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Feto-Maternal Outcomes and Frequency of Singletons and Multiple Births: A Retrospective Study in the University of Uyo Teaching Hospital

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ABSTRACT

Pregnancy continues to be a focus of interest globally due to increasing frequency of complications. The aim of this study was to determine the frequency of singletons, multiple births, and feto-maternal complications. Retrospective review of delivery at the University of Uyo Teaching Hospital from 2011 to 2018 was done. The frequency of singletons and multiple births was 97.8% and 2.2%, respectively. The mean maternal age for singleton and multiple birth mothers was 38.4 ± 1.8 and 35.7 ± 1.6 years, respectively. The mean parity was 3.9 ± 1.6 and 3.2 ± 1.4 for multiple births and singletons, respectively, while booking status was 78.6% (booked) and 17.3% (unbooked) cases of women who delivered singletons, and 6.1% and 4.2% of mothers were HIV-positive reactive individuals. The most common mode of delivery was spontaneous vaginal delivery for singletons (60.4%) and twins (54.2%), followed by caesarean section (33.4%) in singletons. The most common maternal complication was anemia, hypertension, etc., for singletons and multiple births. HIV-reactive status (6.1%), stillbirth (5.6%), and perinatal death are some of the common obstetric complications in singletons. The frequency of singletons and multiple births and their attendant perinatal complications/mortality was high in this study center. Pregnant women should be encouraged to book early and attain antenatal clinics regularly.

Keywords: singletons, multiple births, frequency, maternal complications, fetal complications

INTRODUCTION

Pregnancy risk and its epidemiology are fast changing globally in the recent times. Scientists have studied independently the prevalence of fetal and maternal outcomes of multiple births and singletons (Monden & Smits, 2017; Razaz et al., 2017; Sahzehei et al., 2017). Maternal and fetal outcomes of women with asymptomatic or symptomatic infections have been reported with complications like maternal death, stillbirth, neonatal death, etc. (Cruz-Lemini et al., 2021; Knight et al., 2020; Mullins et

al., 2021). Dizygotic twinning is common with large regional differences (Fisk, 2007; Leroy et al., 2002). Monozygotic twinning occurs around the world at a constant rate of 3 to 4 per 1,000 births (Smits & Moden, 2011), 6 per 1,000 births in Asia, and 40 per 1,000 births in Africa (Hoekstra et al., 2008; Smits & Moden, 2011). In Africa, Nigeria has the leading incidence of twining with the highest concentration among the Yoruba ethnic group in Southwest Nigeria with rates of 49–54 per 1,000 deliveries (Fisk, 2007; Leroy et al., 2002). Multiple births were 68.1/1,000 babies in Southwestern Nigeria (Olusanya, 2011); 51.4% or 19.5/1,000 deliveries in Port Harcourt, Rivers State, Nigeria, for twin births (Wekere et al., 2021); 43/1,000 babies in Ekiti State, Nigeria (Aduloju et al., 2015); 35.2/1,000 births in Lagos State, Nigeria (Okunade et al., 2018); 30.6/1,000 deliveries in Bayelsa State, Nigeria (Ibrahim et al., 2012); 28.8/1,000 births in Jos, Nigeria (Aisien et al., 2000); and 28.4/1,000 deliveries in Bida, North Central Nigeria (Adewale et al., 2018). It may be attributed to the high consumption of a specific yam species (*Dioscorea rotundata*) as their stable food in Western Nigeria, containing a high amount of a gonadotropin-like substance (natural phytoestrogen), which may stimulate multiple ovulation (Fisk, 2007; Leroy et al., 2002).

The wide geographical variation in incidence of twinning and other forms of multiple birth is influenced by both environmental and racial factors (Orumabo, 1990). Also, genetic predisposition (Hoekstra et al., 2008; Lewis et al., 1996; Omonkhua et al., 2020), increased maternal height, increased maternal age, parity, and nutrition (Hoekstra et al., 2008) are believed to contribute to dizygotic (DZ) twinning. The incidence of twins in Nigeria varies between 14.4 to 53.8 per 1,000 births (Bassey & Inimgba, 2014; Iyiola et al., 2013), compared to the lowest rates of 12.3 per 1,000 births in England and Wales (Monden & Smits, 2017) and 11.3–15 per 1,000 births in the United States of America (Smits & Moden, 2011). Pregnancies and different forms of births are usually welcomed; the excitement of such pregnancies can often be overshadowed by unforeseen complications and risks (Monden & Smits, 2017; Patel & Hall, 2004; Razaz et al., 2017; Sahzehei et al., 2017). These pregnancies are associated with serious maternal and fetal morbidities (Koshida et al., 2016; Monden & Smits, 2017; Razaz et al., 2017; Sahzehei et al., 2017; Shetty et al., 2016; Su et al., 2015). Periodic review of the outcome of singleton and multiple birth is necessary to scale up effort aimed at reducing the associated complications. Thus, there is need to provide current information on the maternal and fetal outcomes and prevalence of singletons and multiple births in Akwa Ibom State, South-South Nigeria.

