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**Original Article**

# Trends and Outcomes of Twin Births in Southwest Nigeria: A 14-Year Retrospective Cohort Study

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## Abstract

**Background and objectives:** The study aimed to analyze the prevalence, trends, and outcomes of twin pregnancies in Ile-Ife, Nigeria, over two distinct periods.

**Materials and methods:** This research, based on a 14-year retrospective cohort study, scrutinized twin births occurring in two-time frames: recent years (2012–2018; Period II) and the recent past (2005–2011; Period I) at a University Teaching Hospital in Ile-Ife, Nigeria. The inclusion criteria were limited to twin births, excluding singleton and higher-order gestations. Outcomes were evaluated based on several parameters, including mode of delivery, birth weights, fetal gender combinations, APGAR scores, perinatal mortality, and maternal complications. Data analysis was conducted using the 26th version of Statistical Package for the Social Science, with a significance threshold of $p < 0.05$.

**Results:** The study documented a stable prevalence of twin gestations, registering at 20.7 per 1,000 births without a significant discrepancy between the two time periods (21.7‰ versus 19.7‰; $p = 0.699$). Individuals from the Yoruba tribe predominantly featured in both cohorts, showing no considerable variation between the two time periods [83 (95.4) vs. 120 (99.2); $p$-value = 0.116]). The data exhibited recurrent instances of caesarean delivery (65.6% vs. 50.2%, $p = 0.119$), vertex-vertex presentation (38.0% vs. 44.7%, $p = 0.352$), and differing sex combinations (33.3% vs. 38.0%, $p = 0.722$) across both time frames. Twin II neonates born through Caesarean section were more frequently admitted to neonatal intensive care units than Twin I (5.1% versus 4.6%; $p = 0.001$). The recent years witnessed a surge in preterm labor complications, notably higher than the earlier period (17.1% versus 7.8%; $p = 0.008$).

**Conclusion:** The prevalence of twin births in Ile-Ife, Nigeria, demonstrates a fluctuating decline. To comprehensively understand the dynamics of twin births in the region, there is a pressing need for expansive, community-centric research in southwest Nigeria.

**Keywords:** Twin births; Ile-Ife; Southwest Nigeria; Multiple gestations; Perinatal outcomes; Prevalence; Retrospective cohort study.

**Abbreviations:** CI, confidence interval; CS, caesarean section; DM, Diabetes Mellitus; Ext, Extraction; GA, gestational age; HTN, hypertension; Inst, Instrumental; NICU, Neonatal Intensive Care Unit; OAUTHC, Obafemi Awolowo University, Teaching Hospitals Complex; PPH, primary post partum hemorrhage; SD, standard deviation; UTI, urinary tract infection; Vag, Vaginal.

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## Introduction

Twin gestations represent a high-risk category of pregnancies, inherently accompanied by augmented morbidity and mortality rates for both the mother and fetus when contrasted with singleton pregnancies.[1,2] The likelihood of hospitalizations due to complications such as hypertensive disorders, gestational diabetes mellitus, ane-

mia, and postpartum hemorrhage is sextupled in cases of multiple pregnancies.[2,3] Moreover, twin births are characterized by a four-fold increase in perinatal mortality rates compared to singletons.[2] The higher prevalence of chromosomal abnormalities, preterm births, low birth weights, and small-for-gestational-age statuses notably contribute to elevated perinatal morbidity and mortality associated with twin births.[2,4]

While the frequency of dizygotic twins can vary based on ethnicity and geographic location, the prevalence of monozygotic, or identical twins, remains relatively constant globally.[1,2] Out of every 42 babies born, one was a twin, leading to the birth of one million and 600,000 infants in a single year, according to one of the early studies on twin births. This huge increase was seen in many nations throughout the world beginning in the 1980s.[5] According to the study, over the previous four decades, the mean global twin birth rate was roughly one-third.[5] In 2022, Olotu *et al.* reported that Africa had the highest percentage of dizygotic twins, accounting for 80% of all twin births recorded in Africa or Asia.[5] Igbo-Ora, a Yoruba village in Oyo state, Nigeria, has been dubbed "the melting pot of twin birth" due to the multiple birth record of twins and triplets in nearly every home, which is said to be due to their environment or the food they eat, making the town "the world's twin capital".[5,6]

A noteworthy contributor to this phenomenon is the dietary staple of the Yoruba people: white yam (*Dioscorea cayenensis subspecies rotundata)*, which contains compounds resembling estrogen, clomiphene, or human chorionic gonadotropin. These compounds have been associated with the heightened occurrence of twins within this demographic. It forms an intriguing aspect of ethnobotany and merits further exploration in understanding the nuances of twin pregnancies.[7,8]

Twin deliveries in the Yoruba population had higher mean follicle-stimulating hormone levels than singletons.[9] It has been hypothesized that certain plants in western Nigeria contain hormone-like compounds that raise follicle-stimulating hormone levels and, as a result, boost the population's rate of dizygotic twinning.[10] But recently, it seems as though twinning has become less common in southwestern Nigeria.[5] In Igbo-Ora, a community in the Ibarapa Central Local Government Area of Oyo State, South-west Nigeria, as reported by Omonkhua *et al.*,[10] an average of 45 to 50 twin births per 1,000 births was found. Furthermore, Omonkhua *et al.* discussed the previous work of Akinboro who recorded both in Ilesa and Ile-Ife, the frequency of twin births at 46.5 per 1,000 deliveries and 46.2 per 1,000 deliveries, respectively. He however discovered that Ogbomoso and Ado-Ekiti had frequencies of 38.5 and 22.1 per 1,000 births, respectively. These are neighboring towns to Ile-Ife.[10]

