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Niger Delta University
Wilberforce Island, Bayelsa State, Nigeria

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# Niger Delta Journal Of Medical Sciences

*Reaching out with Scholarly Research*

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## Review Article

# **EDITORIAL:** Critical Insights and Call to Action

**Prof. Chika Onyinyechi Duru;** MBBS, MPH, MRCPCH(UK), FWACP
Editor-in-Chief

*Niger Delta Journal of Medical Sciences.* 2024;4(1)7

In this edition of the Niger Delta of Medical Sciences, we are privileged to present three significant articles that illuminate critical issues affecting maternal and child health in our region.

The first article, "A 5-Year Review of Obstructed Labour at the Federal Medical Centre, Yenagoa, Bayelsa State," provides an in-depth analysis of the prevalence, causes, and outcomes of obstructed labour. This comprehensive review not only highlights the challenges in managing such cases but also underscores the importance of timely intervention and the need for improved healthcare strategies.

The second article, "Intimate Partner Violence during Pregnancy in Yenagoa, Southern Nigeria," addresses a pressing public health concern. It examines the alarming prevalence of intimate partner violence among pregnant women, exploring its implications for maternal and foetal health. This study serves as a vital call to action for healthcare providers, policymakers, and community leaders to implement protective measures and support systems for these vulnerable populations.

The third article, "Prevalence and Risk Factors of Intestinal Helminthiasis among Primary School Children in Obio-Akpor Local Government Area of River State, Nigeria," offers an insight into the prevalence and underlying causes of helminthiasis in children, an important cause of chronic anaemia and malnutrition. This study emphasizes the importance of improving socioeconomic status as a strategy in reducing childhood morbidity and mortality in our environment.

Under the expert guidance of our Editorial team, the Niger Delta Journal of Medical Sciences (NDJMS)is committed to advancing knowledge and fostering dialogue around these crucial health issues. We encourage our readers to engage with these articles and reflect on their implications for improving healthcare in the Niger Delta region.

Thank you for your continued support of our journal. We look forward to your feedback and contributions in future editions.

# A 5-Year review of obstructed labour at the Federal Medical Centre, Yenagoa, Bayelsa State

**Ariwelo S. Warisuo[1], Atemie G[1], Ikobho E. Howell[2], Clifford A. Timiebi[1], Amadi-oyoma C. Miracle[1], Fente A. Erighanyoyefa[3]**

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## ABSTRACT

***Background:*** *Obstructed labour remains a common obstetric complication with resultant fetomaternal morbidity and mortality in low-income countries. In developing countries, fistulae usually result from prolonged obstructed labour and follow pressure necrosis caused by impaction of the presenting part during difficult labour. In the infant, neglected obstructed labour may cause asphyxia, leading to stillbirth, brain damage, or neonatal death. The study aims to determine the prevalence, sociodemographic characteristics, causes, complications, and the fetomaternal outcome of pregnancies complicated by obstructed labour.*

***Methods:*** *It was a retrospective study carried out on managed cases of obstructed labour in Federal Medical Centre, Yenagoa, Bayelsa State, between 1st January 2018 and 31st December 2022.*

***Results:*** *A total of 46 cases were recorded out of 3,718 deliveries during the study period, giving an institutional prevalence rate of 1.2%. The main causes were cephalopelvic disproportion (76.1%) followed by malpresentation (23.9%). Obstructed labour was more common among women aged 30–34 years (39.1%). Most of the women were married (86.9%) with secondary education (47.8%). Most of the women were nulliparous (47.8%), unbooked (95.7%), and referred by traditional birth attendants (52.2%). The common foetal complications were intrauterine foetal death (23.8%) and foetal distress (11.9%), while the common maternal complications were wound infection (7.5%), uterine rupture (4.5%), and puerperal sepsis (4.5%).*

***Conclusion:*** *The prevalence of obstructed labour in this study is low. The major causes were cephalopelvic disproportion and abnormal lie/presentation.*

**Keywords:** Obstructed labour, Perinatal morbidity, Perinatal mortality, Maternal morbidity, Maternal mortality.

## INTRODUCTION

Obstructed labour occurs when there is a lack of progress despite good adequate uterine contractions for mechanical reasons.[1] This is one of the most common preventable causes of maternal and perinatal morbidity and mortality both globally and in the developing world.[2,3] It is a mechanical halt in the progress of labour despite adequate uterine contractions requiring an operative intervention.[1] Obstructed labour is more common in developing countries where antenatal coverage and supervised deliveries are poor. The common causes of obstructed labour include cephalopelvic disproportion, contracted pelvis, abnormal lie, and presentations.[1,4-6] Other causes include macrosomic babies, fetal anomalies, soft tissue abnormalities, and rarely, locked twins.[1,7-9] It is diagnosed when the duration of labour is prolonged, a labouring mother becomes unable to support herself or move her lower extremities, with deranged vital signs, distended bladder, Bandle's ring formed in the lower uterine segment, fetal distress or death, oedematous vulva, significant caput, significant moulding, foul-smelling, and thick meconium-stained amniotic fluid.[10]

Management involves resuscitation, relief of obstruction (delivery), management of associated complications, and rehabilitation/reintegration of the patient. The method for relieving the obstruction depends on the cause and extent of complications.[11] Mismanagement may result in severe complications leaving both mother and baby with devastating disabilities and even mortality. These complications are related to unrelieved pressure on the bladder, rectum, and lumbo-sacral trunk of the sacral plexus and to the method of delivery of the fetus.[11]

Obstructed labour has serious complications that may result in maternal morbidities and mortality. These morbidities include sepsis, fistula, postpartum hemorrhage, rupture of the uterus, and rupture of the bladder.[5,12] Other complications of abdominal delivery include septic shock, anaemia, blood transfusion, wound infection, burst abdomen, prolonged hospital stay, high cost of care, infertility, aversion to hospital delivery, caesarean delivery in a subsequent pregnancy, abandonment, and even divorce.[1,5,10,12] Booking for antenatal care, competent observation in early labour, use of partograph, and prompt referral to specialist centres will significantly help curb this issue. This study aims to determine the prevalence, sociodemographic characteristics, causes, complications, and feto-maternal outcomes of pregnancies complicated by obstructed labour at Federal Medical Centre, Yenagoa, to improve health care.

## MATERIALS AND METHODS

This was a retrospective study of women with obstructed labour managed within a 5-year period in the Federal Medical Centre, Yenagoa. Permission was obtained from the hospital's Ethical and Research Committee. All patients managed for obstructed labour from 1st January 2018 to 31st December 2022 were compiled from the labour ward and obstetrics theatre records, and their case notes were retrieved from the Medical Records Department. Folder retrieval was 100%. The total number of deliveries during the study period was obtained from the

departmental annual report. Relevant data, including age, marital status, educational status, place of residence, parity, booking status, gestational age at presentation, cause of obstruction, complications, duration of indwelling catheter, and duration of hospital stay, were extracted and entered into a proforma. The data was coded into a spreadsheet and analyzed using the SPSS 25.0 version statistical package. The results are presented in tables and charts.

## RESULTS

During the study period, there were a total of 3,718 deliveries, out of which 46 cases involved obstructed labour, giving a prevalence rate of 1.2%. The main causes of obstructed labour were cephalopelvic disproportion (76.1%), followed by malpresentation (23.9%). Obstructed labour was more common among women aged 30-34 years (39.1%). Most of the women were married (86.9%) and had a secondary level of education (47.8%). About 58.7% of the women resided in urban areas, while 41.3% lived in rural areas.

Most of the women were nulliparous (47.8%), unbooked (95.7%), and were referred by traditional birth attendants (52.2%). The common fetal complications were intrauterine fetal death (23.8%) and fetal distress (11.9%), while the common maternal complications included wound infection (7.5%), uterine rupture (4.5%), and puerperal sepsis (4.5%).

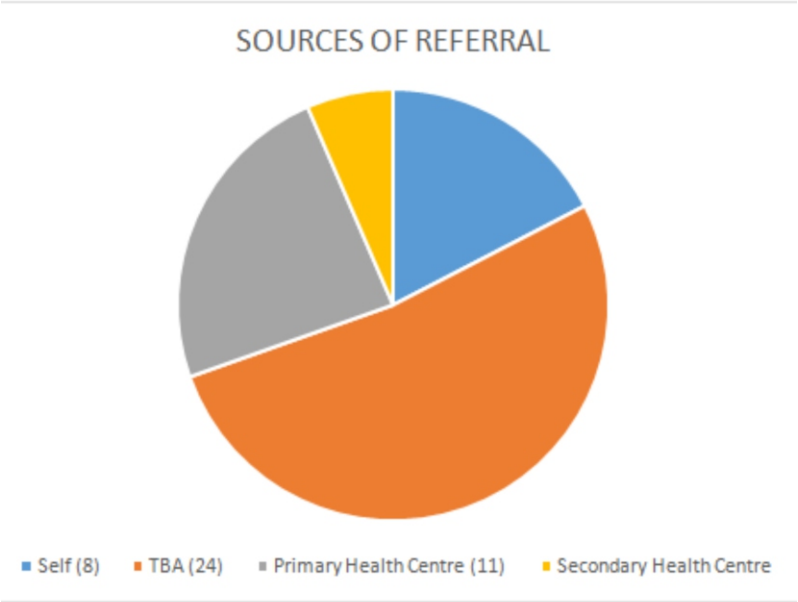
Out of the total obstructed deliveries, 65.2% resulted in live births, while 34.8% were stillbirths. All the women underwent caesarean sections. Most of the women (70.8%) had a good outcome, with no maternal deaths recorded. Fetal outcomes included 26.8% birth asphyxia, 34.2% neonatal sepsis, and 39.0% perinatal death.