MATERIALS AND METHODS

Study Design and Area

This retrospective research was carried out at the Maternity Unit, Department of Obstetrics and Gynecology, University of Uyo Teaching Hospital (UUTH), Uyo, Akwa Ibom State, Nigeria. It is a major reference hospital where major and complicated cases of women's and children's diseases are diagnosed and treated.

Ethical Considerations

Ethical consideration was obtained in accordance with the Helsinki declaration from the Research Ethics Committee (HREC), UUTH, Uyo, before the commencement of this research and was strictly adhered to.

Study Population

The research population consists of all birth records (deliveries) from January 2011 to

December 2018 retrieved from the Obstetric/Gynecology Unit as well as the records held from the Medical Records Unit, UUTH, Uyo, Akwa Ibom State. Primary data were collected from new cases seen in the Maternity/Obstetric Clinic within the study period. All the secondary data were retrieved from case files of patients.

Inclusion and Exclusion Criteria

Inclusion criteria are

i. All singletons and multiple births (twins, triplets, quadruplets, etc.) admitted to the labor room between 22 weeks and above, from January 2011 to December 2018
ii. Preterm and early term birth defined as births between 22–36 weeks and 37–38 completed weeks of gestation, respectively
iii. All deliveries defined as those with a provider-initiated mode of onset, either induction or caesarean section
iv. All deliveries with anemia defined by hemoglobin levels less than 110 g/L during pregnancy. Anemia in pregnancy is defined as a hemoglobin concentration of less than 110 g/L in venous blood. Therefore, hemoglobin concentration of less than 110 g/L is termed as anemia.

The exclusion criteria include

i. Cases and case files of non-Nigerians
ii. Births with incomplete relevant information and those with duplicate maternal identification number
iii. Lethal fetal anomaly of either of the fetus or of the mother
iv. Gestational age below 22 weeks

Questionnaire and Data Collections

The questionnaire was developed in English and interpreted to the illiterate subjects seen in the maternity clinic during the period of the research at UUTH, Uyo. Information was collected for sociodemographic data and maternal, fetal, perinatal and neonatal complications and outcomes. The variables for data collections were maternal age, duration of pregnancy (gestational age), parity, nature of conception (natural or assisted reproductive technology), number of pregnancies, chronicity, maternal or obstetrical complications, birth weight, stillbirth, neonatal intensive care unit (NICU) admissions, and congenital malformations, mode of delivery (vaginal delivery, caesarean section, assisted breech delivery, etc.), body mass index (BMI) of the pregnant woman, sex of infant(s), and infant outcome (preterm birth, low birth weight, perinatal death, etc.). Variables on maternal complications include anemia, preterm labor, hypertensive disorders (preeclampsia, eclampsia), premature rupture of membranes (PROM), gestational diabetes mellitus (GDM), postpartum hemorrhage (PPH), heart diseases, cord prolapse, and maternal death. Information on booking status was retrieved, as well as family history of multiple births and other systemic diseases (diabetes, hypertension, etc.). Anemia was defined as Hb < 11 g/dL, hematocrit (Hct) < 33% or <10.5 g/dL in the first and third trimesters, Hct < 32% in the second trimester, and normal hemoglobin during pregnancy ranging from 11.5 to 13.0 (13.5) g/dL (Sharma et al., 2020).

Statistical Analysis of Data

Information was coded using a Microsoft Excel spreadsheet for subsequent statistical analysis. The coded data was analyzed using Statistical Package for Social Sciences (SPSS) version 21.0. Simple percentage was used to determine the frequency while comparative analysis between singletons and multiple births was carried out using the chi-square (χ^2) test.

RESULTS

A total of 13,116 deliveries, comprising 12,828 singleton deliveries and 288 multiple deliveries, were recorded between 2011 and 2018 using patients' hospital files in the maternity unit of the Department of Obstetrics and Gynecology, UUTH, Uyo, Nigeria.

Maternal Demographic Characteristics and Frequency of Births

The mean age of mothers with single births and multiple births was 36.3 ± 1.82 and 33.1 ± 1.46, respectively. Mothers within the age range of 30 years and below had more singletons while those in the range of 31–40 years had more multiple-birth deliveries. The mean gestational age was 38.4 ± 1.8 and 35.7 ± 1.6 years for singletons and multiple births, respectively. frequency of single births per each multiple birth was 70.8% in 2012 (Table 5). The frequency of singletons and multiple births was 97.8% and 2.2%, respectively, as observed in this study. The mode of deliveries in singletons and multiple births are displayed in Table 6. Vaginal delivery was 60.4%, caesarean section was 33.4%, and forceps delivery was 0.1% for singleton births. In multiple births, vaginal delivery was 56.25%, caesarean section was 35.8%, and breech extraction was 0.3%. The most common maternal outcome in singleton and multiple-birth mothers was anemia occurring in 43.9% and 63.5%, respectively. The common obstetric outcomes in singletons were reactive HIV with 6.1%, stillbirth with 5.6%, preterm delivery with 1.4%, and perinatal death with 5.3%. The highest occurring obstetric outcomes in multiple births were low birth weight (17%), preterm delivery (4.9%), and perinatal death (2.4%) (Table 7).