Omonkhua *et al.* observed a decrease in twinning rates in Igbo-Ora to 23.8 per 1,000 from 45–53 per 1,000 maternities in 1969 in hospital-based surveys.[10] It is crucial to ascertain the current prevalence of twin gestation among the Yorubas of Southwestern Nigeria to confirm or refute claims that the prevalence of twin gestation is declining in this area due to the socioeconomic importance of twinning, such as cultural preservation and revenue generation from tourism attraction. This study seeks to ascertain the current prevalence, study the trend, and determine the outcomes of twin births at the OAUTHC, Ile-Ife, Osun State, Southwest Nigeria.

## Methods

At the OAUTHC, Ile-Ife, from January 1, 2005, to December 31, 2018, we conducted a retrospective cohort study over 14 years to compare the prevalence, trend, and outcome of twin births over the most recent years (2012 to 2018, Period II) versus the most recent years in the past (2005 to 2011, Period I). All twin birth case files from the study periods were obtained from the hospital's medical records (personal data and case records) department, and pertinent information was gathered using a specially created proforma. The inclusion criteria were all twin births that occurred during the study period, while the exclusion criteria were higher-order gestations, singletons, insufficient data, or case files that had been incorrectly recorded. Mode of delivery, newborn weight, fetal gender combinations, APGAR scores, and perinatal death were among the outcome metrics. The significance level was set at a $p$-value < 0.05, and the 26$^{th}$ version of Statistical Package for the Social Sciences was used for data storage, analysis, and comparisons. Associations were tested when appropriate using an independent student t-test for the mean and a Chi-square for proportions.

This study was carried out per the ethical guidelines of the Helsinki Declaration and ethical clearance received from Chukwuemeka Odumegwu Ojukwu University Teaching Hospital, Health Research Ethics Committee with approval number COOUTH/CMAC/ETH.C/VOL.1/FN:04/213. The individual consent for this retrospective analysis was waived.

## Results

Of the 15,222 total deliveries recorded in the hospital over the 14-year study period, 315 were twin deliveries, giving an actual mean prevalence rate of 20.7 ± 9.4 [95% CI 15.3 and 26.1] per 1,000 births. Eighty-one out of the 315 twin births retrieved were excluded due to incomplete data, leaving 234 twin births eligible for analysis with a retrieval rate of 74.3%. The overall retrieved mean prevalence rate was 15.4 ± 7.9 [95% CI 10.9 and 20.0] per 1,000 births. Considering the two time periods, the actual mean prevalence for period I was non significantly higher than that of period II [21.7 ± 11.4 (95% CI: 11.1 and 32.3) vs. 19.7 ± 7.5 (95% CI: 12.8 and 26.6), $p$-value = 0.699] while; the retrieved mean prevalence for period I was non significantly higher than period II [16.0 ± 10.5 (95% CI: 6.2–25.7) vs. 14.9 ± 4.8 (95% CI: 10.5 and 19.4), $p$-value = 0.817]. See Table 1, Figures 1–3.

### *Trend of prevalence of twin births between the two-time period*

The trend of twin birth prevalence at the OAUTHC across the designated periods depicted a fluctuating decline, as illustrated by a linear dotted trend line. A notable sharp decrease was observed in 2009. Despite presenting periodic fluctuations with alternating peaks and troughs throughout the two periods, the mean prevalence did not showcase a statistically significant alteration between them.

Upon a closer inspection of the individual annual prevalence rates, a descending trajectory was noticeable, albeit with oscillating values. This trend line delineates a decline from a high of 24.2 per 1,000 births in 2006, moderating to 23.6 per 1,000 births in 2010. A more pronounced decrease was witnessed in subsequent years, recording rates of 19.1 and 18.9 per 1,000 births in 2014 and 2015, respectively. This downward trend persisted, intersecting a substantially lower value of 16.6 per 1,000 births in 2017.

Remarkably, when contrasting the final prevalence rate from our study, 20.7 per 1,000 births, with the much higher prevalence rate documented by Akinboro, which stood at 46.2 per 1,000 births