Regarding post-delivery care, most of the women (63.1%) had an indwelling catheter for 7 days, while others had it for 14 days. The average hospital stay was 10.7 days.

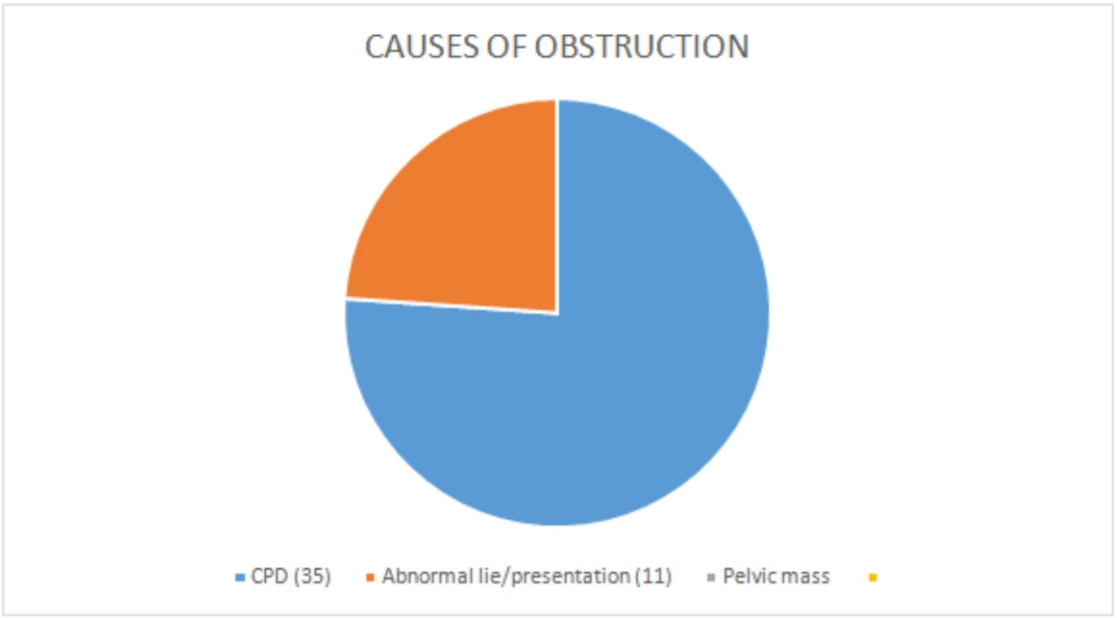
**Table 1:** Sociodemographic characteristics of the 46 women who presented with Obstructed labour

| **Factors** | **Frequency** | **%** |
|---|---|---|
| **AGE GROUP** | **N=46** | |
| 15 – 19 | 2 | 4.3 |
| 20 – 24 | 9 | 19.6 |
| 25 – 29 | 8 | 17.4 |
| 30 – 34 | 18 | 39.1 |
| 35 – 39 | 9 | 19.6 |
| **MARITAL STATUS** | **N=46** | |
| Single | 6 | 13.1 |
| Married | 40 | 86.9 |
| **LEVEL OF EDUCATION** | **N=46** | |
| Primary | 18 | 39.1 |
| Secondary | 22 | 47.8 |
| Tertiary | 6 | 13.1 |
| **PLACE OF RESIDENCE** | **N=46** | |
| Urban | 27 | 58.7 |
| Rural | 19 | 41.3 |
| **PARITY** | **N=46** | |
| 0 | 22 | 47.8 |
| 1 | 9 | 19.6 |
| 2 | 9 | 19.6 |
| 3 | 4 | 8.7 |
| 4 | 2 | 4.3 |
| **BOOKING STATUS** | **N=46** | |
| Booked | 2 | 4.3 |
| Unbooked | 44 | 95.7 |

Table 1 showed that most women were aged 30-34 years (39.1%). Most of the women were married (86.9%) and had a secondary level of education (47.8%). About 58.7% of the women resided in urban areas, while 41.3% lived in rural areas. Most of the women were nulliparous (47.8%) and unbooked (95.7%).




Pie chart 1 above shows that 24 women were referred from the Traditional birth attendant (TBA), 11 women from Primary health centre (PHC), 8 women were self-referred and 3 women from the secondary health centre.




Pie chart 2 above shows that 35 and 11 women respectively had Cephalopelvic disproportion (CPD) and Abnormal lie/presentation as the cause of the obstruction.

**Table 2: Foetomaternal outcomes**

| Factors | Frequency | % |
|---|---|---|
| **FOETAL OUTCOME** | | |
| Birth asphyxia | 11 | 26.8 |
| Neonatal sepsis | 14 | 34.2 |
| Perinatal death | 16 | 39.0 |
| **MATERNAL OUTCOME** | | |
| Anaemia | 8 | 12.3 |
| Wound infection | 11 | 16.9 |
| **DURATION OF INDWELLING CATHETER** | | |
| 7days | 29 | 63.0 |
| 14days | 17 | 37.0 |

Table 2 showed no maternal death recorded. Foetal outcomes included; 26.8% birth asphyxia, 34.2% neonatal sepsis and 39.0% perinatal death. About 63.1% had 7days o find welling catheter while others had14days.

The average hospital stay was 10.7days.

**Table 3: Foetomaternal complications.**

| Factors | Frequency | % |
|---|---|---|
| **COMPLICATIONS** | | |
| Uterine rupture | 3 | 4.5 |
| Sepsis | 3 | 4.5 |
| Postpartum haemorrhage | 3 | 4.5 |
| Wound breakdown | 5 | 7.5 |
| Foetal distress | 8 | 11.9 |
| Intrauterine foetal death | 16 | 23.8 |
| No complication | 29 | 43.3 |
| **MATERNAL DEATH** | 0 | 0 |

**Table 3** shows that 23.8% of the women suffered intrauterine fetal death, and 11.9% had fetal distress, while 7.5%, 4.5%, and 4.5% of the women had wound infection, uterine rupture, and puerperal sepsis, respectively.

## DISCUSSION

The prevalence of obstructed labour in this study was 1.2%. This was comparable to 1.2% in Ekiti and similar to 1.79% recorded in Usmanu Danfodiyo University Teaching Hospital Sokoto and 1.71% in Pakistan. It was slightly lower than 2.7% in Enugu, Nigeria, and far lower than 14.1% in Rivers State, Nigeria, and 18.1% in Ethiopia. The low prevalence in this study may be due to the widespread availability of secondary facilities in the state where caesarean deliveries can be performed.

Most women were aged 30 to 34 years, and the majority had secondary education and resided in urban areas. This finding aligns with studies in Rivers State, Nigeria, but differs from other studies. About 47.8% of the parturients were nulliparous, which may be due to their untested pelvises. This is consistent with similar studies conducted in Nigeria, Pakistan, and Ethiopia but contrasts with studies done in other regions of Nigeria. A high occurrence of obstructed labour was found among the unbooked (95.7%), likely due to late recognition of obstruction in labour and subsequent referral, often influenced by traditional practices like home delivery and unsupervised antenatal care.

Public enlightenment and health education, compulsory basic education, and integrating reproductive health education into secondary school curricula can help women make better health-related choices. Overcoming traditional barriers through education and women's empowerment could encourage greater utilization of antenatal care and delivery services.

More than half of the parturients (52.2%) were initially managed by traditional birth attendants before being referred, consistent with a study in South-Eastern Nigeria. To prevent obstructed labour, it is essential to ensure emergency obstetric care services, use the partograph to monitor labour progress, advocate for girl education, prevent early marriages, provide adequate nutrition, and strengthen community structures against unskilled maternity care.

Cephalopelvic disproportion and malpresentation were common causes of obstructed labour, consistent with other studies but different from a study in India, where malpresentation was the major cause. This discrepancy may be due to poor supervision and the inability to recognize cephalopelvic disproportion.

This study showed that emergency caesarean section was used to relieve the obstruction in all parturients, often due to its perceived safety when the fetus is alive. Destructive delivery was not performed during the study, likely due to the procedure's unpleasantness. The study revealed that obstructed labour contributed to poor perinatal outcomes, similar to findings in Sokoto but different from studies in Maiduguri, Angola, and India. Early referral and prompt, specialized emergency care likely contributed to the lack of maternal complications and the absence of obstetric fistulas.

