19], p = 0.01.

Regarding maternal complications, delivery of babies with birth weight ≥ 4.5kg was significantly associated with 5 times chances of having 2nd degree perineal tear, odds ratio = 5.17[1.00, 20.60], p = 0.03.

The chances of delivery by caesarean section was increased by two folds, odds ratio = 2.79[1.37, 5.68], p = 0.03, and the rate of instrumental vaginal delivery (vacuum extraction) was increased by 6 fold, odds ratio = 6.14[0.80, 47.23], p = 0.03.

Regarding the mode of delivery, the mean blood loss was significantly higher among women delivered by caesarean section t = 14.9 [396.9, 517.2], p = 0.0001.

However, there was no significant increase in the following rates: the mean blood loss between the 2 groups (P = O.19), the rate of PPH for SVD (p = 0.34), rate of PPH for CS (P = 0.26), and blood transfusion (p = 0.56).

DISCUSSION

Fetal macrosomia is delivery of a baby with birth weight of 4000g and above. It is a high risk pregnancy, and it is associated with maternal and fetal complications, especially during delivery. Though maternal mortality attributed to this condition is rare, some of the complications could cause severe, and life threatening hemorrhage if not promptly managed.

Though our rate of 7.0% is relatively low, it is comparable to results from other centers in Nigeria; 6.9% in Lagos,[15] 8.1% at University of Nigeria Teaching Hospital, Enugu,[17] and 8.9% in Port Harcourt.[18] However, higher rates have been reported from studies outside Nigeria; 19.8% in Saudi Arabia, [3] 12.7% in the UK,[13] and Baghdad in Iraq (15.8%). [4]

The difference may emanate from good living standards, and better nutrition; studies have proven that good maternal nutrition increases birth weight.[19,20] The use of gross domestic product (GDP) per capita has provided an objective measure of the living standards of a country. Nigeria is rated as one of the poorest countries in the world, with a GDP per capita of only $ 2,162. In contrast, that for Saudi Arabia is $30,447.9, for UK it is $46, 125.3, and the highest is USA ($74, 161.0).[21]

Regarding the association between birth weight ≥ 4500grams and complications of fetal macrosomia, literature search indicates that articles on this subject matter are scanty. Secondly there is dearth of publications comparing the complications rates of birth weight ≥ 4500 grams and those < 4500 grams (as we did in this study).

A prominent and very common complication of fetal macrosomia is genital tract trauma, which could be: episiotomy, perineal tear, cervical and vaginal lacerations. The intent of episiotomy is to widen the vaginal outlet, and prevent perineal tear during delivery. Evidence from a meta-analysis in Ethiopia has proven that episiotomy is 6 times more likely to be given when the birth weight is > 4000 grams, odds ratio = 6.71(3.14–14.33).[22] This did not vary widely with the odds of 8.33 we got from our study. Similar results were obtained in Brazil where birth weight > 4000 grams was identified as a leading cause of episiotomy, [23] and in Yenagoa, where a high rate episiotomy (31.8%) was reported among babies weighing > 4000grams.[24]

Perineal tear is quite common during delivery of macrosomic babies, and experience from obstetrics practice in Nigeria indicates that the extent of tear is directly proportional to the size of the baby; hence it's rare in low birth weight babies (1500 – 2500 grams), and unknown in very low birth weight (< 1500grams). However the dynamics changes exponentially with big babies.

A study in Sweden reported that birth weight of ≥ 4500 grams was significantly associated with perineal tear.[25] A study at Democratic Republic of the Congo identified birth weight > 4000 grams as the cause of perineal tear in 42.9% of the cases. [26] However, this is much higher than the 18.5% rate we got in this study. This is most probably due to the fact that our denominator was total birth (including CS), but not limited to only vaginal delivery.

Regarding the degree of perineal tear, our results indicates that majority of our perineal tears were mild (1st and 2nd degree), and only 3.0% were severe (3rd degree). There was no case of 4th degree perineal tear. This is most probable due to our high episiotomy rate, which is protective against perineal tear. A previous study at NDUTH reported a high episiotomy rate of 45.5% [27] However, among women with genital tract trauma in NDUTH; the episiotomy rate was higher (63.7%); it was the commonest genital tract trauma in NDUTH. [28]

We also observed from our study that 1st degree perineal tear was the most common type in NDUTH, and the trend tends to replicate in other centers in Africa. In Democratic Republic of Congo, 1st degree tear was reported as the commonest, with a rate of 64.3%.[29] In Calabar, Nigeria, it was the most common perineal tear, accounting for 40.2% of the cases. [30]

Regarding birth weight ≥ 4500 grams, though a great majority of the studies did not use it as their denominators (as stated above), the fact has been established by many studies that delivery of babies with birth weight > 4000 grams is highly associated with genital trauma. [8, 31] A cohort study also reported that the rate of major degree perineal tear (3rd and 4th degree) was significantly higher when birth weight was > 4000grams, (odds ratio = 1.7). [31]

This has been vindicated by our study; delivery of ≥ 4.5kg babies was significantly associated with a 5 fold rise in the rate of 2nd degree perineal tear, odds ratio = 5.17, p = 0.03. This is due to the fact that during vaginal delivery, the large fetal head of macrosomic babies over stretches the perineum, and if precautions are not taken, perineal tear could occur easily. A prophylactic episiotomy is hereby advocated for vaginal delivery of fetuses with estimated fetal weight ≥ 4500 grams (on obstetrics ultrasound scan).