The mean parity was 3.2 ± 1.4, and 64.3% of mothers were multiparous for singletons. Approximately 78.6%, 17.3%, and 4.1% of the women with single births were booked, unbooked, and referred, respectively, whereas 60.8% and 28.8% were booked and unbooked, respectively, for multiple births. The positive HIV status of singleton mothers and multiple-birth mothers was 6.1% and 4.2%, respectively. Maternal death of 0.3% (36) and 1.04% was observed in singleton and multiple-birth mothers, respectively. Age of mothers and gestational age of parity were significant ($p < 0.05$) between singletons and multiple births (Table 1).

The sex ratio of infants from singleton births was 1.129:0.886 while multiple births was 1.378:0.725 as revealed from the study. The sex distribution of babies from singleton births was 47% (males) and 53% (females) while from multiple births was 42% (males) and 58% (females) (Table 2). The annual incidence of singletons was high (15.7%) in 2013 and the lowest (10.4%) in 2018, while the female annual incidence of singleton was high in 2013 (Table 3). Forty-four twin births were recorded in 2017, while four triplet births and one quadruplet birth were observed in 2015 (Table 4). The overall frequency of single births per each multiple birth was 44.5%, and the highest annual

Table 1. Maternal Demographic Characteristics of Singletons and Multiple Births in UUTH

Variables (years)	Singletons (*n* = 12,828) *n* (%)	Multiple Births (*n* = 288) *n* (%)			X^2	*p*-Value
		Twin	Triplets	Quadruplets		
Age						
<20–30	6,486 (50.6)	103 (35.8)	5 (1.7)	0 (0)		
31–40	4,979 (38.8)	117 (40.6)	11 (3.8)	1 (0.3)	2.43	0.871
41–above	1,363 (10.6)	48 (16.7)	3 (1.0)	0 (0)		
Mean age (SD)	**36.3 ± 1.82**		**33.1 ± 1.46**			
Gestational age (weeks)						
Below 37	1,881 (14.7)	53 (18.4)	5 (1.7)	0 (0)		
38–42	9,992 (779)	196 (68.1)	9 (3.1)	1 (0.3)	1.41	0.529
43 and above	955 (7.4)	19 (6.6)	3 (1.0)	0 (0)		
Mean (SD)	38.4 ± 1.8		35.7 ± 1.6			
Parity						
Nulliparous	3 (0.02)	1 (0.3)	0 (0)	0 (0)		
Monoparous	4,581 (35.7)	21 (7.3)	2 (0.7)	0 (0)	3.26	1.85
Multiparous	8,244 (64.3)	246 (85.4)	17 (5.9)	1 (0.3)		
Mean (SD)	3.2 ± 1.4		39 ± 1.6			
Booking status						
Booked	10,086 (78.6)	158 (54.9)	16 (5.6)	1 (0.3)		
Unbooked	2,214 (17.3)	81 (28.1)	2 (0.7)	0 (0)	0.89	1.26
Referral	528 (4.1)	29 (10.1)	1 (0.3)	0 (0)		
HIV status						
Reactive	782 (6.1)	11 (3.8)	1 (0.3)		0.96	1.083
Nonreactive	12,046 (93.9)	257 (89.2)	18 (6.3)			
Condition of mothers						
Good	7,781 (60.7)	177 (61.5)	10 (3.5)	1 (0.3)		
Satisfactory	3,031 (23.5)	76 (26.4)	5 (1.7)	0 (0)	0.73	1.46
Fair	1,998 (15.6)	13 (4.5)	3 (1.0)	0 (0)		
Dead	36 (0.3)	2 (0.7)	1 (0.3)	0 (0)		

Note. SD = standard deviation, *n* = total number of births, X^2 = chi square, HIV = human immunodeficiency virus.

Table 2. Sex Distribution of Babies in Singletons and Multiple Births

Variable	Singletons *n* (%)	Multiple Births *n* (%)
Sex		
Male	6,025 (47.0)	251 (42.0)
Female	6,803 (53.0)	346 (58.0)
Total	**12,828 (100)**	**597 (100)**

Table 3. Annual Incidence of Singletons in UUTH

Years	Singletons	Male	Female	Frequency (%)	Sex Ratio
2011	1,679	700	979	13.1	71.50:100
2012	1,698	868	830	13.2	104.6:100
2013	2,035	928	1,107	15.7	83.8:100
2014	1,750	841	909	13.6	92.5:100
2015	1,473	639	834	11.5	76.6:100
2016	1,397	789	608	10.9	129.8:100
2017	1,464	681	783	11.4	87:100
2018	1,332	579	753	10.4	76.9:100
Total	**12,828**	**6,025**	**6,803**	**100**	