**Table 1. Demographics within the two time periods of 14 years**

| Variable | Period (Mean ± SD) | | t-value | | *p*-value |
|---|---|---|---|---|---|
| | I (n = 129) | II (n = 105) | Total/95% CI | | |
| Age | 30.58 ± 5.12 | 29.68 ± 4.75 | – | 1.37 | 0.171 |
| Parity | 1.42 ± 1.32 | 1.46 ± 1.33 | – | −0.23 | 0.817 |
| GA at delivery | 37.16 ± 2.30 | 36.89 ± 2.78 | | 0.79 | 0.428 |
| Tribe | | | | | |
| Delta | 1 (1.2) | 1 (0.8) | 2 (1.0) | | |
| Igbo | 3 (3.4) | 0 (0.0) | 3 (1.4) | 4.30 | 0.116 |
| Yoruba | 83 (95.4) | 120 (99.2) | 203 (97.6) | | |
| Prevalence | | | | | |
| Actual | 21.7 ± 11.4 | – | 11.1–32.3 | 0.39 | 0.699 |
| | – | 19.7 ± 7.5 | 12.8–26.6 | | |
| Retrieved | 16.0 ± 10.5 | – | 6.2 | −25.7 | 0.817 |
| | – | 15.0 ± 4.8 | 10.5–19.4 | 0.23 | |
| Birthweight | | | | | |
| Twin 1 | | | | | |
| ≤0.99 | 0 (0.0) | 2 (1.9) | 2 (0.9) | | |
| 1.0 to 1.49 | 2 (1.5) | 8 (7.6) | 10 (4.3) | 9.63 | 0.022 |
| 1.5 to 2.49 | 61 (47.3) | 37 (35.2) | 98 (41.9) | | |
| 2.5 to 3.9 | 66 (51.2) | 58 (55.2) | 124 (53.0) | | |
| Twin 2 | | | | | |
| ≤0.99 | 3 (1.3) | 0 (0.0) | 3 (2.8) | | |
| 1.0 to 1.49 | 13 (5.6) | 6 (4.6) | 7 (6.7) | 8.02 | 0.046 |
| 1.5 to 2.49 | 115 (49.2) | 72 (55.8) | 43 (40.9) | | |
| 2.5 to 3.9 | 103 (44.0) | 51 (39.5) | 52 (49.5) | | |

CI, confidence interval; GA, gestational age; SD, standard deviation.

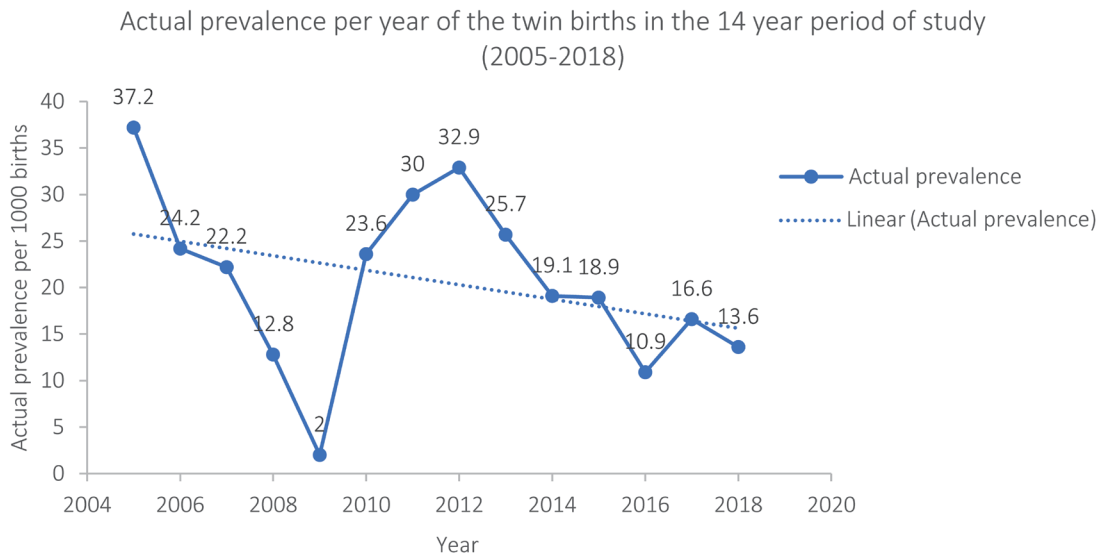


**Fig. 1. Trend of actual prevalence of twin births over the 14 years (2005–2018).**

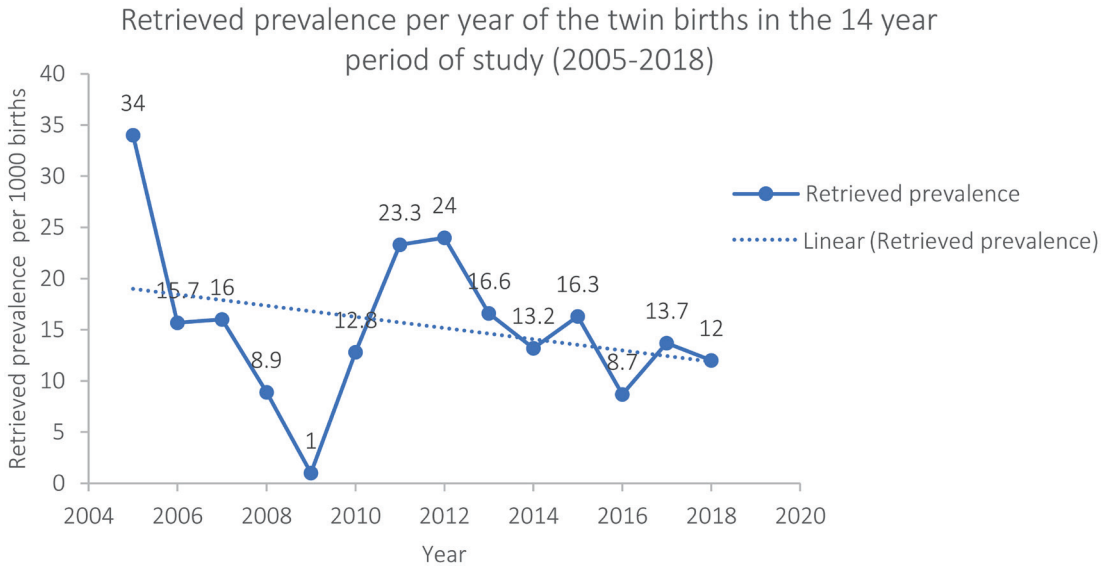


**Fig. 2. Trend of the retrieved prevalence of twin births over the 14 years (2005–2018).**

in the same region of Ile-Ife, a significant decrease becomes evident.[5] Refer to Figures 1–3 for a detailed representation.