With respect to the mode of delivery, we were able to establish the fact that delivery of birth weight ≥ 4.5kg significantly increases the rate of caesarean section and vacuum delivery, with odds of 2.79 and 6.14 respectively. This is because the large size of the fetal head poses a disproportionate diameter that could not easily navigate through the axis of the maternal pelvis during labour. This could cause prolonged labour, cephalopelvic disproportion, deep transverse arrest and obstructed labour. Most of these complications could only be overcome by assistance, to complete the delivery process.

Similar results on the extent to which fetal macrosomia modify the mode of delivery has been published in many articles globally. Results from a study in Enugu indicates that the caesarean section, and instrumental vaginal delivery rates were significantly higher in women who delivered macrosomic babies, p = 0.001 respectively.[17] Another study in the UK reported that the chances of having a caesarean delivery was 3 times higher, odds ratio = 3.1(2.6 - 3.60.[13] A similar result

was obtained in Ottawa in Canada, odd ratio = 1.45. [32]

Conclusion

The maternal complications of fetal macrosomia escalate with increase in birth weight (≥ 4.5kg). Prominent among these are: genital tract trauma, use of instrumental vaginal delivery, and increase in caesarean section rate.

REFERENCE

1. Yvonne Kwun-Yue Cheng, Terence T Lao. Fetal and maternal complications in macrosomic pregnancies. *Research and Reports in Neonatology* 2014; 4: 65–70.
2. Akanmode A. M, Mahdy H. Macrosomia. In: StatPearls [Internet]. Treasure Island (FL): *StatPearls Publishing*; 2024: https://www.ncbi.nlm.nih.gov/books/NBK557577/
3. Alsammani M. A, Ahmed S. R. Fetal and maternal outcomes in pregnancies complicated with fetal macrosomia. *N Am J Med Sci*. 2012; 4(6): 283-6. doi: 10.4103/1947-2714.97212.
4. Shaymaa Kadhim Jasim1, Hayder Al-Momen, Ban Abdulhameed Majeed, Muhammed Jalal Hussein. Rate of Fetal Macrosomia with Maternal and Early Neonatal. Complications in Internally Moved People Affected by Violence. *Int J Med Res Health* Sci. 2018; 7(7): 141-146
5. Mutihir J. T, Ujah I. A. O. Postmaturity and Fetal Macrosomia in Jos, Nigeria. Annals of African Medicine. 2005; 4(2): 72 – 6.
6. Onankpa B. O, Nauzo A. M. Prevalence and outcome of macrosomic babies admitted to special care baby unit of a Nigerian teaching hospital. *Res. J. of Health Sci. 2015: 3(1): 31 – 3.*
7. Ogunfowora O. B, Ogunlesi T. A, Ayeni V. A, Shorunmu T. O. Neonatal macrosomia and associated morbidities in Sagamu, Nigeria. 2019; 5(1): 20-9. doi: 10.30442/ahr.0501-3-33
8. Arvinder Singh Sohal, Charles Kilewo, Fredrick Mwakalemela, Karpal Singh Sohal. Risk factors and outcomes of fetal macrosomia in Iringa municipality hospitals: A case-control study. *Tanzania Journal of Health Research*. 2024; 25(1): 500 – 9:
9. Terence Moodley, and Jagidesa Moodley, A retrospective identification of risk factors associated with fetal macrosomia. *Afr J Reprod Health 2022; 26[7]: 127-34*
10. Boma Awoala. West. Prevalence and clinical outcome of neonates with macrosomia admitted in the special care baby unit of the Rivers State University Teaching Hospital, Nigeria. *International Journal of Health Sciences and Research*. 2021; 11(2): 142 – 51.
11. Osama abdelazem, Ahmed Mohammed. Fetal macrosomia; risk factors and validity of its diagnostic tools. *International Medical Journal*. 2021; 2(11): 13 - 21.
12. Akin Usta, Ceyda Sancakli Usta, Ayla Yildiz, Ruhsen Ozcaglayan, Eylem Sen Dalkiran, Aydin Savkli, Meryem Taskiran. Frequency of fetal macrosomia and the associated risk factors in pregnancies without gestational diabetes mellitus. *The Pan African Medical Journal*. 2017; 26: 62. doi:10.11604/pamj.2017.26.62.11440