DISCUSSION

In this study, the frequency of singletons and multiple births was 97.8% and 2.2%, respectively. The frequency of multiple births recorded in this study is similar to 2.1% reported in Tanzania (Chiwanga et al., 2014); 2.06% in Iran (Bouzar et al., 2015); 2%–2.83% in the Canadian population (Fell & Joseph, 2012); 2.36% in Benin City, Edo State (Maduabuchukwu & Howell, 2018); and 2.6% in Uyo (Abasiattai et al., 2010) among twins, which are examples of multiple births. In contrast, lower frequencies of multiple births (twins, triplets, etc.) were documented in Ahmednagar District, India, with a frequency of 1.49% (Bangal et al., 2012), in Beijing with 1.7% (Su et al., 2015), and in Iran with 1.85% (Nasseri & Azhir, 2009). High frequencies of 3.21% in Nigeria (Akinseye et al., 2019); 3% in Jaipur (Gupta et al., 2017); 3.6% in Bangalore (Shetty et al., 2016); 3.4% in São Paulo, Brazil (de Assuncao et al., 2010); 3.37% in Nnewi, South-East Nigeria (Obiechina et al., 2011); and 3.76% in Kwara State (Iyiola et al., 2013) were documented when compared to the 2.2% observed in this present study. The highest incidences for multiple births of 40.2% in Oyo State and Ekiti State (Akinboro et al., 2008), 26.5% in Calabar (Bassey et al., 2004), 17.6% in India (Gajera et al., 2015), and 13% in Japan (Koshida et al., 2016) were documented. The variations in the rate of twinning and other multiple births may be attributed to diet, apart from genetic predisposition, which agreed

Table 4. Annual Incidence of Multiple Births in UUTH

Years	Twins	Male	Female	Triplets	Male	Female	Quadruplets	Male	Female	Sex Ratio
2011	34	28	40	2	3	3	0	0	0	72.1:100
2012	22	30	14	2	3	3	0	0	0	194.1:100
2013	28	26	30	2	2	4	0	0	0	82.4:100
2014	30	24	36	1	1	2	0	0	0	65.8:100
2015	35	31	39	4	5	7	1	2	2	78.3:100
2016	32	24	40	4	4	8	0	0	0	63.6:100
2017	44	36	52	1	2	1	0	0	0	71.7:100
2018	43	27	59	3	3	6	0	0	0	46.2:100
Total	**268**	**226**	**310**	**19**	**23**	**34**	**1**	**2**	**2**	

Table 5. Incidence of Singletons per Multiple Birth in UUTH

Year	Single Births (*x*)	Multiple Births (*y*)	Total Births (*z*)	Single per Each Multiple Birth (*x*/*y*)
2011	1,679	36	1,715	46.6
2012	1,628	24	1,722	70.8
2013	2,035	30	2,065	67.8
2014	1,750	31	1,781	56.5
2015	1,473	40	1,513	36.8
2016	1,397	36	1,433	38.8
2017	1,464	45	1,509	32.5
2018	1,332	46	1,378	29.0
Total	**12,828**	**288**	**13,116**	**44.5**

with documented reports (Hoekstra et al., 2008; Nylander, 1979; Omonkhua et al., 2020; Smits & Moden, 2011), pointing out that diets and genes have strong influence on multiple births. Additionally, the highest rate of multiple births was observed in South-West Nigeria, but a low frequency was observed in South-South Nigeria from the results in this study. The highest frequency of twinning or multiple births observed in South-West may be attributed to the consumption of yam (*Dioscorea rotundata*), stimulating multiple ovulation (Nylander, 1979), and yam is central to Yoruba people's diet. Also, a higher incidence of twinning and other types of multiple births are common in Asians and Western countries and may be due to common practice of artificial reproductive technology (El-Toukhy et al., 2018; Kahraman et al., 2021; Monden et al., 2021; Qin et al., 2016).

The frequency of 97.8% was recorded for singletons in this present study with the maternal mean age of 36.3 ± 1.82; this is similar to 98.3% of singletons and the mean age of 28.4 ± 16.5 reported in Beijing (Su et al., 2015), 97.7% in Spain among asymptomatic pregnant women (Cruz-Lemini et al., 2021), and 97.9% in

Table 6. Mode of Delivery in Singletons and Multiple Births

Mode of Delivery	Singletons (*n* = 12,828) *n* (%)	Multiple Births (*n*= 288) *n* (%)		
		Twins	Triplets	Quadruplets
Vaginal delivery	7,747 (60.4)	156 (54.2)	6 (2.1)	0 (0)
Caesarean section	4,281 (33.4)	91 (31.6)	11 (3.8)	1 (0.3)
Assisted breech	32 (0.2)	13 (4.5)	1 (0.3)	0 (0)
Breech extraction	58 (0.5)	0 (0)	1 (0.3)	0 (0)
Vacuum extraction	694 (5.4)	8 (2.8)	0 (0)	0 (0)
Forceps delivery	16 (0.1)	0 (0)	0 (0)	0 (0)

