
10 YEARS STATISTICAL ANALYSIS ON THE MODE OF DELIVERY IN KOGI STATE – USING FEDERAL MEDICAL CENTER LOKOJA AS A CASE STUDY BETWEEN 2005-2015

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CHAPTER ONE

GENERAL INTRODUCTION

For a healthy women population, the choice of delivery option is an important decision, expectant parents make many choices which usually include a site for delivery (hospital, birth centre or home) and the choice between spontaneous vaginal delivery and caesarean section. Over time, caesarean section rates have been on the increase around the whole world. Both developed and developing countries have their share of this increase.

Epidemiological studies in Brazil and Chile have shown that there is a higher caesarean section rate among women who have a higher level of education. In some African countries, the rate of caesarean section has been documented; in Ghana and Nigeria. However, there is a broadly held belief that West African women have an aversion to caesarean section delivery, maternal knowledge and occupation have also been seen to influence the attitude of women towards the mode of delivery, many studies have proven women preference for vaginal delivery over caesarean section delivery.

Although a majority of caesarean sections are emergency cases, especially in developing nations, there is also a noticeable increase in the rate of elective surgery probably due to an increase in the level of knowledge of women, improvement in medical practice and women with a higher level of education. It is also important to note that elective emergency caesarean section is known to be associated with more maternal and newborn morbidity than planned vaginal or normal delivery.

In a study carried out by Nira and Colleagues to assess the attitude of women towards the cesarean section in Nepal, they found that vaginal delivery was the preferred mode of delivery by 93% of the respondents while 7% preferred caesarean section as a mode of delivery. Their reasons for these range from it being a natural process that is good for a mother's health and safety to being easy. (*Nira S. Shrestha, 2007*).

It is not strange to hear many pregnant women ventilating the wrong attitude towards caesarean section as an alternative method of childbirth, especially in developing countries like Nigeria, several women believe caesarean section is the last resort used to deliver a pregnant woman of her baby, and many will even say, been told that they are going to deliver their babies through caesarean section is like giving a death sentence. This attitude towards caesarean section influences women's acceptance of the procedure and resulted in a psychological depression that women and their families usually experience when told that their baby will be delivered through a caesarean section which most times harm the outcome of the procedure both on the mother and the unborn baby.

The development of a country depends mainly on how the children are taken care of or carter for "*children are leaders of tomorrow*" and making depends on her children, to enhance a better development of a country and mankind attention should focus on improving the welfare of the children; the highest standard of life is a subset of the highest degree of health.

What is health? Some defined health as wealth; health is the state of being free from physical or psychological disease, illness or malfunction; while some defined it as a state of well-being or balance, often physical but sometimes also mental or social; the overall level of

function of an organism from the cellular (micro) level to the social (macro) level. However, there have been universal concerns dedicated to child health in past years which is considered appropriate, considering the conditions, challenges and situation of the health of a child in Nigeria as a whole.

Throughout the world, especially in developing countries, there is an increasing concern and interest in maternal and child health care. This commitment towards maternal and child health (MCH) gains further strength after the ***world summit for children in 1991***, which gave serious consideration and outlined major areas to be addressed in the provision of maternal and child health care services. Basic antenatal care components are effective means to prevent a range of pregnancy complications and reduce maternal mortality (***Pallikadavath et al., 2004***).

Despite substantial progress made by the fifth-millennium development goal (MDGs) towards reducing the global maternal mortality ratio by three-quarters between 1990-2015. More than a quarter of a million women lost their lives to preventable pregnancy and childbirth complications in 2013, the global strategy to reduce pregnancy-related deaths have mainly focused on increasing skilled birth attendance to expand coverage of effective interventions during childbirth via any of the modes of deliveries, there is also need for all pregnant women to have access to antenatal care during pregnancy.

The US Agency for International Development (USAID) identifies crucial factors for enhancing adolescent maternal health; advising young women to use prenatal care to identify and treat malaria, anaemia and other health issues. In addition, a high number of pregnant women are testing positive for the human immunodeficiency virus, nutritional problems, antepartum haemorrhage and eclampsia; providing obstetric care to ensure safe delivery and also postnatal care to identify postpartum health issues. Also, offer contraception to accomplish birth spacing (***USAID's Family Planning Services, 2006***).

Antenatal care refers to care that is given to a pregnant woman from the time of conception is confirmed until the beginning of labour. (***Viccars and Maputle, 2006***). The overview of this study "Statistical Analysis on the Mode of Delivery is to investigate the mode of delivery which is normal or vaginal delivery and caesarean section using Federal Medical Centre Lokoja as a case study."

1.1 HISTORICAL BACKGROUND OF CASE STUDY

Federal medical centre Lokoja came into existence on the 9th of November 1999. It has a bed capacity of 177 beds. Services provided are Medical, surgical, obstetrics, gynaecology, paediatrics, dental, laboratory, ophthalmic, pharmaceutical services, and x-ray services in addition there is a functional operation theatre and mortuary facilities. It is made up of the following departments.

- i. Surgical Department
- ii. Administrative Department
- iii. Medical Department
- iv. Pediatric Department
- v. Gynae Department
- vi. Dental Department
- vii. Ophthalmic Department
- viii. Nursing Department
- ix. Pharmacy Department

- x. Laboratory Department
- xi. Maintenance Department
- xii. Social Welfare Department
- xiii. X-ray Department
- xiv. Public Health Department

1.2 AIMS AND OBJECTIVES OF THE STUDY

The main aim of this study is to perform statistical analysis on the mode of delivery in Kogi state using Federal Medical Center Lokoja as a case study between 2005-2014.

The objective is to know how many of these pregnant women delivered their babies normally or through a caesarean section. Also,

1. Performed a statistical analysis using **student t distribution t** to test the average equality between the two modes of delivery.
2. To fit a trend line that will help us estimate the total number of women that will undergo normal and caesarean sections and forecast for 2015.
3. To identify the risk associated with both modes of deliveries and some possible remedies.

1.3 PURPOSE OF THE STUDY

The purpose is to enlighten and broaden the types of delivery, and risks associated with them including some remedies to the risks. Most of our young ladies who are planning to engage themselves with their life partners are scared of the pregnancy stage and more so, most of them have no idea or proper understanding of this phase. Despite comparing normal delivery and caesarean section, we noticed that normal delivery was highly preferred to caesarean section but still in Federal Medical Centre, Lokoja where this research took place, each year there are still records of over one hundred records of caesarean section either planned or emergency caesarean section. The purpose of studying this trend is to elaborate on the mode of delivery and forecast.

1.4 SIGNIFICANCE OF THE STUDY

The significance of this is to suggest ways under which the trend shall be checked. In this present-day situation, governments at various levels are building hospitals. The federal government is equipping our teaching hospitals and Federal Medical Centers. State governments are building and equipping our general hospitals and rural hospitals, while our local governments are building basic health centres and clinics in our towns and villages. Well-trained personnel like doctors, pharmacists, laboratory scientists, record staff, nurses and other para-medical personnel are posted to serve in these teaching hospitals, general hospitals and basic health centres to face the challenges of our health needs but still, the issue of normal delivery of our women with these modern facilities and well trained medical personnel needs to be questioned. In the 1960s and 1970s where these facilities and well-trained medical personnel could hardly be seen in our urban and rural areas, but our women of reproductive age normally give birth in their homes and rarely goes to hospitals. They can even give birth to as many children per woman without encountering problems not to talk of caesarean section.

Therefore it is very important to study and know the root causes of this problem so that solution can be found to it.

1.5 LIMITATIONS OF THE STUDY

The issue of maternal admission, and normal deliveries covers the entire world because there is no country in the world where women of reproductive age (15-45 years) do not give birth either normally or caesarean section. But the scope of the study is limited to Kogi State. In Kogi State, Federal Medical Center is chosen out of numerous hospitals because it appears to be a former general hospital where people all over Kogi State go to either rural or urban areas, also records a high number of admissions including deliveries, either normal or caesarean section. It's also a Federal Government hospital. Due to the scope of time and limited resources to cover the entire state in the analysis of normal and caesarean section, the analysis of this chosen hospital (Federal Medical Center, Lokoja) can be used to project the future total number of delivery either normally or caesarean section.