13. Beta J, Khan N, Fiolna M, Khalil A, Ramadan G, Akolekar R. Maternal and neonatal complications of fetal macrosomia: cohort study. *Ultrasound Obstet Gynecol* 2019; 54: 319–325
14. Kate McMurrugh, Matias Costa Vieira, Srividhya Sankaran. Fetal macrosomia and large for gestational age, *Obstetrics, Gynaecology & Reproductive Medicine*. 2024; 34(3): 66-72 doi.org/10.1016/j.ogrm.2023.12.003
15. Omololu Adegbola, Fatimah Murtazha Habeebu-Adeyemi. Fetal Macrosomia at a Tertiary Care Centre in Lagos, Nigeria. *Nig. Qt J. Hosp. Med.* 2015; 25(2): 90 - 4.
16. Fuchs, F., Bouyer, J., Rozenberg, P. *et al.* Adverse maternal outcomes associated with fetal macrosomia: what are the risk factors beyond birthweight?. *BMC Pregnancy Childbirth* **13**, 90 (2013). https://doi.org/10.1186/1471-2393-13-90
17. Ezegwui, H. U, Ikeako, L. C. Egbuji, C. Fetal macrosomia: Obstetric outcome of 311 cases in UNTH, Enugu, Nigeria. *Nigerian Journal of Clinical Practice*. 2011; 14(3): 322-6. DOI: 10.4103/1119-3077.86777
18. Boma Awoala. West. Prevalence and clinical outcome of neonates with macrosomia admitted in the special care baby unit of the Rivers State University Teaching Hospital, Nigeria. *International Journal of Health Sciences and Research*. 2021; 11(2): 142 – 51.
19. Amosu A. M and Degun A. M. Impact of maternal nutrition on birth weight of babies. - *Biomedical Research 2014; 25(1): 75-8*
20. Jerusa da Mota, Oliveira Queiroz V. A, Pereira M, Paixão E. S, Brito S. M, Dos Santos D. B, Oliveira A. M. Associations between Maternal Dietary Patterns and Infant Birth Weight in the NISAMI Cohort: A Structural Equation Modeling Analysis. *Nutrients*. 2021; 13(11): 4054. doi: 10.3390/nu13114054..
21. World Bank Data, Gross Domestic Product (GDP) Per Capita according to countries. 2022. https://data.worldbank.org
22. Deyaso Z. F, Chekole T. T, Bedada R. G, Molla W, Uddo E. B, Mamo T. T. Prevalence of episiotomy practice and factors associated with it in Ethiopia, systematic review and meta-analysis. *Womens Health (Lond)*. 2022; 18:doi: 10.1177/17455057221091659.
23. Mário Dias Corrêa Junior, Renato Passini Júnior. Selective Episiotomy: Indications, Techinique, andAssociation with Severe Perineal Lacerations. *Rev Bras Ginecol Obstet*. 2016; 38: 301–307.
24. Obodo D. U, Makinde O. I, Ozori E. S. Episiotomy at a tertiary hospital in South-South, Nigeria: A 3-year review. *Yen Med J*. 2021; 3(3): 166 – 71.
25. Turkmen S, Johansson S, Dahmoun M. Foetal Macrosomia and Foetal-Maternal Outcomes at Birth. *J Pregnancy*. 2018: 4790136. doi: 10.1155/2018/4790136.
26. Hugues Cakwira, Marcelin Mukengere, Baraka Lucien, Abdullahi Tunde Aborode, Leonard Sironge, Meni Vhosi Michael, Aymar Akilimali. The clinical characteristics of perineal tears: A study carried out on 14 pregnant women in a tertiary

center: Case series. *Annals of Medicine and Surgery*. 2022; 104432: doi.org/10.1016/j.amsu.2022.104432

27. Ikobho Ebenezer Howells, Isaac Joel Abasi. Outcome of Episiotomy Repair by House Officers at the Niger Delta University Teaching Hospital, Nigeria. *International Journal of Research and Reports in Gynaecology*. 2020; 3(2): 30-4. https://www.journalijrrgy.com/index.php/IJRRGY/article/view/30109
28. Ikobho Ebenezer Howells, Isaac Joel Abasi. Genital Tract Lacerations in Women Delivered by Medical Doctors at the Niger Delta University Teaching Hospital, Southern Nigeria. *Asian Journal of Gynaecology and Obstetrics*. 2018; 1(1): 1-10. DOI: 10.9734/ARJGO/2018/42474
29. Cakwira H, Mukengere M, Lucien B, Aborode A. T, Sironge L, Michael M. V, Akilimali A. The clinical characteristics of perineal tears: A study carried out on 14 pregnant women in a tertiary center: Case series. *Ann Med Surg (Lond)*. 2022; 18; 82: 104432. doi: 10.1016/j.amsu.2022.104432.
30. Charles Njoku*, Cajethan Emechebe, Christopher Iklaki, Felix Nnorom. The Pattern and Maternal Outcome of Lower Genital Tract Injuries Among Women With Vaginal Deliveries in Calabar; A Niger Delta State of Nigeria. *International Journal of Women's Health and Reproduction Sciences*. 2015; 3(4); 190–5
31. The International Centre for Allied Health Evidence. 'Factors Related to Perineal Tear Occurrence through Childbirth'. An Evidence Based Review prepared for The Accident Compensation Corporation, Wellington, New Zealand. 2019: 144 - 5.
32. Laura Gaudet, Shi Wu Wen, Mark Walker. The Combined Effect of Maternal Obesity and Fetal Macrosomia on Pregnancy Outcomes. *J Obstet Gynaecol Can*. 2014; 36(9): 776 – 84