Table 7. Maternal and Obstetric Outcomes in Singletons and Multiple Births

Variables	Singletons (*n* = 12,828) *n* (%)	Multiple Births (*n* = 288) *n* (%)
Anemia	5,635 (43.9)	183 (63.5)
Hypertension	4,478 (34.9)	109 (37.8)
Preterm labor	182 (1.4)	11 (3.8)
PROM	214 (1.7)	8 (2.8)
PPH	429 (3.3)	12 (4.5)
SGA	331 (2.6)	26 (9.0)
INCPM	4,181 (32.6)	131 (45.5)
Preterm delivery	184 (1.4)	14 (4.9)
LBW	611 (4.8)	49 (17.0)
Perinatal death	68 (5.3)	7 (2.4)
MSB	341 (2.7)	4 (1.4)
SB	383 (3.0)	5 (1.7)
HIV-EB	782 (6.1)	12 (4.2)

Note. PROM = premature rupture of membranes, PPH = postpartum hemorrhage, LBW = low birth weight, MSB = macerated stillbirth, SB = stillbirth, SGA = small for gestational age, HIV-EB = human-immunodeficiency-virus-exposed babies, INCPM = incomplete placenta and membranes.

Northern Tanzania (Chiwanga et al., 2014). The frequency for single births in Kwara State was 25.6% (Iyiola et al., 2013), which is not in harmony with our present findings. In this present study, singleton and multiple-birth mothers were in their peak fertile age (18–30 years), which is concomitant to the findings in India (Gajera et al., 2015; Shetty et al., 2016), Beijing (Su et al., 2015), Iran (Nasseri & Azhir, 2009), Norway (Nilsen et al., 2016), Oyo State and Ekiti State (Akinboro et al., 2008), the six geopolitical zones in Nigeria (Akinseye et al., 2019), and Calabar (Bassey et al., 2004). Multiparous women have more multiple births (twins, triplets, and quadruplets) from the results of our study and harmonious with findings in Iran (Nasseri & Azhir, 2009), Uyo (Abasiattai et al., 2010), and India (Shetty et al., 2016). Majority of pregnant women were booked in this research and, similar to other researches (Abasiattai et al., 2010; Bassey et al., 2004; Kullima et al., 2011; Maduabuchukwu & Howell, 2018), had regular antenatal care. The findings of Shetty et al. (2016) in India disagreed with our current findings, because majority of the cases were unbooked (54.8%) and they visited the hospital due to complications during child delivery. Unbooked cases were associated with perinatal mortality indicating the importance of specialist care in the management of multiple gestation. The high sex ratio of singletons and multiple births in UUTH within the study period was 129.8:100 and 194.1:100, respectively, showing more of female babies. These findings corroborate the documented research in British Columbia, Canada, where 57.5% were females (Fell & Joseph, 2012), but disagreed with other previous findings in Uyo (Abasiattai et al., 2010), Calabar (Bassey et al., 2004), and India (Bangal et al., 2012), where male babies are more predominant.

In this present study, the most common mode of delivery was vaginal delivery (60.4% and 56.3%) followed by caesarean section (33.4% and 35.8%) for singletons and multiple births, respectively. These current findings are concomitant to documented studies in Hamadan, Iran (Sahzehei et al., 2017); London (Mullins et al., 2021); Maharashtra (Bangal et al., 2012); Ahmadabad (Gajera et al., 2015); Calabar (Bassey et al., 2004); Uyo (Abasiattai et al., 2010); and other Nigerian populations (Akaba et al., 2013; Akinseye et al., 2019; Igberase et al., 2008; Kullima et al., 2011; Onah & Ugwu, 2008) with similar trends in the mode of delivery. These present results with regards to mode of delivery in twin birth were not in harmony with published research in Port Harcourt (Bassey & Inimgba, 2014); São Paulo, Brazil (de Assuncao et al., 2010); Beijing (Su et al., 2015); and India (Shetty et al., 2016), where the most common mode of delivery was caesarean section. The caesarean mode of delivery in this study was attributed to the high incidence of noncephalic presentation leading twins, poor fetal conditions, and increased cases of confounding gestational hypertension. Vacuum or forceps delivery was observed after caesarean section in our study, agreeing with documented study in Spain (Cruz-Lemini et al., 2021). Approximately, 63.5% of the study population had various complications during the antenatal period with anemia being the most common antepartum complication, followed by hypertension. These findings were similar to the documented research in Port Harcourt (Bassey & Inimgba, 2014) and six geopolitical zones in Nigeria (Akinseye et al., 2019), where the most common maternal complication was anemia. Pregnant women are more likely to develop anemia due to exaggerated early pregnancy symptoms affecting intake and increased demand of iron and folic acid by the developing fetus(es). Those cases of anemia