**LIMITATION:** Difficulties in retrieving data at the special care baby unit.

**CONCLUSION:** The prevalence of obstructed labour in this study is low. The common causes were cephalopelvic disproportion and abnormal lie/presentation, predominantly occurring among the unbooked. The primary fetal outcome was perinatal death, and the common maternal complication was wound breakdown.

**AUTHOR CONTRIBUTIONS:** Author AG conceptualized the study, developed the proforma, and drafted the manuscript. Authors ASW and AMG retrieved the folders, Author CTA entered the data into

the proforma, and Author FAE analyzed the data. Author IEH proofread the manuscript and made corrections. All authors read and approved the final draft.

**CONFLICT OF INTEREST:** The authors declare that there is no conflict of interest.

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**ETHICAL APPROVAL:** Ethical approval with approval number 766 was obtained from the ethical committee of the Federal Medical Centre, Yenagoa, Bayelsa State.

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# Intimate Partner Violence During Pregnancy in Yenagoa, Southern Nigeria

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## ABSTRACT

*Background: Intimate partner violence (IPV) perpetrated against women during pregnancy is quite common, and it could lead to psychological or emotional trauma, and physical injury to both mother and fetus.*

***Objectives:*** *To determine the prevalence and pattern of IPV perpetrated against women during pregnancy in Yenagoa.*

***Methodology and subjects:*** *This is a cross-sectional study of 640 booked parturient who received antenatal care at Niger Delta University Teaching Hospital (NDUTH) in Yenagoa. The participants were interviewed using a well structured interviewer administered questionnaire. Information obtained were patients bio-data, and issues related to IPV, such as: physical or emotional violence, sexual abuse, verbal violence, social violence, financial deprivation, and complications of IPV.*

***Results:*** *The prevalence of IPV during pregnancy was 65.6%, and the chances of having IPV was twice higher during pregnancy compared to non pregnant women, odd ratio = 2.96[2.36 – 3.71], p = 0.001 The most perpetrated act was social violence (44.1%), especially infidelity (20.6%). Next was financial deprivation (40.5%), predominated by taking control of the wife's financial resources (20.0 %). Verbal violence was next (38.8%), especially name calling (24.1%). Physical violence was 22.5%, and slapping (12.5%) was the most common form of physical violence; only a handful of the*

*women (2.5%) were attacked with weapons. The least perpetrated act was sexually abuse (13.1%), mostly sexual deprivation as punishment (7.3%).*
*The complication rate from IPV was 13.5% (predominantly mild physical injuries), and only 1.2% reported IPV to police.*

***Conclusion**:*
*IPV during pregnancy is quite common in Yenagoa, and a great majority of the women suffer in silence, even in the face of complications. Public enlightenment and advocacy by women right groups and activists are recommended.*

**KEY WORDS:** Intimate partner violence, pregnancy, Yenagoa, Southern Nigeria

## INTRODUCTION

Violence is any behavior that causes physical, sexual or emotional harm or causes a person to live in fear. [1, 2] Domestic violence or Intimate partner violence (IPV) is widely believed to be used by the perpetrators to subdue or control their partners to subordination. [2,3]

According to the World Health Organization (WHO), IPV refers to any behavior by an intimate partner or ex-partner that causes physical, sexual or psychological harm, including physical aggression, sexual coercion, psychological abuse and controlling behaviors. [2]

Evidence from some centers suggests that the rate of IPV increases during pregnancy; a collaborative study at Gulu University in Uganda, and University of New South Wales (UNSW), Sydney, Australia reported that the rate of IPV increases by 26.7% - 35.9% during pregnancy. [4] Reports also indicate that the rate of IPV during pregnancy is quite high in many centers globally; 50.8% in Mina Governorate in Egypt, [5] 30% in Putalibajar in Nepal, [6] 34.6% in Sao Paulo, Brazil, [7] 32.2% in Ethiopia, [8] 43·4% in Portugal [9] and 34.9% in Port Harcourt, Nigeria. [10] However, in Sweden, the reverse is the case; the rate is as low as 2.1%. [11]

Various forms of IPV have been perpetrated against women, and they are broadly classified as economic or financial exploitation, sexual, physical, and psychological or emotional abuse. [1,2]

According to legal experts, physical abuse refers to any deliberate action that causes harm or injury to another person, such as use of physical force; hitting, kicking, and beating. While sexual abuse is the use of force or taking sexual advantage of a victim, such as sexual assault, rape, or unsolicited physical contact of a sexual nature. [12]

Psychological abuse is defined as a recurring pattern of degrading or humiliating behavior towards a victim, with the intent to cause anguish, distress, or intimidation through verbal or non-verbal actions, as well as denial of basic civil rights, and it includes: repeated insults, ridicule, name-calling, or threats aimed at causing emotional pain. [12,13]
Economic or financial abuse is defined as unreasonable deprivation of economic or financial resources that a victim is entitled to under the law, or requires for basic needs. It occurs when one intimate partner has control over the other partner's access to economic resources, thereby diminishing their ability to support themselves and forcing them to depend on the perpetrator financially. [12,13]

Evidence from a meta-analysis of 92 independent studies on IPV during pregnancy revealed that the rate of sexual abuse was 8.0%, emotional abuse was 28.4%, and physical abuse was 13.8%. [14] A multicentre study in Egypt reported the rates as 41.7% for verbal abuse, 45.4% for emotional abuse, 30.2% for physical, and 20.0% for sexual abuse.[5]

By far, the male partners are the culprits, while the females are usually at the receiving end. A study in the UK reported that the commonest factor associated with IPV is the male partner, accounting for 81% of the cases. [15] Other risk factors include: drug and alcohol abuse, antisocial personality disorders, low educational background and emotional insecurity, low socioeconomic status, suspicion of infidelity and jealousy partner, and being a youth. [15,16]

Regarding injuries sustained following IPV, studies have revealed that during pregnancy, the most common is blunt abdominal injury; the abdomen is more vulnerable, and most likely to be struck. [15] A study on blunt abdominal trauma during pregnancy reported assault as the most common etiological factor. [17] Other injuries commonly sustained are head injuries, fractures, and bruises. [18] Severe head injuries could lead to neurological impairment, and severe intra-abdominal hemorrhage could lead to maternal and fetal death. [18]
Besides physical injuries, other maternal complications commonly reported are psychological trauma, such as depression, anxiety and post traumatic stress disorder. [18,19]

Trauma to the fetus is also common, and mainly from physical injuries. Blunt abdominal injury could cause severe hemorrhage and abruptio placenta, which is a major cause of intra-uterine fetal death. [20] It could also lead to miscarriage, [21] premature rupture of fetal membranes, preterm birth and complications of prematurity, such as low birth weight. [19,20]
Domestic violence during pregnancy is quite common globally, and various studies have been done on this subject matter, including Nigeria. However there are no publications on this issue in Yenagoa, Southern Nigeria, hence the need for this study.

The objective of this study is to determine the pattern of IPV perpetrated against women during pregnancy in Yenagoa, using NDUTH as a case study. Specifically, it would determine the types and scope of violence, such as: physical or emotional violence, sexual abuse or exploitation, social and verbal violence, and financial deprivation. It would also determine the socio-demographic characteristics, and the complications associated with IPV during pregnancy.

## METHODOLOGY

The study was a cross-sectional observational study of 640 booked parturient who received antenatal care, from October 2023 to March 2024, and was carried out at the antenatal clinic, department of obstetrics and gynaecology, NDUTH, Yenagoa, Nigeria.

Included in this study were pregnant women who registered for antenatal care in NDUTH, were fit enough to be interviewed, and consented to participate in the study. Excluded were unbooked pregnant women, and those who were not fit to be interviewed.

Adequate counseling with detailed explanation of IPV was done. The patients were given enough time to ask questions, and areas where they did not understand were clearly explained using simple and unambiguous terms. Written consent was obtained from those who accepted to participate.

**Sample size**

An appropriate sample size for descriptive study was obtained using WinPepi software version 11.65 for windows. Using 95% confidence interval, acceptable difference of 0.05, and assumed prevalence of 43% (0.43) base on a previous study in Enugu in Nigeria [22], and an expected loss of subjects of 10% (attrition), a minimum sample size of 420 was obtained. In order to boost the power of the study, and make it more robust, the sample size was increased to 640.

**Sampling technique**

Simple random sampling technique was employed to recruit patients into this study. The NDUTH antenatal clinic registry recorded an annual attendance of 4760 patients in 2023, giving a monthly attendance of about 397 women. The daily attendance (5 working days a week) was about 20 antenatal patients. Using Winpepi statistical software, 20 random numbers were generated, and assigned for each patient. About 10 alternate numbers were picked per day, and the corresponding patients who met the inclusion criteria, and signed informed consent were selected. This was done until the sample size of 640 was completed.

**Data collection:**

Data was collected by using a semi-structured interviewer administered questionnaire. A team of 8 resident doctors, and the researcher was recruited for data collection exercise. They were in charge of the daily patients' interview, and filling of the questionnaire. The doctors were educated on gender violence, the study, and the questioner. They were also taught how to explain to the patients in simple and clear terms, and how to respond to questions.