1.6 DEFINITION OF TERMS USED

1. Maternity: Maternity section is where deliveries of any kind can be conducted.
2. Normal Delivery: It is a situation whereby a woman delivers successfully by herself with little or no help from the midwives in the labour room.
3. Caesarean Section: This is when the operation is conducted to remove the baby directly from the womb.
4. Breech: When the baby is coming out of the vagina using his/her bottom or legs. Such delivery is said to be breech.
5. Eclampsia: Pregnant women with high blood pressure, and sugar in the urine, are called eclampsia.
6. P.I.H (Pregnant Induced Hypertension): a situation whereby a pregnant woman always has blood pressure anytime she is pregnant.
7. Maternal morbidity: Any health condition attributed to and aggravated by pregnancy and childbirth that harms the woman's well-being.

CHAPTER TWO

LITERATURE REVIEW

2.0 INTRODUCTION

The childbirth experience has always represented a very important event in women's lives, a unique and special moment in her new role, that of being a mother. Studies regarding vaginal birth and caesarean-section deliveries have addressed the various problems associated with both types of care, showing some concern involving the quality of obstetric care, the high caesarean-section rates found at present and the meaning of childbirth according to women who experience it.

To support an impression regarding the experience of vaginal delivery and caesarean section from a women's perspective, this review of the literature aimed at identifying and explaining the perception of normal delivery and caesarean section.

Vaginal or normal delivery occurs without medication or obstetric intervention. Vaginal birth may involve any number of medical interventions with the baby ultimately born vaginally. These medical interventions may include surgical or medical induction, oxytocics for augmentation, electronic cardiotocographic monitoring, analgesics for pain relief, and episiotomy, and the delivery can be spontaneous (i.e. unassisted). (*Walker J.M, 2009*).

A caesarean section involves surgical delivery of the fetus and rates of this procedure have risen dramatically during the past decade, reaching more than 50% in some countries, despite a lack of evidence of an increase in obstetric emergencies. (*Armson B.A, 2007*). This trend is of concern as caesarean deliveries increase the risk of neonatal morbidity and mortality and maternal morbidity, compared with spontaneous vaginal delivery.

Several studies have examined possible reasons for the increasing caesarean section rates. Some authors concluded that maternal request is a significant factor in the rising caesarean section rates. (*Jackson N.V 1998*). Key reasons cited for women preferring a caesarean delivery related to perceptions about safety for both mother and baby, previous negative birth experience, poor care and perceived inequalities in care. (*McCourt C. 2007*). One study identified the fear of vaginal birth as the most important reason why some women preferred an elective caesarean section after their birth. (*Pang M.W, 2008*).

Although many recent studies have examined reasons for women's birth preference for either normal delivery or caesarean section. Few studies have investigated factors that influenced women's birth preferences. Some factors found to influence women's preferred type of birth were specific types of information provided by health professionals (*Gamble J.A, 2001*), and information assessed through public and private discourses of family, friends and acquaintances.

An understanding of factors contributing to the escalating caesarean delivery rates is important to enabling the implementation of safe and successful strategies to reduce unnecessary obstetric interventions in childbirth. (*Gamble J.A, 2000*). Understanding factors that influence women's decisions about childbirth, promoting vaginal birth, as well as improving the delivery of care provided by health professionals.

Therefore, the mode of child delivery can be defined as the method or technique used to deliver a woman her baby either vaginal or normal delivery through caesarean section. Birth is a normal physiological process that a woman's body is designed to do after intercourse, it's part of a woman's natural reproductive life cycle. In most situations, especially when there aren't any unnecessary interventions, virginal birth is a perfectly safe, low-risk and preferred method of giving birth otherwise a caesarean section is used as an emergency procedure.

2.1 DEFINITION OF NORMAL DELIVERY

A normal delivery also known as "vaginal delivery" is the birth of offspring (babies in humans) in mammals via the vagina. **(WHO, 1996).**

2.2 RISK OF NORMAL DELIVERY

Here are six (6) risks associated with normal delivery as well as some tips to help reduce the chance of them occurring.

2.2A PERINEAL TEARS

The perineum is a soft tissue between the vulva and the anus. This soft tissue stretches to accommodate giving birth, but small and even severe tears can occur. Tearing is something many pregnant mothers expect but are also fearful of.

□ REDUCTION

- i. Avoid unnecessary episiotomy
 - ii. Giving birth in an upright position
 - iii. Make informed decisions about using pain medication
 - iv. Request perineal support while pushing
 - v. Avoid directed pushing
 - vi. Avoid unnecessary assisted birth with a vacuum.
-

2.2B DAMAGE TO THE PELVIC FLOOR

In some situations the pelvic floor (a group of muscles attached to the pelvis) can become damaged while giving birth while physiotherapy and medications can help, for some women physical trauma to the pelvic floor occurs during the birth and for others, it's the result of the weight of the pregnancy on the pelvic floor.

□ REDUCTION

- i. Pelvic floor strengthening exercises during pregnancy such as kegel and squats.
 - ii. Give birth in an upright position
 - iii. Avoiding unnecessary episiotomy
 - iv. Make an informed decision regarding pain medication as it may impact mobility and sensation.
-

2.2C PELVIC ORGAN PROLAPSED

This is when the bladder, uterus or rectum protrudes into the vagina or outside the vaginal opening as a result of pelvic floor muscle damage. Vaginal birth isn't the only thing that can cause this type of problem, the weight of pregnancy can too, as smoking and obesity.

□ REDUCTION

- i. Talk to the midwife or doctor about it.
 - ii. Series of checkups before delivery.
-

2.2D PERSISTENT PERINEAL OR VULVAR PAIN

This can be the result of pelvic floor damage or perineal tears, but sometimes it can occur without any visible trauma to the area. There is the possibility of some nerve damage, vulvar vestibulitis or scarring from tears and episiotomies.

□ REDUCTION

- i. If the pain persists, it is important to reach out to your healthcare provider.
 - ii. Appointment with pelvic specialists.
-

2.2E UMBILICAL CORD PROLAPSED

It is a very rare complication, umbilical cord prolapse is when the cord comes out before the baby. The cord can become compressed, causing fetal distress; an emergency caesarean section is often required immediately unless birth is imminent. The incidence of umbilical cord prolapse is very low and ranges from 0.1% to 0.6% of overall births and just over 1% for breech births; this means 99% or more births will not have cord prolapsed.

□ REDUCTION

Series of scanning before delivery to discover the breech position of the baby.

2.2F RISKS FOR BABY

Babies are designed to be born vaginally and in most cases especially when there are no unnecessary interventions, they are born without complications. Occasionally, some complications can affect the baby such as shoulder dystocia varies based on the fetal weight. Fetal distress can occur and can be a sign the baby is receiving inadequate oxygen also birth injuries can occur.

□ REDUCTION

- i. Having a skilled provider confident in resolving shoulder dystocia.
 - ii. Reducing the risk of gestational diabetes or controlling diabetes.
 - iii. Use of oxygen vacuums.
-

2.3 DEFINITION OF CAESAREAN SECTION

A caesarean section delivery is a surgical procedure in which a fetus (baby) is delivered through an incision in the mother's abdomen and uterus. (*WHO, 1996*).

2.4 RISK OF CAESAREAN SECTION

Recovery from a caesarean section takes longer than recovering from vaginal birth. And like other types of major surgery, caesarean sections also carry risks.

2.4A BREATHING PROBLEMS

Babies born by scheduled caesarean section are more likely to develop transient tachypnea (a breathing problem marked by abnormally fast breathing during the first few days after birth), other breathing risks might include respiratory distress syndrome (a condition that makes it difficult for the baby to breathe).