***Analysis of the mean ± SD of demographics in the two-time period***

The mean age and parity of the patients were similar, though not statistically significant, as seen between the two time periods of study [30.6 ± 5.1 vs. 29.7 ± 4.8; *p*-value = 0.171] and [1.4 ± 1.3 vs. 1.5 ± 1.3, *p*-value = 0.187] respectively. The commonest tribe during the period of study was Yoruba, 203 (97.6), with non-statistically significant larger numbers seen in period II compared to the period I [120 (99.2) vs. 83 (95.4), *p*-value = 0.116].

***Analysis of the perinatal outcome measures in the two-time period***

Most of the twins, 124 (53.0) vs. 103 (44.0), were between the weights of 2.5 and 3.9 kg. However, when the modal weights of 2.5 to 3.9 kg were compared between period I and period II, [66 (51.2) vs. 58 (55.2); *p*-value = 0.022] compared to [51 (39.5) vs. 52 (49.5); *p*-value = 0.046] respectively, there was no statistically significant variation in the weights of the twins. Look at Table 1. Regardless of the delivery method used between the two time periods, most twins 1 and 2 had good APGAR scores.

This study showed that due to severe perinatal hypoxia, newborns delivered by Caesarean section frequently require admission

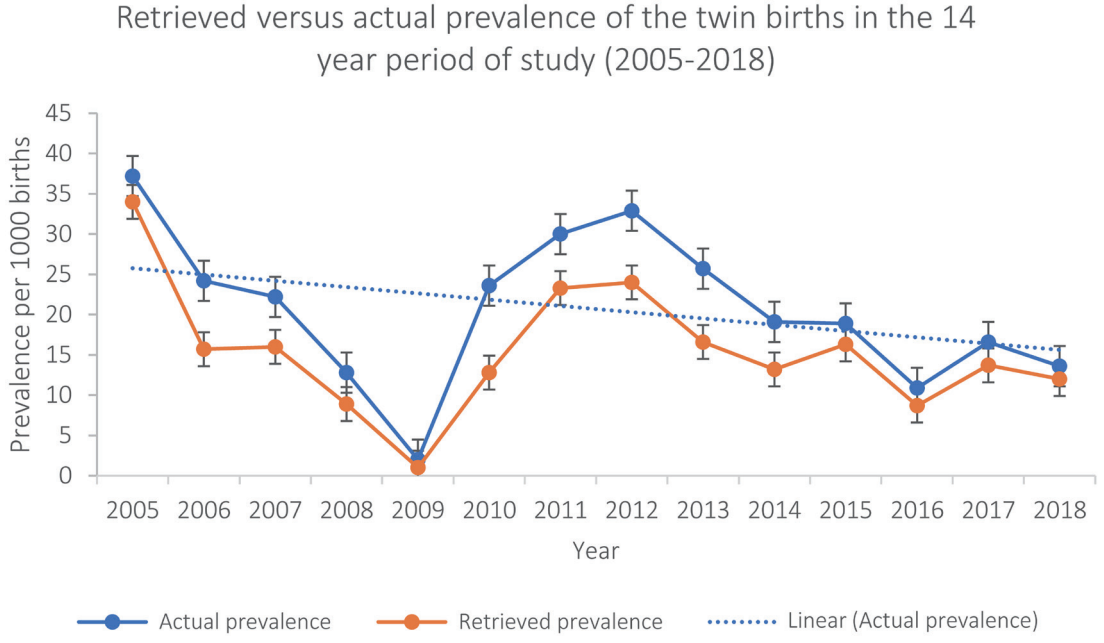


**Fig. 3. Trend of retrieved twin versus actual twin birth prevalence in the 14 years (2005–2018).**

**Table 2. Crosstabulation of the perinatal outcome of the twins within the two periods**

| Variable | Mode of delivery for twin vs. perinatal death (T1) | | | | $\chi^2$-value | *p*-value |
|---|---|---|---|---|---|---|
| | Caesarean delivery (n = 137) | Instrumental delivery (n = 3) | Vaginal delivery (n = 94) | breech extraction (n = 0) | | |
| Perinatal Death (T1) | | | | | | |
| Death | 3 (2.2) | 0 (0.0) | 4 (4.3) | – | 0.91 | 0.633 |
| No death | 134 (97.8) | 3 (100.0) | 90 (95.7) | – | | |

| | Mode of delivery for twin 2 (T2) | | | | $\chi^2$-value | *p*-value |
|---|---|---|---|---|---|---|
| | Caesarean delivery (n = 139) | Instrumental delivery (n = 3) | Vaginal delivery (n = 90) | breech extraction (n = 2) | | |
| Perinatal Death (T2) | | | | | | |
| Death | 8 (5.8) | 0 (0.0) | 4 (4.4) | 0 (0.0) | 0.46 | 0.926 |
| No death | 131 (94.2) | 3 (100.0) | 86 (95.6) | 2 (100.0) | | |