Data collection was based on the following subheadings: husbands' personal behavior, physical or emotional violence, verbal violence, sexual, social, and financial abuse. Also collected were the effects and complications of IPV during pregnancy.

Information on the husbands' personal behavior was: whether he was aggressive, hot tempered, arrogant, drugs and alcohol addiction, and tendency to dominate his wife.

Data on physical or emotional violence obtained were: history of slapping, hitting, kicking, pushing, biting, pinching, chocking, hair pulling and use of dangerous weapons.

Information on verbal violence was: Name calling, repeated harassment, intimidation, treats including using weapons, and talking down in a derogatory manner.

Sexual abuse data collected include: forcing partner to have none-consensual sex, engagement in sexual acts not acceptable and sexual deprivation as punishment.

Data on social violence was: stopping the wife from visiting or receiving friends, prevention from visiting children (for divorced women), prevention from reporting violence to police or family members, engagement in marital infidelity such as having girlfriends, and tendency to get upset when stopped.[12,13]

Financial violence data include: deliberate deprivation of funds, not giving enough money, and taking absolute control of the wife's financial resources.[12,13]

Data on pregnancy complications were: history of physical injuries, miscarriage, severe abdominal pain, premature labour, hypertension in pregnancy, and increased alcohol consumption.

Other related information: whether violence was reported, and to whom. Whether IPV started before pregnancy, during pregnancy, and whether it increases during pregnancy.

**Data analysis**

Data collected from each subject was entered into SPSS version 25 spread sheet, and EPI info version 7 software, and analyzed. Results were presented in tables as rates, proportions, and mean with standard deviation. Test of significance was by odds ratio. Confidence interval was set at 95%, and statistical significance was set a p values ≤ 0.05.

**Ethical Approval**

Ethical approval for this study was granted by the NDUTH ethical committee, with registration number NDUTH/REC/0033/2024. Ethical concerned were properly addressed, including confidentiality, dignity, and the right to withdraw from the study at anytime.

## RESULTS

TABLE 1: BIODATA OF THE WOMEN

| Variable | Number (N = 640) | Percentage (100%) |
|---|---|---|
| **Maternal age** | | |
| = 19 years | 35 | 5.5% |
| 20-24 years | 88 | 13.8% |
| 25-29 years | 248 | 38.8% |
| 30-34 years | 188 | 29..2% |
| = 35 years | 81 | 12.7% |
| **Parity** | | |
| Para 0 | 212 | 33.1 |
| Para 1-4 | 388 | 60.6 |
| = para5 | 40 | 6.3 |
| Tribe | | |
| Ijaw | 377 | 59.0% |
| Igbo | 159 | 24.8% |
| Yoruba | 68 | 10.6% |
| Hausa | 36 | 5.6% |
| **Religion** | | |
| Christian | 592 | 92.5% |
| Muslims | 48 | 7.5% |

| Variable | Number (N = 640) | Percentage (100%) |
|---|---|---|
| **Educational level** | | |
| None formal | 0 | 0.0% |
| Primary | 5 | 0.8% |
| Secondary | 245 | 38.3% |
| Tertiary | 390 | 60.9 % |
| **Occupation** | | |
| Employed | 212 | 33.1% |
| unemployed | 428 | 66.9% |
| **Gestational age** | | |
| 1st trimester (= 12 weeks) | 52 | 8.1% |
| 2nd trimester (13 – 36 weeks) | 325 | 50.8% |
| 3rd trimester (37 – 42 weeks) | 263 | 41.1% |

The mean maternal age was 30.13 ± 5.44 years, the minimum age was 18 years, and the maximum was 42years. The mean gestational age (GA) was 27.7±9.48 weeks; the minimum was 8 weeks, and the maximum GA was 41 weeks.

Majority of the participants 248(38.8%) were 25 – 29 years old. They were predominantly multiparous 60.6%, and from Ijaw tribe 59.0%. Most (60.9%) attained tertiary education, and were predominantly Christians 92.5%. However, the unemployment rate among the women was quite high (66.9%).

**TABLE 2: EXPERIENCE WITH IPV, AND THE TYPE AMONG THE WOMEN**

| Question | Yes | Percentage | No | Percentage |
|---|---|---|---|---|
| **Knowledge and experience with IPV** | **N = 640** | **100%** | | |
| I have previous knowledge of domestic violence | 484 | 75.6% | 156 | 24.4% |
| I have personally experienced IPV during pregnancy | 420 | 65.6 % | 220 | 34.4% |
| I have experienced IPV out side pregnancy | 251 | 39.2% | 389 | 60.8% |
| My husband becomes more aggressive during pregnancy | 16 | 2.5% | 624 | 97.5% |
| **Type of violence experienced during pregnancy** | | | | |
| Physical | 144 | 22.5% | 276 | 43.1% |
| Verbal violence | 248 | 38.8% | 172 | 26.9% |
| Sexual abuse | 84 | 13.1% | 336 | 52.5% |
| Social abuse | 282 | 44.1% | 138 | 21.6% |
| Financial deprivation | 259 | 40.5% | 161 | 25.2% |
| **Pattern of reporting IPV** | | | | |
| I have reported an act of intimate partner violence | 56 | 13.3% | 364 | 86.6% |
| If yes, I reported to who | | | | |
| Family members | 39 | 9.2% | | |
| Religious leader, such as pastor | 9 | 2.1% | | |
| To police | 5 | 1.2% | | |
| Friends | 3 | 0.7% | | |

A total of 420(65.6 %) women experienced IPV during pregnancy, and 251(39.2%) women had the experience when they were not pregnant. The chances of having IPV during pregnancy was twice higher, odd ratio = 2.96[2.36 – 3.71], p = 0.001. However, only 16 women (2.5%) admitted that their husband become more aggressive during pregnancy.

The most perpetrated act of violence experienced in Yenagoa was social violence (44.1%), followed by financial deprivation (40.5%). The prevalence of verbal violence was 38.8%, physical or emotional violence was 22.5%, significantly more women in Yenagoa experienced verbal to physical violence, odd ratio = 0.46[0.36 – 0.59], p = 0.0001. The least type of IPV was sexual abuse in 13.1%.

A great majority of women in NDUTH (86.6%) bear the burden of IPV alone without reporting to anyone and only a handful (1.2%) reported to the Nigerian police. However some women 78(9.2%) complained to their relatives, and 2.1% with their religious leaders, such as pastors.

**TABLE 3: MARITAL ISSUES AMONG THE WOMEN, AND HUSBAND'S TEMPERAMENT**

| Variable | Yes | Percentage | No | Percentage |
|---|---|---|---|---|
| **Marital issues** | **N = 640** | **100%** | | |
| I am married | 600 | 93.7% | 40 | 6.3% |
| I am living with my husband | 548 | 85.6% | 52 | 8.1% |
| For how long have you been married? | | | | |
| < 5 years | 404 | 63.1% | | |
| 5 -10 years | 140 | 21.9% | | |
| 10 – 15 years | 44 | 6.9% | | |
| > 15 years | 12 | 1.9% | | |
| **Previously divorced women** | **N = 640** | 100% | | |
| I am previously divorced | 60 | 9.4% | 580 | 90.6% |
| If yes, please answer the following questions | | | | |
| I have children with my previous husband | 32 | 5.0% | 28 | 4.4% |
| Husband grants me free access to visit my children | 21 | 3.2% | 39 | 6.1% |
| Free access for my children to visit me | 7 | 1.1% | 53 | 8.2% |

| Variable | Yes | Percentage | No | Percentage |
|---|---|---|---|---|
| **Husband or spouse temperament** | **N = 640** | **100%** | | |
| Your husband or spouse is hot tempered | 148 | 23.1% | 492 | 76.9% |
| He is very jealous | 212 | 33.1% | 428 | 66.9% |
| He is very arrogant | 24 | 3.8% | 616 | 96.3% |
| He is an aggressive person | 16 | 2.5% | 624 | 97.5% |
| He like to dominate you all the time | 52 | 8.1 | 588 | 91.9% |
| He is addicted to alcohol | 395 | 61.7% | 245 | 38.3% |
| He is addicted to hard drugs, like cannabis, cocaine etc | 10 | 1.6% | 630 | 98.4% |

Majority of the women (93.7%) are married, 85.6% lives with their husbands, and 9.4% were previously divorced..4%)
Out of the 60 divorced women, 21(3.2%) were allowed to visit their children at the homes of their previous husbands, while 39(6.1%) were not, the difference was statistically significant, odds ratio = 2.22(1.31- 3.71), p = 0.004.

Only a handful 7(1.1%) of the husbands allow the children above to visit their mothers at their homes (the home of the current husband). The chances of not granting such permit is 4 times higher, Odds ratio = 4.0[1.55, 10.33], p = 0.002.