2.4B SURGICAL INJURY

Although rare accidental cuts to the baby's skin can occur during surgery.

2.4C INFLAMMATION AND INFECTION TO THE MEMBRANE LINING THE UTERUS

This condition (known as endometritis) can cause fever, out-smelling vaginal discharge and uterine pain.

2.4D INCREASED BLEEDING

More blood loss with a caesarean section than with a vaginal birth. However, transfusions are rarely needed.

2.4E REACTIONS TO ANESTHESIA

Adverse reactions to any type of anaesthesia are possible. After a spinal block or combined epidural-spinal anaesthesia. It's rare, but possible, to experience a severe headache if the mother is upright in the days after delivery.

2.4F SURGICAL INJURY

Although rare, surgical injuries to nearby organs such as the bladder can occur during a caesarean section.

2.4G INCREASED RISKS DURING FUTURE PREGNANCIES

After a caesarean section, the mother faces a higher risk of potentially serious complications in a subsequent pregnancy. The risk of uterine rupture is when the uterus tears open along the scar line from a prior caesarean section.

2.4H WOUND INFECTION

Infections are more common with caesarean sections compared to vaginal deliveries. Caesarean section infections are generally found around the incision site or within the uterus.

2.5 CAESAREAN SECTION COMPARED TO VAGINAL DELIVERY

Several studies have compared the outcomes between elective caesarean section and vaginal delivery in an attempt to address the question, of whether caesarean section without strict medical indications is justified or not. The results vary particularly by the group compared to an elective caesarean section: spontaneous vaginal delivery, all vaginal deliveries and emergency caesarean section or after induction of labour also after previous caesarean section.

In all studies comparing maternal morbidity between elective caesarean section and spontaneous vaginal delivery, the total complication rate is higher in elective caesarean section. (*Kreb et al., 2003, Burrows et al., 2004, Koroukian et al., 2004*). Of the specific complications,

only obstetric trauma is more common in vaginal delivery than caesarean section. A Canadian register-based study compared maternal morbidity in elective caesarean section with spontaneous onset labour in a population of 18435 deliveries and showed a similar maternal morbidity rate for an elective caesarean section as for spontaneously onset labour (including deliveries that ended up in emergency caesarean section). The total maternal morbidity rate was 7.0% for elective caesarean section and 8.4% for spontaneous onset of labour. In this study, 8.0% of the women have a caesarean section in labour and 19.6% had a vaginal delivery. (**Allen et al., 2003**) severe morbidity was not studied separately. In this study, only febrile morbidity and wound infection occurred more often in elective caesarean section than in attempted vaginal delivery (**Allen et al., 2003**).

Studies specifically on severe maternal morbidity show that election caesarean section is, without expectations, related to significantly higher morbidity rates than vaginal deliveries or attempted vaginal deliveries (**Liu et al., 2007, Van Dillen et al., 2010, Kuklina et al., 2009**).

It takes more time and special care to heal from a caesarean section, which is major surgery. Women who have caesarean section without complications spend about 3 days in the hospital, compared with about 2 days for women who delivered normally. Full recovery after caesarean delivery takes about 4-6 weeks; full recovery after normal delivery takes about 1-2 weeks.

The maternity section in any hospital is a place where deliveries of any kind are conducted. In normal circumstances, the maternity section supposes to be neat. They are supposed to be well-trained medical doctors in gynaecology and well-trained midwives who specialized in conducting deliveries with nurse aids or attendants who are very neat, and hardworking to help these medical personnel conduct deliveries at any given time.

We have different types of deliveries ranging from breech delivery, normal delivery and caesarean section often serve as an alternative solution for pregnant women who cannot deliver normally nor have their labour prolonged more than necessary. Delivery is the process whereby pregnant women give birth to either a male or female after nine months of pregnancy in a normal circumstance.

The main purpose of caesarean section is to serve as an alternative solution for pregnant women who finds it difficult to have a normal delivery due to one problem or the other. These problems range from labour, pregnancy-induced hypertension, Eclampsia, PPH, CPD, etc. these problems in pregnant women make it impossible for some of these pregnant women to deliver normally unless they pass through a caesarean section where an operation is done to remove the baby directly from the womb.

CHAPTER THREE

METHODOLOGY

3.1 METHOD OF DATA COLLECTION

The method under which data is collected is through the records and statistics department of Federal Medical Centre Lokoja. Records of staff are often in various wards and sections of this hospital on daily basis to collect information from these wards and units which are often recorded and kept in the custody of this department. Data from the maternity section where deliveries are conducted is not an exception. Record staff goes there to record the number of deliveries either normal or caesarean and other relevant data from a such unit (maternity) on daily basis.

The sources of data in the Federal Medical centre where this research takes place are as follows: wards, surgical outpatient department, medical outpatient department, antenatal, clinic, dental department, eye department, and maternity section of the hospital. These wards and units provide a primary source of data for the hospital; to get this information for further analysis and research. These data serve as secondary data for an organization outside the hospital.

Any data collected by the observer himself is normally valid and reliable. The level of accuracy is high because the observer normally records what he or she sees and records accordingly. Federal Medical centre is not an exception because records staff goes to various wards and sections in the hospital to record the data directly from the source which does not give room for substandard information which may be given by a third party.

Therefore the information used for this project is obtained from source (primary source) data obtained from the maternity section of Federal Medical Centre Lokoja directly from the record and statistics department of this hospital which serves as a base for this research work and can serve as a basis for further references for other researchers.

3.2 TIME SERIES ANALYSIS

A time series is the record of observations measuring a certain quantity of interest at a regular or irregular interval of time. The observations may be recorded daily, weekly, monthly, yearly or bi-annually. It is a realization or sample function from a certain stochastic process. The word time used in this context may either imply physical time, distance or any other quantity representing a process of life whose magnitude is measurable. The Interval of time depends on any unit of measurement. A time series is denoted by X_t where X_t is the observed value of time t .

Mathematically, a time series is defined by the values $y_1, y_2, \dots$ a variable y at time $t_1, t_2, \dots$. Thus, it can be said that y is a function of t .

$$Y = f(t)$$

Movement in time-structured data are governed by some peculiar and inherent forces which may be characterized by their regularity/periodicity and their effect on the entire series. The forces could also be due to changes in the social, economic, psychological or environmental characteristics of the system. The patterns generated by these forces are referred to as components of time series.

These factors are

- i. Trend
- ii. Seasonal variation/movement
- iii. Cyclical variation/movement
- iv. Irregular/random movement

The process of analyzing a time series data is to isolate and measure the separate effects of these forces.

TREND

This is the long-term movement in series in the same direction over a long period. It is denoted by Tt . It is usually characterised by a continuous increase or decrease in the values of a variable over time.

SEASONAL VARIATION

This refers to identical or almost identical patterns, which a time series appears to follow during corresponding months of successive years due to mainly recurring event that takes place annually. This kind of movement is brought about by climatic or social factors e.g. weather, and New Year. It is denoted by St .

CYCLICAL VARIATION

Refers to a long-term oscillation about the trend which may or not be periodic due to some other physical causes. This is brought about by economic factors. It is denoted by Ct .

IRREGULAR VARIATION

This refers to the erratic or sporadic movement of time series due to the occurrence of random per chance events, which are unforeseen, hence it cannot be isolated directly. They are not deterministic. E.g. flood, strikes, war, elections etc. it is denoted by It .

ESTIMATION OF THE COMPONENTS

Estimation of Trend

The following methods can be used to estimate the trend value of a time series data:

- i. Freehand method
- ii. The moving average method
- iii. Method of semi-average
- iv. Least square method

Usually, moving averages tend to smoothen out the irregular and seasonal variations present in a series and hence we are left with a trend (Tt) for a quarterly data, we estimate the trend by finding 4-point moving averages. Also, for monthly data, we find 12-point moving averages. One major disadvantage of the moving average method is that some observation at both the beginning and the end of the series is lost. The numbers of missing data for odd and even periods are $n-1$ and n respectively where n is the total number of periods used. The moving average method cannot be used for prediction because it loses data rather than gaining and is seriously affected by abnormal values.