in pregnancy were effectively managed with either hematinic or blood transfusion before the intrapartum period depending on the consent of the patient to professionals. Researches in India (Bangal et al., 2012; Gajera et al., 2015) and Calabar, Nigeria (Bassey et al., 2004), reported that preterm labor was the most common maternal complication, disagreeing with these present findings in UUTH, Uyo. Preterm delivery is an important etiology factor of the increased frequency of low birth delivery in multifetal gestations. Pregnancy-induced hypertension was another maternal complication seen in our current study, which was documented in Spain (Cruz-Lemini et al., 2021), Port Harcourt (Bassey & Inimgba, 2014), and Calabar (Bassey et al., 2004). Pregnant women were reactive to HIV in our current findings but medically handled for booked cases during antenatal care, and harmonious results were documented in Finland (Tasa et al., 2021) and different countries (World Association of Perinatal Medicine Working Group on COVID-19, 2021). The most common obstetric complication was reactive HIV cases, followed by stillbirth, preterm delivery, and perinatal deaths. Several studies (Abasiattai et al., 2010; Bassey et al., 2004; Gajera et al., 2015; Shetty et al., 2016) also reported similar complication trends in neonates, but the HIV status of the babies was not documented. Reactive HIV cases in neonates were observed in mothers with unbooked status, calling for sensitization campaigns on the need of pregnant women going for antenatal care in hospitals, especially in rural areas. Perinatal death in this current study was also caused by macerated stillbirth and very low birth weight sequel to preterm labor, and similar causes of perinatal death were reported in Calabar (Bassey et al., 2004) and Maiduguri (Nwobodo et al., 2002).

CONCLUSION

The frequency of singletons and multiple births was 97.8% and 2.2%, respectively. The most common maternal outcomes were anemia, hypertension, and incomplete placenta/membranes, while obstetric outcomes were reactive HIV status of babies, stillbirth, and perinatal death for both singleton and multiple births. This information will be useful in the management of complications due to singletons, multiple births, and prenatal counselling in our locality.

RECOMMENDATIONS

Population-based research is recommended in order to explore the occurrence of multiple births and family history of twinning. Also, research on the identification of common genetic variants influencing spontaneous dizygotic twining in South-South Nigeria is recommended.

REFERENCES

Abasiattai, A. M., Umoiyoho, A. J., Utuk, N. M., & Shittu, D. G. (2010). Incidence and mode of delivery of twin pregnancies in Uyo, Nigeria. *Nigerian Medical Journal*, *51*(4), *170–172.*

Adewale, F. B., Ashimi, A., & Oyewopo. O. A. (2018). Trends of multiple birth at Federal Medical Centre Bida, Northcentral Nigeria. *Tropical Journal of Obstetrics and Gynecology, 35,* 68–72. https://doi.org/10.4103/tjog.tjog_57_17

Aduloju, O. P., Olofinbiyi, B., Olagbuji, B. N., Ade, O. I. P., & Akintayo, A. (2015). Obstetric outcome of twin gestations in a tertiary hospital South-Western Nigeria. *Journal of Maternal-Fetal Neonatal Medicine, 28*(8), 900–904.

Aisien, A. O., Olanrewaju, R. S., & Imade, G. E. (2000). Twins in Jos Nigeria: A seven-year retrospective study. *Medical Science Monit*or, *6*, 945–950.

Akaba, G. O., Agida, T. E., Onafowokan, O., Offiong, R. A., & Adewole, N. D. (2013). Review of twin pregnancies in a tertiary hospital in Abuja, Nigeria. *Journal of Health, Population, and Nutrition*, *31*(2), 272–277.

Akinboro, A., Azeez, M. A., & Bakara, A. A. (2008). Frequency of twinning in Southwest Nigeria. *Indian Journal of Human Genetics*, *14*(2), 41–47.

Akinseye, K. M., Anifowoshe, A. T., Owolodun, O. A., Aina, O. M., & Iyiola, O. A. (2019). Frequency of twinning in Nigeria: A review. *Manila Journal of Science*, *12*, 78–88.

Bangal, V. B., Patel, M., & Khainar, D. N. (2012). Study of maternal and fetal outcome in twin gestation at tertiary hospital. *International Journal of Biomedical and Advance Research*, *3*(10), 758–762.

Bassey, E. A., Abasiattai, A. M., Udoma, E. J., & Asuquo, E. E. (2004). Outcome of twin pregnancy in Calabar, Nigeria. *Global Journal of Medical Sciences*, *3*(1–2), 13–15.

Bassey, G., & Inimgba, N. M. (2014). Fetomaternal outcome of twin gestation in Port Harcourt, South-South Nigeria. *Nigerian Journal of Medicine*, *23*(4), 282–287.

Bouzar, Z., Sadeghi, M., Naeimi-rad, M., & Bozorgi, N. (2015). The prevalence, cause and outcomes of twin pregnancies. *World Applied Sciences Journal*, *33*(11), 1701–1704.

Chiwanga, E. S., Massenga, G., Mlay, P. J., & Mahande, M. J. (2014). Maternal outcome in multiple versus singleton pregnancies in Northern Tanzania: A registry-based case control study. *Asian Pacific Journal of Reproduction*, *3*(1), 46–52.

Cruz-Lemini, M., Perez, E., de la Conty, C. M. L., Aguilar, C. A., Pardilla, P. M. B., Rodríguez, P. P., Hernando, M. M., Acebal, F. L., Recarte, P. P., Mallen, M. M. C., et al. (2021). Obstetric outcomes of SARS-CoV-2 infection in asymptomatic pregnant women. *Viruses*, *13*, 112. https://doi.org/10.3390/v13010112

de Assuncao, R. A., Liao, A. W., Brizot, M. D. L., Krebs, V. L. J., & Zugaib, M. (2010). Perinatal outcome of twin pregnancies delivered in a teaching hospital. *Revista da Associação Médica Brasileira*, *56*(4), 447–451.