| Mode of Delivery versus APGAR score | | | | | | |
|---|---|---|---|---|---|---|
| **APGAR score** | | | | | | |
| ***Score:* Combined mode of delivery** | **Severe** | **Moderate Mild** | | **Normal Total** | | **$\chi^2$ (*p*-value)** |
| | **[0–3] (%)** | **[4–5] (%)** | **6 (%)** | **[7–10] (%)** | **[n = 234] (%)** | |
| Twin I | | | | | | |
| CS-CS | 7 (5.1) | 9 (6.5) | 8 (5.8) | 114 (82.6) | 138 (100.0) | 104.02 |
| Vag-vag | 4 (4.6) | 3 (3.4) | 6 (6.8) | 74 (85.1) | 87 (100.0) | 0.001 |
| Vag-CS | 0 (0.0) | 0 (0.0) | 1 (100.0) | 0 (0.0) | 1 (100.0) | |
| Vag-Inst | 0 (0.0) | 0 (0.0) | 0 (0.0) | 2 (100.0) | 2 (100.0) | |
| Inst-Inst | 0 (0.0) | 0 (0.0) | 0 (0.0) | 1 (100.0) | 1 (100.0) | |
| Vag-Breech ext | 0 (0.0) | 0 (0.0) | 0 (0.0) | 2 (100.0) | 2 (100.0) | |
| Inst-Vag | 1 (100.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 1 (100.0) | |
| Vag-CS | 0 (0.0) | 0 (0.0) | 0 (0.0) | 1 (50.0) | 2 (100.0) | |
| Total | 12 (5.1) | 12 (5.1) | 16 (6.8) | 194 (82.9) | 234 (100.0) | |
| Twin II | | | | | | |
| CS-CS | 10 (7.2) | 6 (4.3) | 11 (8.0) | 111 (80.4) | 138 (100.0) | 89.38 |
| Vag-vag | 4 (4.6) | 8 (9.2) | 13 (15.0) | 62 (71.3) | 87 (100.0) | 0.016 |
| Vag-CS | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 1 (100.0) | |
| Vag-Inst | 0 (0.0) | 1 (50.0) | 0 (0.0) | 1 (50.0) | 2 (100.0) | |
| Inst-Inst | 0 (0.0) | 1 (100.0) | 0 (0.0) | 0 (0.0) | 1 (100.0) | |
| Vag-Breech ext | 0 (0.0) | 1 (50.0) | 0 (0.0) | 1 (50.0) | 2 (100.0) | |
| Inst-Vag | 0 (0.0) | 0 (0.0) | 0 (0.0) | 1 (100.0) | 1 (100.0) | |
| Vag-CS | 0 (0.0) | 0 (0.0) | 0 (0.0) | 2 (100.0) | 2 (100.0) | |
| Total | 14 (6.0) | 17 (6.8) | 24 (10.3) | 179 (76.5) | 234 (100.0) | |

CS, caesarean section; Ext, Extraction; Inst, Instrumental; Vag, Vaginal.

to the Neonatal Intensive Care Unit (NICU) compared to babies delivered by other methods. With Twin II babies compared to Twin I babies, this trend for NICU admission following a C-section rather than a vaginal birth appears to be significantly worse [10 (7.2) vs. 4 (4.6); $p = 0.016$] compared to [7 (5.1) vs. 4 (4.6); $p = 0.001$]. Look at Table 2. Additionally, though not statistically significant, Twin II babies born via Caesarean section are likely to die more than those delivered vaginally [8 (5.8) vs. 4 (4.4); *p*-value = 0.926]. Look at Table 2. Vertex-vertex twin presentations were the most prevalent, accounting for 89 (38.03). There was no statistically

**Table 3. Perinatal outcome of the twins within the two time periods of 14 years**

| Variable | Period (Mean ± SD) | | t-value | *p*-value |
|---|---|---|---|---|
| | I (n = 129) | II (n = 105) | | |
| APGAR Score twin 1 | 8.4 ± 2.0 | 7.9 ± 2.5 | 1.69 | 0.093 |
| APGAR Score twin 2 | 8.0 ± 2.4 | 7.4 ± 2.6 | 1.76 | 0.079 |

| | Total | I (n = 129) | II (n = 105) | t-value | *p*-value |
|---|---|---|---|---|---|
| Combined Presentation | | | | | |
| Breech-non-vertex | 61 (26.1) | 38 (29.5) | 23 (21.9) | | |
| Breech-vertex | 29 (12.4) | 19 (14.7) | 10 (9.5) | | |
| Non-vertex-nonvertex | 8 (3.4) | 5 (3.9) | 3 (2.8) | 5.56 | 0.352 |
| Oblique-vertex | 3 (1.3) | 1 (0.8) | 2 (1.9) | | |
| Vertex-non-vertex | 44 (18.8) | 24 (18.6) | 20 (19.0) | | |
| Vertex-vertex | 89 (38.0) | 42 (32.6) | 47 (44.7) | | |
| Combined Twin Delivery route | | | | | |
| CS-CS | 138 (59.0) | 85 (65.9) | 53 (50.5) | | |
| Instrument-instrument | 1 (0.43) | 1 (0.8) | 0 (0.0) | | |
| Inst-vaginal delivery | 1 (0.43) | 1 (0.8) | 0 (0.0) | | |
| Vaginal-CS | 1 (0.43) | 1 (0.8) | 1 (0.9) | | |
| Vaginal-instrument | 2 (0.85) | 1 (0.8) | 1 (0.9) | 11.47 | 0.119 |
| Vaginal delivery-breech extraction | 2 (0.9) | 1 (0.8) | 1 (0.9) | | |
| Vaginal delivery-CS | 2 (0.9) | 1 (0.8) | 1 (0.9) | | |
| Vaginal delivery-vaginal delivery | 87 (37.2) | 38 (29.5) | 49 (46.7) | | |
| Combined Gender of Twins | | | | | |
| Different Sex | 84 (36.0) | 35 (33.3) | 49 (38.0) | | |
| Same sex (Female) | 75 (32.0) | 36 (34.3) | 39 (30.2) | 0.65 | 0.722 |
| Same sex (Male) | 75 (32.0) | 34 (32.4) | 41 (31.8) | | |