Generally, if we have a set of observations $X_1, X_2, \dots, X_n$ on a time series (X_t), then the n th point moving averages are defined as:

$$\bar{y}_1 = \frac{(x_1 + x_2 + \dots + x_N)}{n}$$

$$\bar{y}_2 = \frac{(x_2 + x_3 + \dots + x_{N+2})}{n}$$

$$\bar{y}_3 = \frac{(x_3 + x_4 + \dots + x_{N+2})}{n}$$

METHOD OF LEAST SQUARES

Another method of calculating the trend is the method of least square. The basis of this method is the fitting of a mathematical line/curve to the set of data to find values of trend (T_t) at a given time considering a series (X_t) with linear trend, the following relationship holds:

$$X_t = a + b_t + e_t$$

Where a and b are estimated from the normal equations:

$$\sum x_t = a_n + b \sum t$$

$$\sum t x_t = a \sum t + b \sum t^2$$

The estimate a and b are the solutions to the normal equations where

$$a = \frac{\sum x_t - b \sum t}{n}$$

and

$$b = \frac{n \sum t x_t - (\sum t)(\sum x_t)}{n \sum t^2 - (\sum t)^2}$$

Where n = total number of observation

t = time

x_t = time series values

Therefore $T_t = a + bt$

3.3 STUDENT t DISTRIBUTION

The t distribution was first obtained by W.S Gosset (1876-1937) in 1908, who published his research under the pen name "student", hence the distribution is known as student t distribution of student's t distribution Freund and Watpole (1987:290). Although, the appropriate method is the student's t -test developed by fisher for independent groups or samples, and is very popular among researchers. The t distribution has been derived mathematically under the assumption of a normally distributed population. Just as it is true of the standard normal distribution, the t distribution is symmetrical and has a mean of 0. However, the standard deviation of the t -distribution is higher than the standard deviation of the normal distribution (**Ali: 2005**)

Another importance of t -distribution is that for an infinite number of degrees of freedom, t -distribution and normal distribution are exactly equal. That is, one of the characteristics includes the fact that the greater the degree of freedom (larger sample) the more the t distribution resembles a normal curve. Also, as the degree of freedom increases, the differences in that proportion of area under that normal curve and the student's t distribution become negligible.

Where;

$\bar{X}$ = Mean of the sample being studied

N = Population mean

SD = Standard deviation for comparison

N = Size of sample

There are three types of *t*-tests they are:

- Population *t*-test
- Independence *t*-test
- Dependence *t*-test

POPULATION T-TEST

This is applicable when a sample mean value is to be compared with a known earlier hypothetical mean value. That is when compared with a known performance of the population. The sample is drawn randomly from the population and is normally distributed in the population and the scores involved are continuous.

Test Statistics =

$$t = \frac{\bar{x} - \mu}{\frac{SD}{\sqrt{N}}} \quad \text{or } t = \frac{\bar{x} - \mu}{S_x}$$

Where $S_x = \frac{SD}{\sqrt{N}}$ is known as standardized error.

INDEPENDENCE T-TEST

Its applicable when the comparison is made on the mean performance of two groups that are independent. That is, each sample produces two different means. It is the easiest to understand and most popular. For example, researching the performance of males and females in any subject.

Test statistics: $t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{SD_1^2}{N_1} + \frac{SD_2^2}{N_2}}}$

- $\bar{x}_1$ = Mean of sample 1 or group one
- $\bar{x}_2$ = Mean of sample 2 or group two
- SD_1 = Standard deviation of group one
- SD_2 = Standard deviation of group two
- N_1 = Size of sample one
- N_2 = Size of sample two
- Df = $N_1 + N_2 - 2$

DEPENDENCE T-TEST

Its applicable when a group is studied two times and their performance and those times are being compared. i.e. the two drawn from the population. Variables of measure are normally distributed, and variables are continuous.

Test statistics, $t = \frac{\bar{d}}{S_d}$

$$S_d = \sqrt{\frac{\sum d^2 - \frac{(\sum d)^2}{N}}{N - 1}}$$

$$D = \sum (x_1 - x_2)$$

Where;

d = differences score

D = Mean difference score

N = Size of sample

Df = N-1

CHAPTER FOUR

ANALYSIS IMPLEMENTATION AND PRESENTATION OF DATA

4.1 ANALYSIS OF DATA

TABLE 4.1A: CLASSIFICATION INTO NORMAL DELIVERIES AND CAESAREAN SECTION

Year	Normal Delivery	Caesarean Sections	Total
2005	1,139	208	1,347
2006	1,816	164	1,980
2007	963	314	1,277
2008	1,364	294	1,658
2009	1,613	220	1,833
2010	1,295	295	1,590
2011	2,234	113	2,347
2012	2,070	480	2,550
2013	2,382	593	2,975
2014	1,475	341	1,816
Grand Total	16,351	3,022	19,373

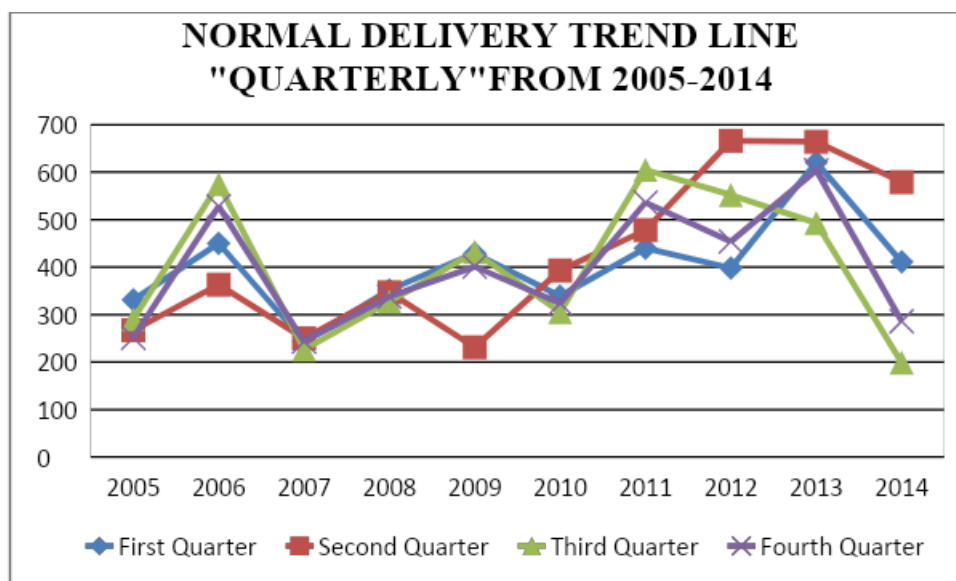
Source: Federal Medical Centre, Lokoja.

TABLE 4.1B: DELIVERIES IN FEDERAL MEDICAL CENTRE, LOKOJA.

Delivery Mode	Grand Total
Normal Deliveries	16,351
Caesarean Section	3,022
Total	19,373

4.2 TIME SERIES ANALYSIS ON NORMAL DELIVERY (BETWEEN 2005-2014)

Quarterly	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
1	331	450	244	352	429	339	440	398	621	411
2	267	363	250	347	231	393	478	666	664	579
3	290	575	226	327	432	305	605	552	493	199
4	251	528	243	338	401	324	536	454	604	286



INTERPRETING THE TREND LINE FOR NORMAL DELIVERY

For the first quarter the line follows a trend which increases in the year 2006, drops in 2007 and also a very high increase in the year 2013. For the second quarter, the line drops at 2009 and high increased between 2012-2013. For the third quarter, the line increases in 2006 and 2011 and drops at 2014. For the fourth quarter, there is an increase in 2006 and also a very high increase in 2013 and it drops in 2007 and 2014 respectively. Therefore the normal delivery shows strong seasonality within each year.