El-Toukhy, T., Bhattacharya, S., & Akande, V. A. (2018). Multiple pregnancies following assisted conception. *International Journal of Obstetrics and Gynaecology*, *22*, 1–6.

Fell, D. B., & Joseph, K. S. (2012). Temporal trends in the frequency of twins and higher-order of multiple births in Canada and the United States. *BMC Pregnancy and Childbirth*, *12*, 103–109.

Fisk, N. M. (2007). Multiple pregnancy. In D. K. Edmonds (Ed.), *Dewhurst Textbook of Obstetrics and Gynaecology* (7th ed.). United States: Blackwell Publishers.

Gajera, A. V., Basavannayya, H. P., Kavitha, C., & Hiremth, R. (2015). Feto-maternal outcome in twin pregnancy. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology*, *4*(6), 1836–1839.

Gupta, D., Meena, B. S., Benwal, D., Singhal, S., & Ainani, R. (2017). Comparative assessment of fetomaternal outcome in twin pregnancy with singleton pregnancy at tertiary care center. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology*, *6*(6), 2395–2400.

Hoekstra, G., Zhao, Z. Z., Lambalk, C. B., Willemsen, G., Martin, M. G., Boomsma, D. I., & Montgomery, G. W. (2008). Dizygotic twinning. *Human Reproduction Update*, *14*, 37–47.

Ibrahim, I., Oyeyemi, A., & Obilahi, A. (2012). Twin pregnancies in the Niger Delta of Nigeria. A four-year review. *International Journal of Women's Health, 4,* 245.

Igberase, G. O., Ebeigbe, P. N., & Bock-Oruma, A. (2008). Twinning rate in a rural mission tertiary hospital in the Niger Delta, Nigeria. *Journal of Obstetrics and Gynaecology*, *28*(6), 586–589.

Iyiola, O. A., Oyeyemi, F. B., Raheem, U. A., & Mark, F. O. (2013). Frequency of twinning in Kwara State, North-Central Nigeria. *The Egyptian Journal of Medical Human Genetics*, *14*, 29–35.

Kahraman, S., Duzguner, I. N. B., Duzguner, S., Sahin, Y., & Sen, C. (2021). Incidence of multiple births in relation to current regulations in Turkey regarding embryo transfer. *BMC Pregnancy and Childbirth*,

21, 117–125. https://doi.org/10.1186/s12884-021-03616-9

Knight, M., Bunch, K., Vousden, N., Morris, E., Simpson, N., Gale, C., O'Brien, P., Quigley, M., Brocklehurst, P., & Kurinczuk, J. (2020). Characteristics and outcomes of pregnant women admitted to hospital with confirmed SARS-CoV-2 infection in UK: National population based cohort study. *BMJ*, *369*.

Koshida, S., Ono, T., Tsuji, S., Murakami, T., & Takahashi, K. (2016). Perinatal backgrounds and NICU bed occupancy of multiple-birth infants in Japan. *Tohuku Journal of Experimental Medicine*, *238*, 261–265.

Kullima, A. A., Audu, B. M., & Geidam, A. D. (2011). Outcome of twin deliveries at the University of Maiduguri Teaching Hospital: A 5-year review. *Nigerian Journal of Clinical Practice*, *14*(3), 345–348.

Leroy, F., Olaleye-Oruene, T., Koeppen-Schomerus, G., & Bryan, E. (2002). Yoruba customs and beliefs pertaining to twins. *Twin Research*, *5*(2), 132–136. https://doi.org/10.1375/1369052023009

Lewis, C. M., Healey, S. C., & Martin, N. G. (1996). Genetic contribution to DZ twinning. *American Journal of Medical Genetics*, *61*(3), 237–246. https://doi.org/10.1002/(SICI)1096-8628(19960122)61:3<237::AID-AJMG7>3.0.CO;2-R

Maduabuchukwu, I. E., & Howell, I. E. (2018). A review of twinning in Niger Delta Region, Nigeria. *Clinical Medical Research*, *7*(1), 18–25. https://doi.org/10.11648/j.cmr.20180701.13

Monden, C., Pison, G., & Smits, J. (2021). Twin peaks: More twinning in humans than ever before. *Human Reproduction, 36*(6), 1666–1673. https://doi./10.1093/humrep/deab029

Monden, C. W. S., & Smits, J. (2017). Mortality among twins and singletons and sub-Saharan Africa between 1995 and 2014: A pooled analysis of data from 90 demographic and health surveys in 30 countries. *Lancet Global Health*, *5*, 673–679.

Mullins, E., Hudak, M. L., Banerjee, J., Getzlaff-Ttownson, J., Barnette, K., Playle, R., Perry, A., Bourne, T., & Lees, C. C. (2021). Pregnancy and neonatal outcomes of COVID-19: Coreporting of common outcomes from PAN-COVID and AAP-SONPM registries. *Obstetrics and Gynecology*, *57*, 573–581.