**TABLE 4: EXPERIENCE WITH PHYSICAL AND VERBAL VIOLENCE**

| Question | Yes | Percentage | No | Percentage |
|---|---|---|---|---|
| | yes | no | | |
| **Physical and emotional violence** | **144** | **22.5%** | | |
| He has attacked me with a weapon | 32 | 2.5% | 112 | 17.5% |
| He has destr oyed any of my belongings | 56 | 4.3% | 58 | 9.1% |
| Husband engaging wife in any of the following acts | | | | |
| Slapping | 95 | 12.5% | 49 | 7.7% |
| Kicking | 10 | 0.8% | 134 | 20.9% |
| Pushing | 8 | 0.6% | 136 | 21.3% |
| Hitting | 7 | 0.5% | 137 | 21.4% |
| Biting | 6 | 0.6% | 138 | 21.6% |
| Pulling of hair | 4 | 0.3% | 140 | 21.9% |
| Choking | 2 | 0.3% | 142 | 22.1% |
| Pinching | 2 | 0.2% | 142 | 22.1% |
| **Verbal violence** | **248** | **38.8%** | | |
| He has repeatedly harass me to make me scared | 56 | 8.7% | 192 | 30% |
| He unnecessarily scold me | 96 | 7.5% | 152 | 23.8% |
| He frequently despise me | 104 | 16.3% | 144 | 22.5 % |
| He calls me names when he is angry | 154 | 24.1% | 94 | 14.7% |
| He has threatened to use weapon on me | 40 | 6.3% | 208 | 32.5% |

Slapping 12.5% was the most common form of physical violence, followed by destruction of belonging (4.3%). Only a handful of the women (2.5%) were attacked with weapons.

Regarding verbal violence, name calling (24.1%) was predominant, followed by despise (16.3%), repeated harassment (8.7%). unnecessary scolding (7.5%), and threat to use weapon was least (6.3%).

**TABLE 5: SEXUAL ABUSE, SOCIAL AND FINANCIAL DEPRIVATION**

| Question | Yes | Percentage | No | Percentage |
|---|---|---|---|---|
| | yes | no | | |
| **Sexual abuse** | **84** | **13.1%** | | |
| He forces me to have sex | 32 | 5.0% | 52 | 8.1% |
| He make me afraid to say no to sex | 8 | 1.3% | 76 | 11.9% |
| He deprive me of sex as punishment | 54 | 8.4% | 30 | 4.7% |
| He forces me to do sexual acts that i don't like | 3 | 0.5% | 81 | 12.7% |
| **Social violence** | **282** | **44.1%** | | |
| He prevents me f rom seeing my friends and family? | 61 | 9.5% | 221 | 34.5% |
| He prevent me from seeing health workers or police | 28 | 4.4% | 254 | 39.7% |
| He prefer to eat outside, instead of my food when upset | 95 | 14.8% | 187 | 29.2% |
| He is infidel (has girlfriends) | 128 | 20.0% | 154 | 24.1% |
| He gets upset when i stop him from having girlfriends | 67 | 10.5% | 215 | 33.6% |
| **Financial deprivation** | **259** | **40.5%** | | |
| He deliberately deprive me of money | 84 | 13.1% | 175 | 27.3% |
| I ask for money all the time before he gives me | 72 | 11.3% | 187 | 29.2% |
| He takes cont rol of my financial resources | 128 | 20.0% | 131 | 24.5% |
| He blames me for not making good financial contribution to the family | 25 | 3.9% | 234 | 36.6% |

The most perpetrated sexual abuse was sexual deprivation as punishment in 7.3%, and forceful intercourse in 5.0%.

Regarding social violence, infidelity was the most common act (20.6%), while in 10.5% the husbands got upset when confronted by their wives. When upset, 14.8% of the men stop eating food cooked by their wives, and preferred to eat outside. In 9.5%, the women were prevented from visiting their friends.

With respect to financial deprivation, taking control of the wife's financial resources was most commonly observed (20.0%), followed by deliberate deprivation from access to funds (13.1%).

**TABLE 6: COMPLICATIONS OF INTIMATE PARTNER VIOLENCE IN PREGNANCY**

| COMPLICATION | FREQUENCY (N = 173) | PERCENTAGE (13.5%) |
|---|---|---|
| **Obstetrics complications** | **45** | **7.0%** |
| Severe abdominal pain | 15 | 2.3 % |
| Hypertension in pregnancy | 10 | 1.6% |
| Bleeding in pregnancy | 9 | 1.4 % |
| Miscarriage | 8 | 1.3% |
| Premature labour | 2 | 0.3% |
| Separation of placenta (abruptio placenta) | 1 | 0.2% |
| **Psychosocial complications** | **62** | **9.7%** |
| Increased alcohol consumption | 56 | 8.8% |
| Depression | 6 | 0.9% |
| **Physical injuries** | **66** | **10.3%** |
| Bruises | 35 | 5.5 % |
| Lacerations | 20 | 3.1% |
| Blunt abdominal injury | 9 | 1.4 % |
| Head injury | 2 | 0.3% |
| **Treatment in hospital** | **61** | **9.5%** |
| Outpatient treatment | 42 | 6.6% |
| Hospital admission | 19 | 3.0 % |
| Minor surgery | 21 | 3.3% |
| Major surgery | 1 | 0.2% |

A total of 173 women developed complications secondary to IPV, giving a rate of 13.5%, Forty five women (7.0%) had obstetrics complications, mostly from severe abdominal pain

(2.3%). Increased alcohol consumption was the most predominant psychosocial complication, accounting for 8.8%. Sixty six women (10.3%) sustained physical injuries, predominantly bruises (5.5%), and 61 women (9.5%) received treatment in hospital.

## DISCUSSION

Violence perpetrated against women by their intimate partner is very common, and it is a global health challenge. Apart from the physical injuries sustained by the sufferers, some women suffer severe psychological trauma, marital disharmony, and divorce. [23] During pregnancy, the safety of the fetus is a source of a great concern.

For decades, human right groups, women right activist, WHO, and governments have been battling with IPV, and various legislative measures, acts and law have been enacted to protect women against abuse and brutality by their intimate partners.[24] Despite these interventions, IPV is still persistent and very common. IPV cannot be completely eradicated; anger and aggression are natural components of human instinct, with varying degree of expression from one individual to another. However, it can be limited to the barest minimum, especially in societies with zero tolerance to crime.

In my opinion, the fight against criminality is grossly deficient and inefficient in Nigeria; as a result many perpetrators of crime (including intimate partner violence) go unpunished. This has encouraged them to do more with impunity.

The high rate of IPV of 65.5% we got in Yenagoa was comparable to the 72% obtained from a multicentre study in health centers in Oyo East Local Government in Nigeria.[25]However, much lower rates were obtained in other centers; 37.4% in the Federal capital tertiary Abuja, [26] and 34.9% in Port Harcourt.[10]

Evidence from published articles in Nigeria does not seems to suggest a pattern of violence peculiar to any of the 6 regions, namely North East (NE), North West (NE), North Central (NC), South East (SE), South South (SS), and South West (SW) Nigeria. It could therefore be augured that IPV in Nigeria is not very much influenced by ethnicity, tribe religion and geographical location. In northern states in Nigeria, the most perpetrated act of violence was psychological abuse (66.4%) in Abuja (NC) [26], verbal violence (68.5%) in Jigawa (NE), [27] and 80% physical violence in Jos (NC). [28] In the southern states, the perpetrated violence were: verbal violence [85.5%] in Enugu (SE), [29] psychological aggression (4.8%) in IIorin (SW), [30] verbal violence (43.5%) in Port Harcourt (SS), [31] and from our study in Yenagoa (SS), financial violence (40.5%) was the most perpetrated.

Among the pattern of violence observed in this study, social violence had the highest rate, which is completely at variance with other published articles in Nigeria.[33, 34]

Among the women socially abused in our study, infidelity ranked number one, this is most probably because many of our men are promiscuous. A study in Abakaliki and Enugu (both in Nigeria) reported that 28.0% of married men engage in extra-marital sexual relationships during pregnancy.[33] In addition, as a result of cultural, tribal and religious beliefs, polygamy is highly practiced in Nigeria; a study reported a rate of 33.7%. [34] This has encouraged some married men to have girlfriends (lovers) against the wish of their wives; some have actually imposed these extramarital affairs on their wives. [33,34]

This study has revealed that in Yenagoa, financial violence was commonly employed as a weapon of aggression

against our women; to express anger and displeasure. It seems taking absolute control of the wife's financial resources (and deprivation from access to funds) is usually perceived as a very effective means of forcing the women to submission. Taking into cognizance the economic crises in Nigeria (the high cost of living and the very high (29.90%) inflation rate); it is common knowledge that survival with limited fund under this setting would be highly problematic.[32]

It's not morally right for men to physically assault or beat-up their wives in order to express anger or displeasure. However, our study revealed that quite a significant number of men; up to 22.5% abuse their wives physically in Yenagoa. Luckily, the injuries sustained were minimal, and predominantly bruises. It implies that irrespective of the level of anger our men exhibits, most of them show retrain when it come to the use of weapons; only a handful of men (2.5%) used weapons in this study. This may partly explain why our mortality rate from IPV was 0.0%. The reverse was the case in Jos Plateau State in Nigeria, where the rate of physical violence was 80%. [28]

Sexual abuse does not seem to be fashionable among IPV perpetrators in Yenagoa, as it was the least perpetrated act of violence. This trend tends to cut across most parts of Nigeria; literature search indicates that among the published articles, there is none that sexual violence predominates. The only one that comes close was a study in llorin, where sexual abuse was the second most perpetrated act, accounting for 47.8%.[30].