Note that the highest increase in all the years is in the second quarter in the year 2012 which is 666; while the lowest record is found in the third quarter in the year 2014, which is 199.

Estimation of Trend

The following are different methods of estimating trends:

- i. Freehand method
- ii. The Semi-moving average method
- iii. Moving average method
- iv. The method of least square

But in this project work, the moving average method and least square method are used.

The following table shows an analysis of normal delivery mode using the moving average method.

Year	Quarter	Y	4 quarter moving total	4 quarter moving average	Centre moving average	Specific moving average
2005	1	331				
	2	267				
			1139	284.75		
	3	290			299.625	96.79

			1258	314.5		
	4	251			326.5	76.88
			1354	338.5		
2006	1	450			374.125	120.28
			1639	409.75		
	2	363			444.375	81.69
			1916	479		
	3	575			453.25	126.86
			1710	427.5		
	4	528			413.375	127.73
			1597	399.25		
2007	1	244			355.625	68.61
			1248	312		
	2	250			276.375	90.46
			963	240.75		
	3	226			254.25	88.89
			1071	267.75		
	4	243			279.875	86.82
			1168	292		
2008	1	352			304.625	115.55
			1269	317.25		
	2	347			329.125	105.43
			1364	341		
	3	327			350.625	93.26
			1441	360.25		
	4	338			345.75	97.76
			1325	331.25		
2009	1	429			344.375	124.57
			1430	357.5		
	2	231			365.375	63.22
			1493	373.25		
	3	432			369.5	116.91
			1463	365.75		
	4	401			378.5	105.94
			1565	391.25		
2010	1	339			375.375	90.31
			1438	359.5		
	2	393			344.25	114.16
			1361	329		
	3	305			348	87.64
			1468	367		
	4	324			377.625	85.80
			1553	388.25		
2011	1	440			425.75	103.35

			1853	463.25		
	2	478			489.75	97.60
			2065	516.25		
	3	605			510.25	118.57
			2017	504.25		
	4	536			527.25	101.56
			2205	551.25		
2012	1	398			544.625	73.08
			2152	538		
	2	666			527.75	126.20
			2070	517.5		
	3	552			572.375	96.44
			2293	573.25		
	4	454			573	79.23
			2291	572.75		
2013	1	621			565.375	109.84
			2232	558		
	2	664			576.75	115.13
			2382	595.5		
	3	493			569.25	86.61
			2172	543		
	4	604			532.375	112.82
			2087	521.75		
2014	1	411			485	84.74
			1793	448.25		
	2	579			408.5	141.74
			1475	368.75		
	3	199				
	4	286				

The specific moving average showing in the table above is gotten by using the following:

$$\frac{y}{x} \times 100$$

Centre Moving Average

Where y = number of women that delivered normally in federal medical centre Lokoja.

Since the 4-quarterly means should be theoretically needed to add up to 400% in this problem.

Another table to calculate the mean for the quarterly index is shown below.

TABLE 4.2c

Year	1	2	3	4
2005	-	-	96.79	76.88
2006	120.28	81.69	126.86	127.73
2007	68.61	90.46	88.89	86.82
2008	115.55	105.43	93.26	97.76
2009	124.57	63.22	116.91	105.94
2010	90.31	114.16	87.64	85.80
2011	103.35	97.60	118.57	101.56
2012	73.08	126.20	96.44	79.23
2013	109.84	115.13	86.61	112.82
2014	84.74	141.74	-	-
Total	890.33	935.63	911.97	874.54
Average	98.93	103.96	101.33	97.17
Adjusted seasonal variation (5.0)	98.59	103.60	100.98	96.83

Average Total = 401.39

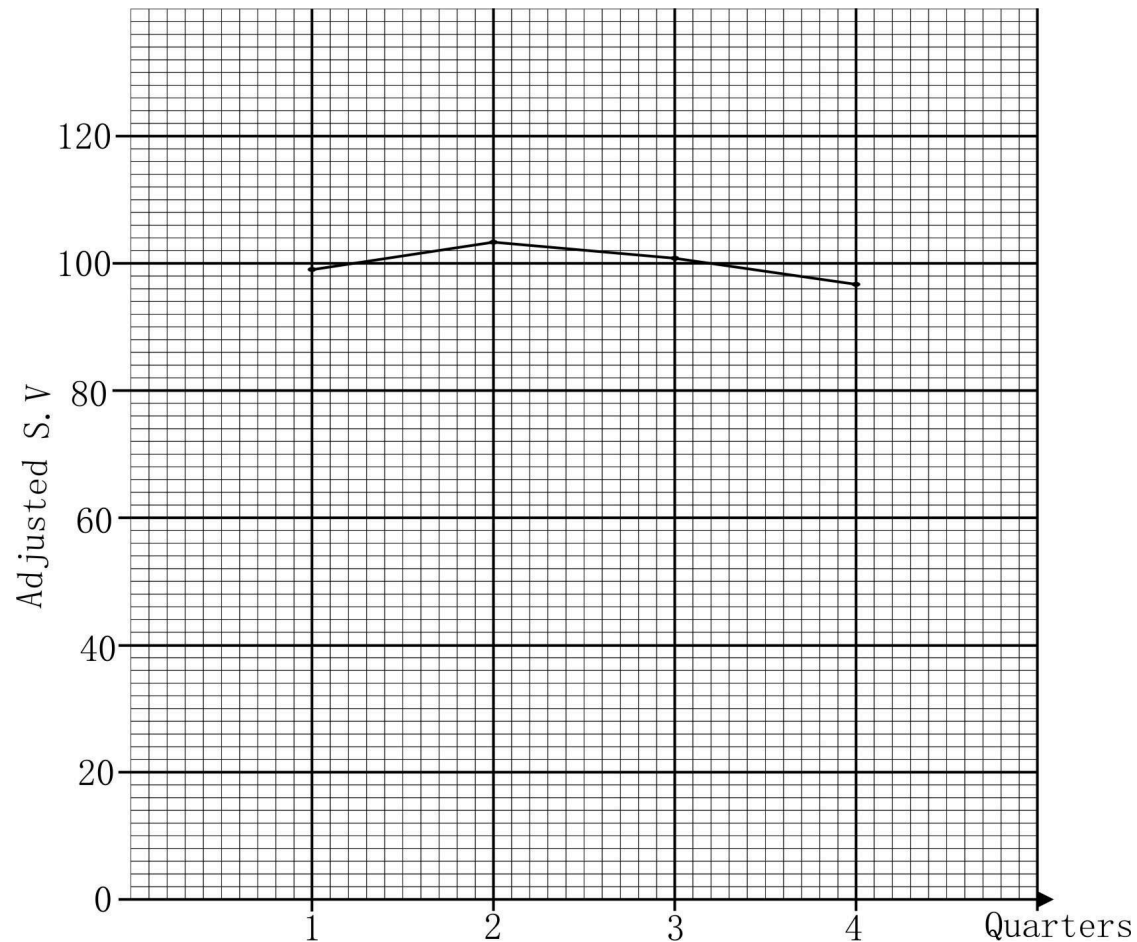
Adjusted Seasonal variation (5.0) = 400

Adjusted S.V = $400 / \text{Average total} \times \text{Average}$

Correcting factor (CF) = $400 / 401.39 = 0.9965$

The above table is shown on the graph below to indicate the point to be able to interpret the result. The adjusted seasonal variation is plotted against the quarters.

GRAPH 1



INTERPRETING THE GRAPH;

Graph 1 above depicts that, the second quarter exhibited the highest peak followed by the third quarter due to a high number of women who gave birth normally in those years. The first and fourth quarters are low because fewer women delivered in those years.