Nasseri, F., & Azhir, A. (2009). The neonatal outcome in twin versus triplet and quadruplet pregnancies. *Journal of Research in Medical Sciences*, *14*(1), 7–12.

Nilsen, T., Magnus, P., & Ørstavik, R. (2016). Maternal body composition in relation to twinning. *Norsk Epidemiologi*, *26*(1–2), 77–81.

Nwobodo, E. I., Bobzom, D. N., & Obed, J. (2002). Twin births at University of Maiduguri Teaching Hospital: Incidence, pregnancy complications and outcome. *Nigerian Journal of Medicine*, *11*(2), 67–69.

Nylander, P. P. (1979). The twinning incidence of Nigeria. *Acta Geneticae Medicae et Gemellologiae (Roma)*, *28*(4), 261–263. https://doi.org/10.1017/s0001566000008746

Obiechina, N. J., Okolie, V. E., Eleje, G. U., Okechukwu, Z. C., & Anemeje, O. A. (2011). Twin versus singleton pregnancies: The incidence pregnancy complications and obstetric outcomes in Nigerian Tertiary Hospital. *International Journal of Women's Health*, *3*, 227–230.

Okunade, K. S., Daramola, E., Adenekan, M., Sekumade, A., Ajepe, A., & Osanyin, G. E. (2018). Review of twin deliveries and fetomaternal outcomes in a tertiary hospital in Lagos, Southwest Nigeria. *The Nigerian Journal of General Practice, 16*(1), 6.

Olusanya, B. O. (2011). Perinatal outcomes of multiple births in Southwest Nigeria. *Journal of Health Population and Nutrition, 29*, 639–647.

Omonkhua, A. A., Okonofua, F. E., Ntoimo, L. F. C., Aruomaren, A. I., Adebayo, A. M., & Nwuba, R. (2020). Community perceptions on causes of high dizygotic twinning rate in Igbo-Ora, South-West Nigeria: A qualitative study. *Plos One*, *15*(12), e0243169. https://doi.org/10.1371/journal.pone.0243169

Onah, H. E., & Ugwu, G. O. (2008). Trends in the twinning rate in Enugu, Nigeria. *Journal of Obstetrics and Gynaecology*, *28*(6), 590–592.

Orumabo, C. T. (1990). Multiple births in Port Harcourt: Analysis of associated biological variables and problems in classification of the growth retarded twin. *Tropical Journal of Obstetrics and Gynaecology*, *9*, 9–12.

Patel, F., & Hall, D. R. (2004). Twin pregnancy risks and complications: A review article. *Obstetrics and Gynecology Forum*, *14*(3), 13–19.

Qin, J., Liu, X., Sheng, X., Wang, H., & Gao, S. (2016). Assisted reproductive technology and the risk of pregnancy-related complications and adverse pregnancy outcomes in singletons pregnancies: A meta-analysis of cohort studies. *Fertilization and Sterility*, *105*(1), 73–85.

Razaz, N., Avitan, T., Ting, J., Pressey, T., & Jospeh, K. S. (2017). Perinatal outcomes in multifetal pregnancy following fetal reduction. *Canadian Medical Association Journal*, *189*(18), 652–658.

Sahzehei, M. K., Basiri, B., Shokouhi, M., & Eghbalian, F. (2017). Perinatal outcome in multiple versus singleton pregnancies in neonates born in Fatemi Hospital of Hamadan, Iran. *International Journal of Pediatrics*, *5*(8), 543–550.

Sharma, D., Amgain, K., Panta, P. P., & Pokhrel, B. (2020). Hemoglobin levels and anemia evaluation among pregnant women in the remote and rural high lands of Mid-Western Nepal: A hospital based study. *BMC Pregnancy and Childbirth*, *20,* 182–188.

Shetty, M. B., Shivananjaiah, C., & Swarup, A. (2016). A retrospective study: Twin gestation at tertiary care, maternal and fetal outcome. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology*, *5*(1), 217–219.

Smits, J., & Moden, C. (2011). Twinning across the developing world. *Plos One*, *6*(9), 1–5.

Su, R. N., Zhu, W. W., Wei, Y. M., Wang, C., Feng, H., Lin, L., & Yang, H. X. (2015). Maternal and neonatal outcomes in multiple pregnancy: A multicenter study in the Beijing population. *Chronic Diseases and Translational Medicine*, *1*, 197–202.

Tasa, J., Holmberg, V., Sainio, S., Kankkunen, P., & Vehviläinen-Julkunen, K. (2021). Maternal health care utilization and the obstetric outcomes of undocumented women in Finland—a retrospective register-based study. *BMC Pregnancy and Childbirth*, *21*, 191–199.

Wekere, F. C. C., John, D. H., Clement-Wekere, G. A. F., & Iwo-Amah, R. S. (2021). Prevalence, trend and outcome of twin pregnancy in Rivers State University Teaching Hospital, Southern Nigeria. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology, 10(7),* 2571–2577.

World Association of Perinatal Medicine Working Group on COVID-19. (2021). Maternal and perinatal outcomes of pregnant women with SARS-CoV-2 infection. *Ultrasound in Obstetrics and Gynecology*, *57*, 232–241.