Though sexual deprivation as punishment was the most common strategy employed by men in Yenagoa, its impact was not remarkable, as the rate was as low as 8.4%. This is because the tendency for some women to request for sex (sexual drive) is said to reduce during pregnancy. [35] A study in Enugu reported that sexual function reduces by 50.7% during pregnancy, and the mean frequency of sex per week declines as pregnancy advances. [35] A collaborative study in Abakaliki and Enugu in Eastern Nigeria on male sexual activity during pregnancy, also reported that male libido reduces by 41.9%, and coital frequency declines by 72.4%. [33]

Negative perception about sex may be another factor; many couples believe that sex during pregnancy is not safe. [36] A study at Nnewi in Nigeria reported that 86.9% of women believe that sex during pregnancy could lead to miscarriage. [36]

Though our complication rate from physical injuries of 10.3% was quite high, the injuries were predominantly mild; bruises and laceration. As a result, our surgical rate was quite low, and no case of fatality was recorded. This was at variance with the result obtained from a study in Jos (in Nigeria), which reported a high mean death rate from IPV of 4.24, involving both mother and fetus. [28]

## CONCLUSION

IPV during pregnancy is quite common in Yenagoa, and a great majority of our women suffer in silence, even in the face of complications. Public enlightenment via the electronics and print media is highly recommended, especially by the women right groups and activists.

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# Prevalence and Risk Factors of Intestinal Helminthinthiasis among Primary School Children in Obio-Akpor Local Government Area of River State, Nigeria.

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***ABSTRACT***

***Background:*** *Intestinal helminthic infections continue to pose a significant global health burden, particularly in tropical and sub-tropical regions. Thus, the prevalence and the risk factors intestinal helminth infections was investigated among primary schools children in Obio-Akpor, Rivers State, Nigeria.*

***Methods:*** *This was a descriptive cross sectional study of three hundred and sixty children, selected using a multistage sampling method. Their stool samples were collected and examined for helminth eggs using Kato- Katz technique and analyzed at the Department of the Medical Microbiology laboratory, University of Port Harcourt Teaching Hospital. Data was analyzed using Statistical Software for Social Sciences version 17.0 (Chicago IL, USA).and a p- value of 0.05 was regarded as statistically significant.*

***Results:*** *Their ages ranged from 5-12 years (mean age of 8.95±1.96 years)and most 229 (62.4%) were female. Twenty of the 367 (5.4%) children were infested with helminths. Three of the 161(1.9%) children resident in an urban community compared to 17 of 206 (8.3%) living in a rural community were infested with intestinal helminths and this was statistically significant($\chi 2$= 7.159; p= 0.007). Multivariate analysis showed that children drinking from wells and streams were ten times at risk of being infected with intestinal helminths.($\beta$=2.320, 95% C I=2.02 to 51.20, p=0.005).*

***Conclusion****: Children who drank from wells and streams were at ten times greater risk of intestinal helminths. Therefore, access to improved water sources and improved personal hygiene should be the main goal in reducing the burden of helminthic infestation.*

**KEYWORDS**: Helminthic infestation, prevalence, risk factor and primary school children

## INTRODUCTION

Intestinal helminthic infections continue to pose a significant global health burden, particularly in tropical and sub-tropical region.[1]Globally, about 4.5 billion individuals are at risk and more than 1.5 billion people become infected. Of these, about 568 million suffer from the infection, most of whom are school-age children.[2] In 2010, it was estimated that 438.9 million people worldwide had hookworm infections, 819.0 million had Ascaris lumbricoides infections, and 464.6 million had Trichuris trichiura[3] These infections affect the poorest and most deprived communities with poor access to clean water, sanitation and hygiene in tropical and subtropical areas, with the highest prevalence reported from sub-Saharan Africa, China, South America and Asia.[4]

Over 260 million preschool-age children, 654 million school-age children and 108 million adolescent girls live in areas where these parasites are intensively transmitted.[4] Transmission could be by ingestion of eggs present in human faeces that contaminate vegetables and water or when children put soil contaminated hands into their mouth.[4] Walking on contaminated soil bare footed also, could get children infected by the macroparasite of hookworm.[4]

Intestinal helminths have been linked with significantly reduced growth and increased risk of protein- energy malnutrition, including growth stunting, iron deficiency anaemia and reduced cognitive/ psychomotor development.[5] They impaired children through direct feeding of the worms on host tissue and blood causing iron deficiency anaemia; increased malabsorption of nutrients causing growth stunting; chronic intestinal blood loss that can result in anaemia, and loss of appetite and reduction of nutritional intake and physical fitness.[4]

Studies [6,7] in Nigeria have identified a common triad of transmitted helminth infection: Ascaris lumbricoid, Trichuris trichiuria, and hookworm species.In a study of intestinal helminthiasis, Idowu, et al.[8] in Lagos State, examined 413 stool samples of children and reported that 132 (32%) were positive for soil transmitted helminths (STHs). The three STHs recorded were: Ascaris lumbricoides (50%), Trichuris trichiura (23%) and hookworm (3%). In another study [9] done in Uganda among 432 primary school children aged 6-10 years, the prevalence was 10.9%, 3.1%, 1.95 and 0.3% for hookworm, T. trichiuria, Schistosoma mansoni, and Ascaris lumbricoides respectively.

Scio-economic factors, including low income, poor sanitation, overcrowding, and limited access to clean water, have been linked to increased prevalence of these infections.[10]Reduced prevalence has been associated with improved economic status and access to proper toilet facilities, but hand washing and clean drinking water are equally important for preventing transmission.[11] The high burden of intestinal helminths in Nigeria is due to poor socioeconomic status, which will necessitates the estimation of its prevalence and risk factors.

This study would help determine the prevalence of intestinal helminth infestation and risk factors for helminth infestation among primary school in Obio/Akpor local government of Rivers State. The outcome of this study will raise awareness of the impact of helminthic infestation as a significant aspect of school health, and the significance of effective programs designed to improve the health and hygiene of school-aged children.

## Subjects and Methods

### Study population

All pupils aged 5-12 years in the selected private and public primary schools in Obio/ Akpor Local Government were recruited into the study. Data obtained from Rivers State Ministry of Education show that as at 2009/2010, the estimated number of pupils in primary 1-6 in Obio/Akpor Local Government Area were 106,920. Of these, 23,200 were from private schools and 83,720 from public schools.

This was a cross-sectional study which was carried out among children attending private and publicprimary schools in Obio/ Akpor Local Government Area of Rivers, South-south of Nigeria between September and November 2016.

All children aged 5-12 years in the selected schools and those whose parents/ guardians gave written consent and those who gave assent were included in the study. However, children who had received anthelminthics within three months preceding the date of data collection were excluded.

### Sample size determination

The sample size for this study was calculated based on previously documented prevalence rate of 32.1% among primary school children in a study[12] done in Enugu, South East Nigeria, using the formular.;

Minimum sample size (n) = $\underline{Z^2Pq/d^2}$

WithZ being 1.96 (corresponding to 95% confidence interval)and with a prevalence rate of 0.321 and anacceptable error of 0.05, the minimum sample size plusattrition of 10% calculated was 367.

The schools and the pupils for this study were selected by stratified multistage sampling technique. This selection involved four stages.

One hundred and sixty six schools were stratified into rural and urban schools with assistance of the officials of Ministry of Education. The total number of schools in urban and rural areas was 142 and 24 respectively.

Fifteen out of 142 and 4 out of 24 government-approved schools in the urban and rural areas of the community respectively were randomly selected. The schools in both the urban and rural areas were further stratified into public and private schools through the assistance of the officials of the Ministry of Education.

The total number of schools in the urban area= (33 public schools+ 109 private schools) = 1: 3 .Total number of schools in rural area = (13 public schools + 11 private schools) = 1: 1. Based on the ratio above, five public and fifteen private schools were randomly selected by simple random sampling from the urban schools. For rural schools, two public schools and two private were selected by simple random sampling. The pupils in the selected schools who met the inclusion criteria for the study were sampled based on proportion to size allocation. This was done by selecting the appropriate number from the schools. They were selected via simple random sampling by balloting using school attendance as the sampling frame.

The body weight and height of the pupils were determined using a weighing scale and height pole respectively. Weight was measured using Health scale (Ocean

Medical, England) and read off to the nearest 100g (0.1kg). Scale was adjusted to zero prior to each measurement and calibrated using known weight monthly. Pupils were weighed in their schools with minimal clothing (underpants used for physical training). All the selected pupils were given consent forms to be filled by their parents; those whose parents/ caregivers signed the consent form were given questionnaires and well labeled sample bottles. The number on the questionnaire was the same on the sample bottles. They were to come with the stool samples the next day for submission and measurement of weight and height.