NORMAL DELIVERY SPSS TIME SERIES ANALYSIS

Variable Entered/Removed^a

- a. Dependent Variable: Delivery

MODEL SUMMARY

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.451 ^a	.203	.182	120.34866

- a. Predictors: (Constant), year

ANOVA^a

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	140403.515	1	140403.515	9.694	.004 ^b
Residual	550384.385	38	14483.800		
Total	690787.900	39			

- a. Dependent Variable: delivery

- b. Predictors: (Constant), year

Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficient	t	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
1	305.467	37.355		8.177	.000	229.846	381.088
(Constant)	5.132	1.648	.451	3.133	.004	1.795	8.470
Year							

a. Dependent Variable: delivery

INTERPRETING THE SPSS RESULT

$H_0: B_0 = 0$ (i.e the model does not fit)

$H_1: B_1 \neq 0$ (the model fits)

The model: $y = a + \beta t$

From the result on coefficient it shows that

P value = 0.004

Decision rule: Reject H_0 if P- value is less than 0.05 otherwise we do not reject H_0 .

Conclusion: since P value (0.004) < 0.05, therefore we reject H_0 and conclude that the model fits.

$\bar{y} = 305.467 + 5.132t$

From the model summary, $R^2 = 20.3\%$ shows that 20.3% of the change in y was explained by t

For every unit increase in t, there is a 5.132 increase in y.

TABLE 4.2D

TABLE SHOWING THE FITTED TREND (MODEL: $\bar{y} = 305.467 + 5.132T$)

Year	Quarters	Period	No of Normal Delivery	TREND ($\bar{y} = a + \beta t$)
2005	1	0	331	305.467
	2	1	267	310.599
	3	2	290	315.731
	4	3	251	320.863
2006	1	4	450	325.995
	2	5	363	331.127
	3	6	575	336.259
	4	7	528	341.391
2007	1	8	244	346.523

	2	9	250	351.655
	3	10	226	356.787
	4	11	243	361.919
2008	1	12	352	367.051
	2	13	347	372.183
	3	14	327	377.315
	4	15	338	382.447
2009	1	16	429	387.579
	2	17	231	392.711
	3	18	432	397.843
	4	19	401	402.975
2010	1	20	339	408.107
	2	21	393	413.239
	3	22	305	418.871
	4	23	324	423.503
2011	1	24	440	428.635
	2	25	478	433.767
	3	26	605	438.899
	4	27	536	444.031
2012	1	28	398	449.163
	2	29	666	454.295

	3	30	552	459.427
	4	31	454	464.559
2013	1	32	621	469.691
	2	33	664	474.823
	3	34	493	479.955
	4	35	604	485.087
2014	1	36	411	490.219
	2	37	579	495.351
	3	38	199	500.483
	4	39	286	505.615

PREDICTION OF DELIVERY FOR 2015

First Quarter $y = 305.467 + 5.132t$
 $= 305.467 + 5.132 (40)$
 $= 305.467 + 205.28$
 $y = 510.747 \approx 510$

Second Quarter $y = 305.467 + 5.132t$
 $= 305.467 + 5.132 (41)$
 $= 305.467 + 210.412$
 $y = 515.879 \approx 516$

Third Quarter $y = 305.467 + 5.132t$
 $= 305.467 + 5.132 (42)$
 $= 305.467 + 210.412$
 $y = 515.879 \approx 516$

Fourth Quarter $y = 305.467 + 5.132t$
 $= 305.467 + 5.132 (43)$
 $= 305.467 + 220.676$
 $y = 526.143 \approx 526$

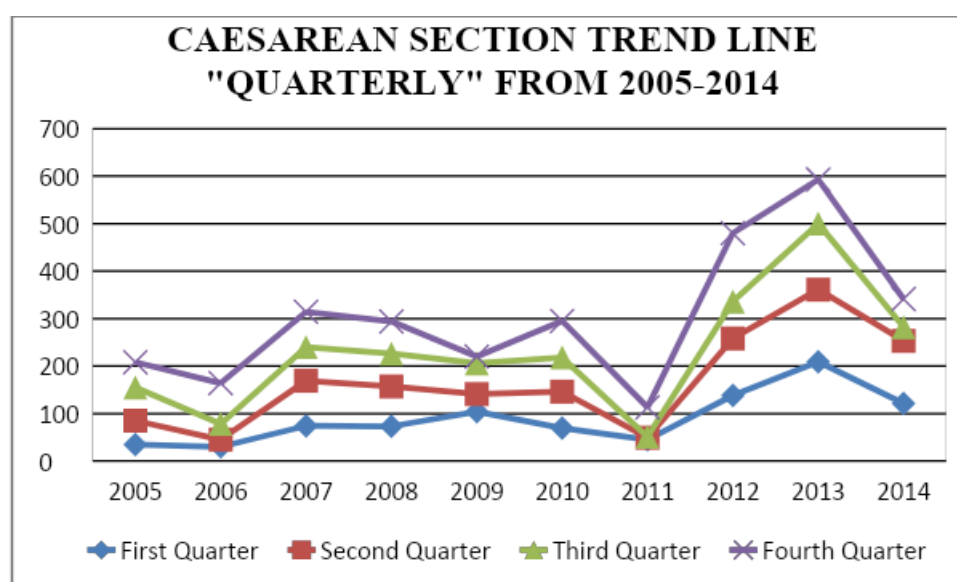
Estimated number of women to deliver normally for the year 2015 is:

$$510 + 516 + 516 + 526 = 2,068$$

4.3 TIME SERIES ANALYSIS ON CAESAREAN SECTION IN FEDERAL MEDICAL CENTRE LOKOJA (BETWEEN 2005- 2014).

TABLE 4.3A

Quarter	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
1	35	30	74	73	104	69	45	138	209	121
2	50	15	95	84	37	77	4	120	152	132
3	70	33	71	69	65	72	2	78	139	29
4	53	86	74	68	14	77	62	144	93	59



INTERPRETING THE TREND LINE FOR CAESAREAN SECTION

For first quarter, the line follows a trend but there is an increase in 2012 and 2013 but drops back at 2014. For the second quarter, there is an increase in 2007, then a drop at 201 and a very high increase in 2013. For the third quarter, there is an increase in 2007 then a drop in 2011 and a high increase in 2013. For the fourth quarter, there is an increase in 2007 a drop in 2011 and a very high increase in 2013.

Note that the highest increase in all the years is in the fourth quarter in the year 2013 which is 209; while the lowest record is found in the third quarter in the year 2011, which is 2. The following table shows an analysis of the caesarean delivery mode using the moving average method.

TABLE 4.3B

Year	Quarter	Y	4qtr Morning total	4qtr Morning average	Centre Morning average	Specific Morning average
2005	1	35				
	2	50				
			208	52		
	3	70			51.38	136.24
			203	50.75		
	4	53			46.38	114.27
			168		42	
2006	1	30			37.38	80.26
			131	32.75		
	2	15			36.88	41.23
			164	41		
	3	33			46.5	70.97
			208	52		
	4	86			62	138.71
			288	72		
2007	1	74			76.75	96.42
			326	81.5		
	2	95			80	118.75

			314	78.5		
	3	71			78.38	90.58
			313	78.25		
	4	74			76.88	96.25
			302	75.5		
2008	1	73			75.25	97.01
			300	75		
	2	84			74.25	113.13
			294	73.5		
	3	69			77.38	89.17
			325	81.25		
	4	68			75.38	90.21
			278	69.5		
2009	1	104			69	150.72
			274	68.5		
	2	37			61.75	59.92
			220	55		
	3	65			50.63	128.38
			185	46.25		
	4	14			51.25	27.32

			225	56.25		
2010	1	69			57.13	120.78
			232	58		
	2	77			65.88	116.88
			295	73.75		
	3	72			70.75	101.77
			271	67.75		
	4	77			58.63	131.33
			198	49.5		
2011	1	45			40.75	110.43
			128	32		
	2	4			30.13	13.28
			113	28.25		
	3	2			39.88	5.02
			206	51.5		
	4	62			66	93.94
			322	80.5		
2012	1	138			90	153.33
			398	99.5		
	2	120			109.75	109.34

			480	120		
	3	78			128.88	60.52
			551	137.75		
	4	144			141.75	101.59
			583	145.75		
2013	1	209			153.38	136.26
			644	161		
	2	152			154.63	98.30
			593	148.25		
	3	139	5		137.25	101.28
			505	126.25		
	4	93			123.75	75.15
			485	121.25		
2014	1	121			107.5	112.56
			375	93.75		
	2	132			89.5	147.49
			341	85.25		
	3	29				
	4	59				

The specific moving average shown in the table above is being gotten by using the formula:

$$\frac{y}{\text{Centre Moving Average}} \times 100$$

Where y = number of women undergoing a caesarean operation in federal medical centre Lokoja.