CS, caesarean section; SD, standard deviation.

significant difference between the two time periods [42 (32.6) vs. 47 (44.7); $p = 0.352$] (Table 3). The commonest Gender combination seen in this study was different gender combination 84 (36.0), which was non-significantly higher in time-period II compared to period I [49 (38.0) vs. 35 (33.3); $p$-value = 0.722]. See Table 3. Among the maternal complications seen in this study, preterm labor was modal, 28 (12.0%), with significantly higher preterm labor complications seen in Period II compared to Period I [10 (7.8%) vs. 18 (17.1%); $p$-value = 0.008)]. See Table 4.

## Discussion

Our 14-year study illustrates significant fluctuations in the prevalence of twin gestations in Ile-Ife, Southwest Nigeria, over two distinct periods. It was observed that there was no statistical difference in the mean prevalence when comparing periods, I and II, either in terms of actual or retrieved data.

Historical data presents higher prevalence rates at 45 to 50 twin births per 1,000 births and also Akinboro *et al.* in Ile-Ife at 46.2 twins per 1,000 births.[11] Even though our data revealed a lower prevalence compared to these past studies, it is in alignment with findings at Ekiti as reported by Akinboro at 22.1 per 1,000 births.[10,11] Adenowo *et al.* classified Fingerprint patterns in Igbo-Ora women with multiple and single births.[12] The Whorls, Twin loops, and Arches patterns were shown to be significantly more common in multiple birth women than in single birth women. Fingerprint pattern inheritance is a combination of genetic and intrauterine environmental factors.[12] Fingerprint pattern could have also played a role in twinning at Ile-Ife.

The prevalence of twinning in this study was less than that of Aduloju *et al.* in Ekiti who reported a prevalence of 1 in 23 deliveries (43 per 1,000 birth),[13] and even lower than findings by Onyiriuka in Benin city of 25.3 per 1,000 deliveries or one in 40 births.[14] Furthermore, our findings was less than 32.5 per 1,000 deliveries, reported by Oriji *et al.*,[15] but, higher than figures quoted by Lawal in Katsina at 17.3 per 1,000 deliveries.[16] The twin prevalence figure reported by south-south geopolitical zone of Nigeria by Gabriel *et al.* was exactly the same rate in the recent past years of 2005 to 2011 in this study accounting for 21.7 per 1,000 of all deliveries.[17]

The varied durations of each study could potentially influence the divergence in prevalence rates across different studies. Another

**Table 4. Maternal outcome within the two time periods of 14 years**

| Variable | Total (%) | Period (%) | | $\chi^2$-value | *p*-value |
|---|---|---|---|---|---|
| | | I (n = 129) | II (n = 105) | | |
| Maternal complications | | | | | |
| PPH | 1 (0.4) | 1 (0.8) | 0 (0.0) | | |
| UTI | 1 (0.4) | 1 (0.8) | 0 (0.0) | | |
| Acute pyelonephritis | 1 (0.4) | 1 (0.8) | 0 (0.0) | | |
| Anemia | 4 (1.7) | 2 (1.6) | 2 (1.9) | | |
| Antepartum hemorrhage | 4 (1.7) | 0 (0.0) | 4 (3.8) | | |
| Cervical laceration | 1 (0.4) | 1 (0.8) | 0 (0.0) | | |
| Chronic HTN | 1 (0.4) | 1 (0.8) | 0 (0.0) | | |
| Delay 2nd twin | 1 (0.4) | 0 (0.0) | 1 (0.9) | 37.01 | 0.008* |
| Eclampsia | 4 (1.7) | 4 (3.1) | 0 (0.0) | | |
| Failed induction | 2 (0.9) | 0 (0.0) | 2 (1.9) | | |
| Failure to progress | 7 (3.0) | 3 (2.3) | 4 (3.8) | | |
| Malaria in pregnancy | 5 (2.1) | 1 (0.8) | 4 (3.8) | | |
| Obstructed haemorrhage | 3 (1.3) | 0 (0.0) | 3 (2.8) | | |
| Poor maternal effort | 1 (0.4) | 1 (0.8) | 0 (0.0) | | |
| Pre-eclampsia | 2 (0.9) | 2 (1.6) | 0 (0.0) | | |
| Pregnancy-induced hypertension | 11 (4.7) | 3 (2.3) | 8 (7.6) | | |
| Preterm labour | 28 (12.0) | 10 (7.8) | 18 (17.1) | | |
| Retained second twin | 1 (0.4) | 1 (0.8) | 0 (0.0) | | |
| Type 2 DM | 1 (0.4) | 1 (0.8) | 0 (0.0) | | |
| None | 155 (66.2)) | 96 (74.4) | 59 (56.2) | | |