For measurement of height, the subject had to stand straight on a level floor, with their buttocks, shoulders and back of the head touching the wall, with the heels flat and together, shoulder relaxed and arms hanging down, the head erect with eyes looking straight forward and the lower border of the orbit in line with the external auditory meatus (Frankfurt plane). The headpiece, a metal bar was lowered gently, pressing down the hair and height was measured. The pupils were stratified into socio-economic classes (I-V) based on the Oyedeji classification.[13] Socio-economic index scores (one to five) were awarded to each subject, based on the occupational and educational levels of parents. The mean of four scores (two for the father and two for the mother) to the nearest whole number, was the social class assigned to the child. For the study, classes I and II were grouped together as upper social stratum, class III was taken as the middle stratum and classes IV and V as lower social stratum.

The approval of the Ethics Committee of the University of Port Harcourt Teaching Hospital was obtained before the commencement of the study. Notification and permission to carry out the study was obtained from the Rivers State Ministry of Education. Written consent was also obtained from the parents

**Specimen collection and handling**

The stool was collected by the child's parent into a container (universal bottle) provided by the investigator which had already been washed and air-dried. Only stool specimens passed on the collection day were accepted for examination by the investigator under the supervision of the laboratory scientists. This because hookworms' eggs are seen in fresh samples due to their thin wall. The stool samples were properly labelled and carried in cold boxes filled with ice packs to enhance detection of macroparasite of hookworm. They were transported to the Department of Medical Microbiology at University of Port Harcourt Teaching Hospital for analysis within 10 hours of collection. The samples were analyzed by investigators under the supervision of experienced, certified laboratory technicians. The samples that could not be analyzed immediately were preserved using 100% formalin examination on the latter day.

**Microscopic examination**

The cellophane thick faecal smear technique described by Kato and modified by Katz *et al*[14] was used to examine for the parasites. A test kit comprising nylon meshes/ filters, cover-slips of pre-stained cellophane, spatulas, perforated plates and conversion tables for the determination of the number of the eggs per gram of faeces was utilize in the procedure.

To prepare the thick smear, stool was taken with a spatula and placed on a piece of absorbent paper. A nylon mesh was placed over the stool and compressed with the spatula so that part of the stool passed through the mesh. The side of the spatula was used to scrape off the stool that passed through the mesh and deposited into the orifice of the perforated plate already placed on a microscope slide. The stool was smeared into orifice of the plate until it was

full. The spatula was then passed over the perforated plate to remove excess faeces. The spatula and meshes were discarded. The perforated plate was carefully lifted from the slide from one end so that a cylinder of faecal material is left on the microscope slide. A pre-stained cover-slip was then placed on the cylinder of faeces. The preparation was turned upside down on a smooth surface and pressed gently with the thumb over the cylinder of faeces to spread it evenly without spilling. The preparation was allowed to stand for 60 minutes in room temperature before a microscopic examination and counting of ova under x 10 objective lenses magnification of a light microscope was done. All the parasite ova in each slide were identified and counted. To obtain semi-qualitative estimation of the eggs-load, the total number of eggs counted was multiplied by twenty-four to obtain the number of eggs per gram of faeces. Based on eggs per gram of faeces and their association with morbidity, individuals were classified into light, moderate and heavy infestation by World Health Organization.[15] For ascariasis, light infestation is less than 5,000 epg, heavy infestation is greater than 50,000 epg while moderate infestation lies between these figures.[5] For trichuriasis, light infestation is less than 1,000 epg, heavy infestation is greater than 10,000 epg and moderate infestation lies between these figure.[15] For hookworm, light infestation is less than 2,000epg, heavy infestation is greater than 4,000epg and moderate infestation lies between these figures.

**Data analysis**

Data entry was using the Microsoft Excel software and analyzed using version 17.0 of the Statistical Package for Social Scientific software package (SPSS Inc, Chicago, IL). Proportions and ratios were compared using Fisher's exact test and Chi square test. To analyse the intensity of infestation for intestinal helminths, the number of eggs per slide was converted to number of eggs per gram. Student t- test was used to compare the means.

The potential influence of place of residence and other socio-demographic variables on worm infestations was tested using multivariate logistic regression. A p-value of $< 0.05$ was considered to be statistically significant.

## Results

General characteristics

Three hundred and eighty-four pupils (384) were selected to participate in this study. The study was performed on 367subjects, a total of 17 subjects were excluded due to missing data. Of these, 206 (56.1%) were from rural public school and 161 (43.9%) were from urban schools.

Out of 367 children studied, 138 (37.6%) were males and 229 (62.4%) were females giving a male: female ratio of 1: 1.6. The subjects were between 5 and 12 years old, with a mean age of 8.95±1.96 years .Of these, 184(50.1%) were in 8-10 years age group and 92 (25.1%) were in 11-12 years age group. Of these, 281 (76.6%) were from the lower social class, 73 (19.9%) from the middle class and 13 (3.5%) from the upper class. Two hundred and six (56.1%) pupils lived with their parents in the rural area and 161 (43.9%) in the urban area.

**Tab I: Socio-demographic characteristics of the study population**

| Variables (N=367) | Frequency | Percentage (%) |
|---|---|---|
| **Age category** | | |
| 5-7 years | 91 | 24.8 |
| 8-10 years | 184 | 50.1 |
| 11-12 years | 92 | 25.1 |
| **Mean age +SD (years)** | **8.95±1.96** | |
| **Mean weight +SD ( Kg)** | **25.0±7.13** | |
| **Gender** | | |
| Male | 138 | 37.6 |
| Female | 229 | 62.4 |
| **Social class** | | |
| Upper (I-II) | 13 | 3.5 |
| Middle(III) | 73 | 19.9 |
| Lower(IV-V) | 281 | 76.6 |
| **Place of residence** | | |
| Rural | 206 | 56.1 |
| Urban | 161 | 43.9 |

**Prevalence of helminths**. A total of 20 out of 367 pupils had ova of parasite helminth in their stools. An overall prevalence of 5.4% was recorded.

**Intensity of intestinal helminth infestation among school children**
The intensity of infestation was of light intensity in 14 (70%) and moderate in 6 (30%). No heavy intensity was observed in the study.

Table II shows the prevalence of helminth infestation was 7.6%, 5.4%, and 3.3% in children aged 11- 12 years, 8-10 years, and 5-7 years respectively. There was no statistically significant difference in the prevalence of helminth infestation among age groups ($\chi 2$ =1.651; p = 0.438). The prevalence of helminth infestations was 5.1% in females and 5.7% in males. The two groups were similar ($\chi 2$= 0.061, p=0.805). The prevalence of helminth infestations was 8.3% in children living in a rural areas compared to 1.9% of those living in urban areas. There was a statistically significant difference in the prevalence of helminth infestation between children in rural and urban schools ($\chi 2$= 7.159; p= 0.007).

**Table II: Socio-demographic characteristics and intestinal helminths infestation among school children**

| Variables | Intestinal helminths infestation | | Total n (%) | *Chi* Square/Fisher's exact | *p-value* |
|---|---|---|---|---|---|
| | Infested n (%) | Not infested n (%) | | | |
| **Age category** | | | | | |
| 5 – 7 years | 3 (3.3) | 88 (96.7) | 91 (100.0) | *1.651* | *0.438* |
| 8– 10 years | 10 (5.4) | 174 (94.6) | 184 (100.0) | | |
| 11 – 12 years | 7 (7.6) | 85 (92.4) | 92 (100.0) | | |
| **Gender** | | | | | |
| Male | 7 (5.1) | 131 (94.9) | 138 (100.0) | *0.061* | *0.805* |
| Female | 13 (5.7) | 216 (94.3) | 229 (100.0) | | |
| **Type of school** | | | | | |
| Public | 16 (6.8) | 219 (93.2) | 235 (100.0) | *2.342* | *0.126* |
| Private | 4 (3.0) | 128 (97.0) | 132 (100.0) | | |
| **Social class** | | | | | |
| Upper | 2 (15.4) | 11 (84.6) | 13 (100.0) | ** | *0.127* |
| Middle | 2 (2.7) | 71 (97.3) | 73 (100.0) | | |
| Lower | 16 (5.7) | 265 (94.3) | 281 (100.0) | | |
| **Place of residence** | | | | | |
| Rural | 17 (8.3) | 189 (91.7) | 206 (100.0) | *7.159* | *0.007** |
| Urban | 3 (1.9) | 158 (98.1) | 161 (100.0) | | |

**Statistically significant p<0.05* ***Fisher'*

**Household Characteristics and Intestinal Helminths Infestation among School Children**

Table III shows the household characteristics and intestinal helminthic infestation among school children. The prevalence of intestinal helminthic infestation was 33.0%, 25.0%, 4.9%, and 4.1% in children who drank from wells, streams, taps (pipe-borne water), and boreholes. There was a statistically significant difference in the prevalence of helminth infestation in children who drank from various sources of water ($\chi2 = 9.266$, p=0.023). The prevalence of helminth infestation in children who use pit latrines, open defecation and water cisterns was 8.9%, 7.1%, and 5.0% respectively. There was no statistically significant difference in the prevalence of helminth infestation and the type of toilet ($\chi2 = 1.844$, p=0.555). The prevalence of intestinal helminth was 15.2%, 12.5%, 5.6%, and 3.3% in children whose floors were made of rug, earth, cement, and tiles respectively. There was a statistically significant difference in the prevalence of helminth infestation and home floor

material ($\chi 2 = 8.179$; $p = 0.030$). The prevalence of helminthic infestation was 5.9% among children who did not wear shoes outside the house compared to 4.7% among children that wore shoes. There was statistically significant difference in the prevalence of helminthic infestation in those that wore and those that did not wear shoes outside the house ($\chi^2$=0.222, p = 0.638).