Since the 4 quarterly means should theoretically need to add up to 400% in this problem. Another table to calculate the mean for the quarterly index is shown below:

TABLE 4.3C

Year	1	2	3	4
2005	-	-	136.24	114.27
2006	80.26	41.23	70.97	138.71
2007	96.42	118.75	90.58	96.25
2008	97.01	113.13	89.17	90.21
2009	150.72	59.92	128.28	27.32
2010	120.78	116.88	101.77	131.33
2011	110.43	13.28	5.02	93.94
2012	153.33	109.34	60.52	101.59
2013	136.26	98.30	101.28	75.15
2014	112.56	147.49	-	-
Total	1057.77	818.32	783.93	868.77
Average	117.53	90.92	87.10	96.53
Adjusted seasonal variation (S.V)	119.90	92.76	88.86	98.48

Average total = 392.08

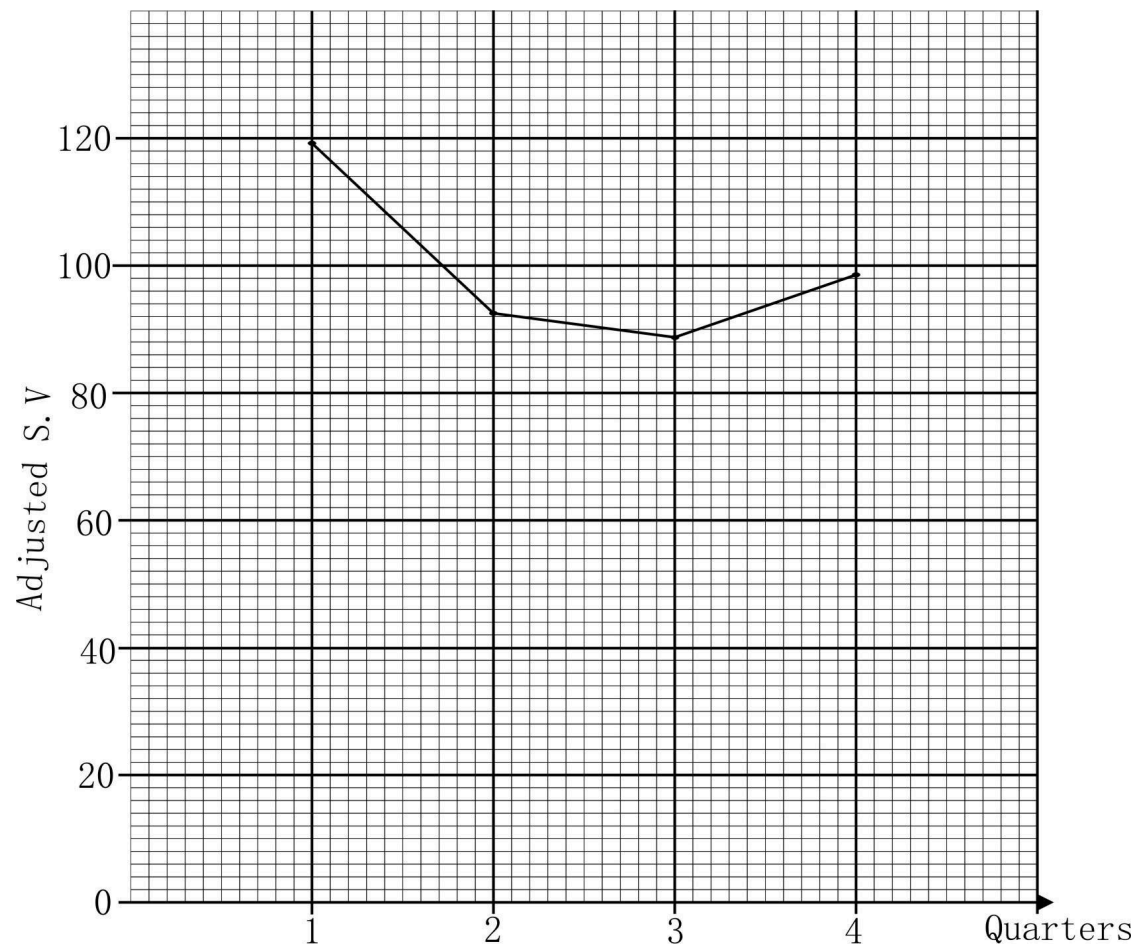
Adjusted Seasonal Variation (S.V) = 400

Adjusted S.V = $\frac{400}{\text{Average total}} \times \text{Average}$

Correcting factor (CF) = $\frac{400}{392.08} = 1.0202$

The above table is shown on the graph below to indicate the point to be able to interpret the result. The adjusted seasonal variation is plotted against the quarters.

GRAPH 2



INTERPRETING THE GRAPH

Graph 2 above depict that, the first quarter exhibited the highest peak followed by the fourth quarter and second quarter due to a high number of women undergoing a caesarean operation in those years. The third quarter is low maybe because most pregnant women turned up for antenatal care service during pregnancy and were able to be enlightened on pregnancy-related issues.

CAESAREAN SECTION SPSS: TIME SERIES ANALYSIS

a. Dependent Variable: Caesarean

MODEL SUMMARY

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.440 ^a	.193	.172	39.96212

b. Predictors: (Constant), year

ANOVA^a

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	14538.989	1	14538.989	9.104	.005 ^b
Residual	60684.911	38	1596.971		
Total	75223.900	39			

c. Dependent Variable: Caesarean

d. Predictors: (Constant), year

Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficient	t	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
1	43.344	12.404		3.494	.001	18.234	68.454
(Constant)	1.652	.547	.440	3.017	.005	.543	2.760
Year							

b. Dependent Variable: Caesarean

INTERPRETING THE SPSS RESULT

$H_0: B_0 = 0$ (i.e the model does not fit)

$H_1: B_1 \neq 0$ (the model fits)

The model: $y = a + \beta t$

From the result on coefficient it shows that

P value = 0.005

Decision rule: Reject H_0 if P-value is less than 0.05 otherwise we do not reject H_0 .

Conclusion: Since P-value (0.005) < 0.05, therefore we reject H_0 and conclude that the model fits.

$\bar{y} = 43.334 + 1.652t$

From the model summary, $R^2 = 19.3\%$ shows that 19.3% of the change in y was explained by t.

For every unit increase in t, there is a 1.652 increase in y.