*Significant *p*-value < 0.05. DM, Diabetes Mellitus; HTN, Hypertension; PPH, Primary Post Partum Hemorrhage; UTI, Urinary Tract Infection.

contributing factor might be the evolving lifestyle of the Ile-Ife populace, who were increasingly embracing urbanization and industrialization. This transition encompasses a dietary shift towards European preferences, moving away from the traditional reliance on yam-based local delicacies, historically associated with higher twinning rates.[10,11]

Igbo-Ora, a village in Oyo state, Southwest Nigeria, which is noted for having the highest frequency of twins in the world, showed a reduction in the twin birth rate from 45.1 per 1,000 deliveries in 1969 to a sharp decline of 27.2 per 1,000 in 1986.[10,11] This number is larger than our findings, but it is closer to our prevalence. Ibrahim *et al.* reported in the Niger Delta a prevalence rate of 30.6/1,000.[18] Omonkhua *et al.* discussed that when equivalent age and parity groups in Western Nigerian and British populations were assessed, Nigerian twinning rates remained almost four times higher.[10] In Nigeria, the dizygotic twinning rate was highest in the lowest socioeconomic class (about 62 per 1,000 maternities) and lowest in the highest social class (roughly 15 per 1,000 maternities).[10].

We were not entirely sure what has contributed to this decline in twin prevalence compared to previously reported prevalence in other research works in the same Ile-Ife. We believe that the reason may be multifactorial. Migration and interethnic mixing also frequently alter twinning rates.[5,14] Other ethnic groups are now residing among the Yorubas due to migration. The Yoruba tribe has been shown to cohabitate and interbreed, which has caused gene mixing and, as a result, a decline in the number of twins in Nigeria's Southwest.[5]

Omonkhua *et al.* believed that the high twinning rate in Southwest Nigeria is well recognized to be influenced mainly by genetic predisposition.[10] According to their study the high twinning in the Igbo-Ora diet was due to *ilasa* (okra leaf) soup eaten with *amala (*yam or cassava flour) or the community's water which must be used for various purposes in addition to cooking to have the intended effect.[10,17] Furthermore, this qualitative study, reported that the cause of dizygotic twinning may follow the eating of *Amala & ilasa* (okra leaves), influence by twin deity, physical residence in Igbo-Ora, eating of bananas, the care respect & the celebration of twins, eating of cassava flour, eating of fresh food, soil of Igbo Ora, use of *Ilasa* Water, eating of melon (egusi) leaves and eating of Yam.[10]

Borokini *et al.* in 2022 investigated the significance of the Okra plant leaf (Abelmoschus esculentus Moench L) in multiple births, and the Okra leaf included significant minerals and phytochemicals that perform biological protective effects against free radicals, thus alleviating oxidative stress.[19] It's however, unclear whether these have any effect on fertility or Dizygotic twinning rates.[19]

Migration and interethnic mixing, however, would not have significantly contributed to the declining and low rate of twinning in our study population, as most of the women were of Yoruba

ethnicity, with no statistically significant difference between the two time periods of 14 years of study. The Yoruba tribe was found to be modal compared to other tribes, which is consistent with the fact that it is the tribe with the highest occurrence of twins globally. One could also argue that the study site was a Yoruba community, which might be a confounder.

The disruption of family relationships and structure brought on by rising population mobility, a decline in the adoption of polygamous family structures, an increase in the number of women delaying childbearing to pursue their careers, and a rise in the use of contraception are additional factors that could explain Southwest Nigeria's declining twin prevalence.[11]

To support the latter, the 2018 Nigeria Demographic and Health Survey found that women in Southwest Nigeria utilize contraception more frequently than women in other parts of the country.[20] Additionally, despite rising infertility rates, awareness, and acceptance of assisted reproductive technology (a risk factor for twinning) are still low in Southwest Nigeria, perhaps due to its high cost and, occasionally, the region's divisive religious beliefs.[21]

According to our research, women between the ages of 27 and 36 had the highest prevalence of twin pregnancies, with non-significant mean age differences between the two study years. These results are consistent with research conducted in the Niger Delta by Maduabuchukwu *et al.* and in southwest Nigeria by Akinboro *et al.*[1,11] The rate of twin births rises with maternal age and parity, peaking at around 37 years of age.[11] This explains why there were so few twins among women in this study between the ages of 17 and 26. However, our data did not coincide with the predicted peak at 37 years but instead observed a fall. What caused this literary disparity to be not entirely obvious? Given that most research was conducted over shorter study periods, it might have something to do with the 14-year study period.

This study's majority of female participants were nulliparous, contrasting with the typical peak pattern observed in multiparous females. This picture may be explained by recent developments in ART and the rise in infertility rates. Because women tend to put off having children as they age, among other things, an age-parity match analysis may help explain this discrepancy.

When the mode of birth was compared to the APGAR ratings, a sub-analysis in our study showed that Twin II foetuses were more likely than Twin I to be admitted to the Neonatal Intensive Care Unit. Compared to twin deliveries made vaginally, twin deliveries made by Caesarean section frequently result in babies who have suffered more severe birth asphyxia. We were not sure if the mode of delivery served as a direct factor leading to hypoxia.