**Table III: Household characteristics and intestinal helminths infestation among school children**

| | **Intestinal helminths infestation** | | | | |
|---|---|---|---|---|---|
| **Variables** | **Infested n (%)** | **Not infested** n (%) | **Total n (%)** | **Chi-square /fisher's exact test** | **p-value** |
| **Source of water in household** | | | | | |
| Tap | 14 (4.9) | 269 (95.1) | 283 (100.0) | *9.266*** | *0.023** |
| Borehole | 3 (4.1) | 71 (95.9) | 74 (100.0) | | |
| Well | 2 (33.3) | 4 (66.7) | 6 (100.0) | | |
| River | 1 (25.0) | 3 (75.0) | 4 (100.0) | | |
| **Treatment of water in household** | | | | | |
| Yes | 11 (6.4) | 162 (93.6) | 173 (100.0) | *0.525* | *0.469* |
| No | 9 (4.6) | 185 (95.4) | 194 (100.0) | | |
| **Type of toilet in household** | | | | | |
| Water cistern | 15 (5.0) | 285 (95.0) | 300 (100.0) | *1.844*** | *0.555* |
| Pit latrine | 4 (8.9) | 41 (91.1) | 45 (100.0) | | |
| Public toilet | 0 (0.0) | 8 (100.0) | 8 (100.0) | | |
| No toilet (open air defecation ) | 1 (7.1) | 13 (92.9) | 14 (100.0) | | |
| **Use of soap for hand was hing after toilet** | | | | | |
| Yes | 15 (5.0) | 283 (95.0) | 298 (100.0) | ** | *0.554* |
| No | 5 (7.2) | 64 (92.8) | 69 (100.0) | | |

*Statistically significant ** Fisher's ex

**Table III: Household characteristics and intestinal helminths infestation among school Children continued**

| Variables | Intestinal helminths infestation | | Total n (%) | Chi-square / fisher's exact test | p-value |
|---|---|---|---|---|---|
| | Infested n (%) | Not infested n (%) | | | |
| **Home floor material** | | | | | |
| Tiles | 6 (3.3) | 178 (96.7) | 184 (100.0) | *8.179* ** | *0.030** |
| Earth | 1 (12.5) | 7 (87.5) | 8 (100.0) | | |
| Cement | 8 (5.6) | 134 (94.4) | 142 (100.0) | | |
| Rug | 5 (15.2) | 28 (84.8) | 33 (100.0) | | |
| **Going outside without shoe** | | | | | |
| Yes | 6 (4.7) | 122 (95.3) | 128 (100.0) | *0.222* | *0.638* |
| No | 14 (5.9) | 225 (94.1) | 239 (100.0) | | |
| **Footwear used at home** | | | | | |
| Shoe | 0 (0.0) | 44 (100.0) | 44 (100.0) | *7.332* | *0.026** |
| Sandal | 17 (8.2) | 191 (91.8) | 208 (100.0) | | |
| Neither | 3 (2.6) | 112 (97.4) | 115 (100.0) | | |

*Statistically significant ** Fisher's exact

**Predictive Factors for Helminth Infection among School Children**.

Parameters with probability values less than 0.05 (place of residence, source of water in household, household floor material, and footwear used at home) were selected into our logistic regression models accordingly to predict relationships with helminth infections (Table IV). Drinking from the well water and stream was the main predictor of intestinal helminth infestation among these children (β=2.320, 95% C I=2.02 to 51.20, p=0.005).

**Table: IV Logistic regression analysis for predictors of intestinal helminths infestation in schoolchildren**

| Independent variables | Coefficient (B) | Odds ratio | 95% Confidence Interval | | P-value |
|---|---|---|---|---|---|
| | | | Lower | Upper | |
| **Place of residence** | | | | | |
| Rural | 1.215 | 3.370 | 0.91 | 12.54 | 0.070 |
| Urban R | | 1 | | | |
| **Source of water in household** | | | | | |
| Well/Stream | 2.320 | 10.176 | 2.02 | 51.20 | 0.005* |
| Tap/Borehole R | | 1 | | | |
| **Household floor material** | | | | | |
| Earth/Rug | 0.981 | 2.668 | 0.89 | 8.02 | 0.081 |
| Tiles/Cement R | | 1 | | | |
| **Footwear used at home** | | | | | |
| Non-sandal use | 1.284 | 3.612 | 0.96 | 13.57 | 0.057 |
| Sandal use R | | 1 | | | |

*Statistically significant R – Reference catego

## Discussion

In this study, the prevalence of intestinal helminths among the primary school children in Rivers State was 5.4%. This was compared to a prevalence of 4.9% found in a study conducted in Enugu, Nigeria[16], but it was lower than that of a similar study in the same local government with a prevalence of 30.7%.[17] This difference in prevalence of intestinal helminths may be due to the use of different methods in analyzing stool samples. The formol-ether concentration technique was employed by Odu et al[17]. Formol - ether concentration technique is believed to have a sensitivity that is 15 to 50 times greater than the direct method.[18] These variable rates in prevalence between this index study and Odu et al may be a reflection of the timing and geographical differences when the studies were carried out. The index study was carried out between September and November, while the study by Odu et al covered the entire year.

In this study, Trichuris trichiura was the aetiological agent that was most prevalent. This was similar to the findings of the study[17] done in the same local government, but in contradiction to other previous studies in Nigeria.[19,20] While in past decades, both species of Trichuris trichiura and Ascaris lumbricoide were thought to be distributed somewhat similarly, more recent estimates indicate an increasing predominance of Trichuris trichiura.[21]

De Silva et al,[21] in their important update on the global prevalence of soil-transmitted helminth, estimated 100 million cases of trichuriasis and 84 million cases of ascariasis in the Latin American and Caribbean (LAC) region. The reasons behind the current preponderance of Trichuris trichiura infestations remain unclear. One plausible explanation is that

the widespread use of single-dose albendazole for de-worming campaigns in endemic countries has been less effective in reducing trichuriasis as this parasite is less susceptible to this drug.[22]

In this study, the intensity of helminthic infestations was primarily of light infestations. This is similar to that of previous workers [23] in Enugu, but contrast to a study done in Osun, Nigeria.[19] The differences are probably due to variations in study sites and methodologies applied. In this study, stool analysis was done using the Kato-Katz method, which is different from the Stoll's dilution egg-count technique employed in the Oninla et al.study.[19] The Stoll dilution technique is associated with higher intensity.[24]

The prevalence of helminth infestation in this study is significantly influenced by the types of household floors. Improved household floor was associated with a lower prevalence of helminth infestation. Improved household floors like cement and tiled surfaces are easy to clean and may not be damp, which makes them a hard surface for parasite ova to survive and proliferate. This finding suggests that improved household floors such as cement and tiled surfaces hold promise as an environmental intervention to reduce helminth infestation transmission among children in low-resource settings.[25] A random-effects meta-analysis suggested that households with improved floors had 0.75 times the odds of infection with any type of enteric or parasitic infection compared with households with unimproved floors.[25]

In this study, children who reside in urban communities were less than three times as likely to be infested with intestinal helminths as those who reside in rural communities. This is consistent with a study done in Ibadan, Nigeria.[19] Rural communities have been known to be associated with potential risk factors that favour the transmission of helminth infestations. For instance, the proportion of the Nigerian population with access to an improved water source is higher in urban than in rural areas.[26] However, these findings disagree with a study done in southern Malawi, where pupils from urban areas were more than four times infected with intestinal helminths than their rural counterparts.[27]This disparity is due to potential risk factors for intestinal helminthic infestations that is present in the communities. These include having pools of waters and sewage around the houses, not wearing shoes and low socioeconomic status.[27]

The findings from multivariate analysis demonstrated that children who drank from wells and streams had ten times the risk of being infected with intestinal helminths. This agrees with another study [28] in Port Harcourt, Nigeria. This disparity may be due to contaminated soil particles that are washed into open wells and streams. When water is drawn from these wells and streams and used by households without boiling or treating it, households are infected by ingestion of helminth eggs.[29]

## Conclusions

This study found a low prevalence of intestinal helminths, with a light intensity of intestinal helminths. The risk of intestinal helminth infection was ten times greater for children who drank from wells and stream.

## Recommendations

Provision of pipe-born water should be available made in the communities and schools. A single dose of Albendazole should not be used for routine deworming where there is a high prevalence of Trichuris trichuris.

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**Conflict of Interests**
The authors declare that there is no conflict of interests regarding the publication of this paper.

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