Table 4.3d

Table showing the fitted trend (Model: $\bar{y} = 43.344 + 1.652t$)

Year	Quarter	Period	No. of Caesarean Delivery	Trend ($\bar{y} = a + \beta t$)
2005	1	0	35	43.344
	2	1	50	44.996
	3	2	70	46.648
	4	3	53	48.3
2006	1	4	30	49.952
	2	5	15	51.604
	3	6	33	53.256
	4	7	86	54.908
2007	1	8	74	56.56
	2	9	95	58.212
	3	10	71	59.864
	4	11	74	61.516
2008	1	12	73	63.168
	2	13	84	64.82
	3	14	69	66.472
	4	15	68	68.124
2009	1	16	104	69.776
	2	17	37	71.428
	3	18	65	73.08

	4	19	14	74.732
2010	1	20	69	76.384
	2	21	77	78.036
	3	22	72	79.688
	4	23	77	81.34
2011	1	24	45	82.992
	2	25	4	84.644
	3	26	2	86.296
	4	27	62	87.948
2012	1	28	138	89.6
	2	29	120	91.252
	3	30	78	92.904
	4	31	144	94.556
2013	1	32	209	96.208
	2	33	152	97.86
	3	34	139	99.512
	4	35	93	101.164
2014	1	36	121	102.816
	2	37	132	104.468
	3	38	29	106.12
	4	39	59	107.772

PREDICTION OF CAESAREAN FOR 2015

First Quarter $y = 43.344 + 1.652t$
 $= 43.344 + 1.652(40)$
 $= 43.344 + 66.208$
 $y = 109.424 \approx 109$

Second Quarter $y = 43.344 + 1.652t$
 $= 43.344 + 1.652(41)$
 $= 43.344 + 67.732$
 $y = 111.076 \approx 111$

Third Quarter $y = 43.344 + 1.652t$
 $= 43.344 + 1.652(42)$
 $= 43.344 + 69.384$
 $y = 112.728 \approx 113$

Fourth Quarter $y = 43.344 + 1.652(t)$
 $= 43.344 + 1.652(43)$
 $= 43.344 + 71.036$
 $y = 114.38 \approx 114$

Estimated number of women that will undergo caesarean section for the year 2015 is:
 $109 + 111 + 113 + 114 = 447$

4.4 STUDENT T-DISTRIBUTION ANALYSIS ON NORMAL DELIVERY AND C-SECTION IN FEDERAL MEDICAL CENTER LOKOJA BETWEEN (2005-2015)

Hypothesis:

H_0 : There is no significant difference in the average of normal delivery and c-section (i.e $x_1 = x_2$)

H_1 : There is significant difference in the average of normal delivery and c-section (i.e $x_1 \neq x_2$)

Note: y = year - -

x_1 = Normal delivery, $\bar{x}_1$ = mean of normal delivery

x_2 = Caesarean Section, $\bar{x}_2$ = mean of Caesarean Section

Year	x_1	$x_1 - \bar{x}_1 = d$	d^2	x_2	$x_2 - \bar{x}_2 = d$	d^2
1	1139	-496.1	246115.2	208	-94.2	8873.64
2	1816	180.9	32724.81	164	-138.2	19099.24
3	963	-672.1	451718.41	314	11.8	139.24
4	1364	-271.1	73495.21	294	-8.2	67.24
5	1613	-22.1	488.41	220	-82.2	6756.84
6	1295	-340.1	115668.01	295	-7.2	51.84
7	2234	598.9	358681.21	113	-189	35721
8	2070	434.9	189138.01	480	177.8	31612.84
9	2382	746.9	557859.61	593	290.8	84564.64
10	1472	-160.1	25632.01	341	38.8	1505.44
	16,351		2051520.9	3,022		188391.96

N = Total size of the sample. n = 10

$$\bar{x}_1 = \frac{\sum x_1}{n} = \frac{16351}{10} = 1635.1$$

$$\bar{x}_2 = \frac{\sum x_2}{n} = \frac{3022}{10} = 302.2$$

$$\text{Variance for normal delivery} = \frac{\sum d^2}{n} = \frac{2051520.9}{10} = 205152.09$$

$$SD_1 = \sqrt{\text{variance}} = \sqrt{205152.09} = 452.937$$

$$\text{Variance for C-Section} = \frac{\sum d^2}{n} = \frac{188391.96}{10} = 18839.196$$

$$SD_2 = \sqrt{\text{variance}} = \sqrt{18839.196} = 137.256$$

$$\begin{aligned} \text{Test statistics: } t &= \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{SD_1^2}{n_1} + \frac{SD_2^2}{n_2}}} = \frac{1635.1 - 302.2}{\sqrt{\frac{(452.937)^2}{10} + \frac{(137.256)^2}{10}}} \\ &= \frac{1332.9}{\sqrt{20515.193 + 1883.921}} = \frac{1332.9}{\sqrt{22399.114}} = \frac{1332.9}{149.6633} = 8.9051 \end{aligned}$$

Degree of freedom = $n_1 + n_2 - 2 = 10 + 10 - 2 = 18$

Level of significance: 0.05

t critical at 0.05 level of significance = 2.101

Decision Rule: we reject H_0 if t calculated is greater than t tabulated (i.e $t_{cal} > t_{tab}$) otherwise we do not reject H_0 : $t_{cal} = 8.9051 > t_{tab} = 2.101$

Conclusion: Therefore we reject H_0 and conclude that there is significant difference between the average mean of normal delivery and c-section.

CHAPTER FIVE

5.0 SUMMARY OF FINDING, CONCLUSION AND RECOMMENDATIONS

This chapter summarizes the findings, draws a conclusion and makes recommendations on this project entitled “Statistical Analysis on the mode of delivery in Kogi State” using Federal Medical Center Lokoja as a case study between 2005-2014.

5.1 SUMMARY OF FINDING

This study examined the risk associated with normal delivery and caesarean section. The population of the study covered the entire delivery record both normal delivery and caesarean section in Federal Medical Center Lokoja, Kogi State. Also, a model was developed for the two deliveries for normal delivery we have $y = 305.467 + 5.132t$ which means a unit increase in t leads to a 5.132 unit increase in y , while the y -intercept is 305.467, the model for the caesarean section we have $y = 43.344 + 1.652 t$ which means a unit increase in t leads to 1.652 unit increase in y , while y -intercept is 43.344.

After forecasting and fitting the trend, it was discovered that there is an increase in the two modes of deliveries in the year 2015, more so, the trend line was fitted quarterly to express how the trend follows where it was discovered that in both modes of deliveries the lowest record was on the third quarter in all the years and the highest record for normal delivery and caesarean section was in the fourth quarter and second quarters respectively. This research work was also designed to analyze and compare the two modes of delivery.

It was also discovered that Federal Medical Center, Lokoja records a high number of deliveries either normal delivery or caesarean section reason is that it's a government-owned hospital which gives access to research work and also the masses of Kogi State can easily gain access. More so, it is more affordable than any other private owned hospital or health care. It was also discovered that there is a significant difference in the average mean of the two modes of delivery.

After forecasting and fitting the trend, it was discovered that there is an increase in the two modes of deliveries in the year 2015. This research work was also designed to analyze and compare the two modes of delivery.

The main aim of this project was to know the total number of women that came to Federal Medical Center Lokoja for the purpose of delivery between 2005-2014 and also do a general finding on the risk associated with normal delivery and caesarean section.

5.2 CONCLUSION

This study indicates that the average equality of the mode of delivery differs and according to the forecast for 2015 there will be an increase in the two modes of delivery but there is more increase in normal delivery than caesarean section because it is either a woman delivers her baby normally (vaginal delivery) or through a caesarean section also risks are associated with these two modes of deliveries just that it is more complicated in the aspect of caesarean section. Studies also show that women preferred normal delivery to caesarean section despite that some caesarean sections were actually planned while some are due to emergencies.

I will like to conclude that efforts should be intensified by enlightening our women to go for antenatal services nearer to them for a proper understanding of partaking to delivery and to know which mode of delivery is safer as their condition varies, involving regular exercise and a good diet should be encouraged among pregnant women especially those with a low education background.

5.3 RECOMMENDATIONS

In the world today, many pregnant women during delivery usually have one or more complications which may lead to a caesarean operation. Therefore am recommending that:

1. Government should build more hospitals in our rural areas because the majority of our people dwell in rural areas.
2. Healthcare providers should be employed to work in all hospitals and clinics.
3. Efforts should be also intensified to train and retrain our medical personnel to boost their morale.
4. I will also want to recommend that people should be enlightened on the need to go for antenatal services.
5. Eating vegetables, regular exercise and recommended diet by medical personnel should be encouraged.

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