However, we know the benefits of vaginal delivery over Caesarean section involving the chest compression effect that vaginal birth offers to the fetus as the fetus navigates the vaginal canal, unlike fetuses delivered via caesarean section. Babies born by caesarean may develop some difficulties with breathing (called transient tachypnoea of the newborn). Though most babies recover fully, they may need to spend time in a special care unit.

Occasionally, a baby may develop respiratory distress syndrome and may need extra oxygen, breathing assistance, and a more extended stay in the NICU. Of note is that the risks of developing this related complication may follow the use of general anesthesia and the gestational age at which the baby is born.[22]

Vertex-vertex was the most frequent fetal presentation in our sample, similar to other studies,[2,22] although, unlike other studies, Caesarean section was the most frequent method of birth. As some obstetricians believe, an elective Caesarean section on twins might have been made due to the mother's wish or a safe obstetrics assessment. The established risks of twin pregnancies include preterm birth and prematurity, which add significantly to the burden of perinatal illness and mortality related to twin deliveries.[2,4] According to The Twin Birth Study, there is no benefit to planned Caesarean birth over planned vaginal delivery regarding fetal or neonatal death or major neonatal illness in twin pregnancies where the first twin presents cephalic.[23] Therefore, based on our findings, it is advised to promote vaginal birth whenever possible when the leading twin is cephalic.

Compared to Twin I, Twin II in our study had a higher rate of birth asphyxia, low birth weight, tendency to be admitted to the NICU, and perinatal mortality. Other writers have backed up these conclusions.[1,23] The second twin is more vulnerable than the first twin because problems such as cord prolapse, preterm placental separation, and fetal distress during birth are more frequent in the second twin than in the first twin.[24,25] The most frequent maternal consequence was preterm labor, which is identical to the findings by Oriji *et al.* in 2021.[15]

## Strengths, limitations, and recommendations

This study was a retrospective cohort study conducted in a hospital and may not be an accurate representation of the overall results at the community level. Due to the retrospective nature of the work and the potential for missing information in participant case records, there may be potential selection bias during patient case note retrieval. We acquired every patient delivery case note from the study period before selection to lessen recollection bias. The total number of twin deliveries, higher order gestations, and singleton deliveries served as the denominator to offer the study a wide range.

We did not differentiate the twins depending on whether they underwent in vitro fertilization-embryo transfer treatment, ovulation inducement, or natural pregnancies as a restriction. Additionally, we did not categorize twins based on zygosity. Our work did not consider the indications for a caesarean section. Most record-keeping systems worldwide are switching to more robust methods, such as the electronic medical record, to make storing and retrieving data simpler. The electronic medical record will always suggest how hospitals in our various centres should preserve their records.

We advise doing a prospective, multicentre community study in the southwestern geopolitical region that will consider zygosity and whether the twins were conceived naturally through ovulation inducement or *in vitro* fertilization. Future research will either support or contradict this assertion that the prevalence of twins is trending downward in the southwestern area of Nigeria.

## Future direction

The highest prevalence or prevalence of twin births worldwide has historically been found in southwestern Nigeria. The reported drop in prevalence/prevalence in this part of the world may be due, among other things, to dietary changes, a high rate of contraceptive use, migration patterns, and immigration throughout time. The current *Dioscorea cayenensis subspecies rotundata* (white yam) and any other yam species present in southwestern Nigeria must have their contents reviewed.

To determine whether the long-known clomiphene-like/beta-human chorionic gonadotrophin-like substance present in *Dioscorea cayenensis subspecies rotundata* (white yam) is still pre-

sent or to determine whether this substance has been attenuated or changed to another substance over time due to advancements in agricultural genetic engineering. In a population with ovulatory factor infertility, laboratory isolation of this clomiphene- or human chorionic gonadotrophin-like molecule can work as an ovulation-inducing drug. The harvest rate of these compounds can be raised even further through genetic modification of these yams. Could climate change impact the rate of twinning in the southwest of Nigeria?

Along with the long-established impact of nutrition on twinning, gene mapping of the inhabitants of Southwestern Nigeria is necessary to identify the genomic relationship of twining in this community and link it to environmental factors.

Further research on fingerprinting as it relates to twinning may be required for better forensics and a deeper understanding of twin distribution among the people of southwest Nigeria.

## Conclusion

Contrary to the higher prevalence rate of 46.2 per 1,000 births reported in 2008 by Akinboro *et al.* during a 10-year study in the same region of Ile-Ife,[11] our research delineates a considerably lower and fluctuating decrease in the general prevalence of twin births in Ile-Ife, Nigeria. It is imperative to conduct large-scale, community-based, multicentric research in southwest Nigeria to substantiate this inferred trend of a declining twinning prevalence.

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## Conflict of interest

The authors declare no conflicts of interest concerning the research or publication of this article.

## Author contributions

EPI conceptualized, designed, drafted the article, and participated in the acquisition, analysis, interpretation, and critical revision of data for the article. OAI, AEU, GUE, CCG, BCO, NLN, KOA, JII, OML, UUO, and AE participated in the interpretation of data, revised it critically for important intellectual content, and approved the version to be published. All authors agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

## Ethical statement

This study was carried out per the ethical guidelines of the Helsinki Declaration and ethical clearance received from Chukwuemeka Odumegwu Ojukwu University Teaching Hospital, Health Research Ethics Committee with approval number COOUTH/CMAC/ETH.C/VOL.1/FN:04/213. The individual consent for this retrospective analysis was waived.

## Data availability statement

Data will be made available to the public upon request.

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